

**CITY OF WINFIELD
PUTNAM COUNTY, WEST VIRGINIA**

**CONTRACT NO. 2 – WINFIELD WASTEWATER TREATMENT PLANT SBR
EQUIPMENT (VENDOR BID)**

JANUARY 16, 2020

ADDENDUM NO. 2

To whom it may concern:

A. BOILER PLATE

1. Bid Opening for Contract #1 **HAS BEEN MOVED TO** February 4, 2020 at 2:00 p.m. at the City of Winfield, 12448 Winfield Road, Winfield, WV.
2. Bid Opening for Contract #2 will **REMAIN** on January 28, 2020 at 2:00 p.m. at the City of Winfield, 12448 Winfield Road, Winfield, WV.

B. SPECIFICATIONS

1. **DELETE** Section C-410 – Bid Form in its entirety and **REPLACE** with the attached Section C-410 – Bid Form
2. **DELETE** Section 463333 – “Sequencing Batch Reactor System” in its entirety and **REPLACE** with the attached Section 463333 – “Sequencing Batch Reactor System”

C. DRAWINGS

1. NOT APPLICABLE

D. QUESTIONS AND CLARIFICATIONS

The following are clarifications and responses to questions posed by Contractors and suppliers regarding the above referenced project.

1. **Question:** Are pre-cast concrete Sequencing Batch Reactor basins acceptable?

Answer: Yes, page 4 of the Bid Form has been updated so the Contractor can specify whether their bid includes pre-cast post-tension or cast-in-place concrete basins. Specification Section 034100 “Precast Structural Concrete” has been added for Precast Structural Concrete.

2. **Question:** Spec Section 463333 – “Sequencing Batch Reactor System” references Dezurik valves with Rotork actuators. Are Milliken and Milliken/Auma combinations acceptable?

Answer: Yes.

3. **Question:** Specification 463333 Part 2.04 states Decanter Restrained Mooring System (Part F) and Stainless Steel Dewatering Support Posts (Part G) refer to schedule 40 stainless steel. Is this correct?

Answer: Section 463333 – “Sequencing Batch Reactor System” Part F and Part G have been revised to call for schedule 10 stainless steel posts.

4. **Question:** Based on the quoted blower temperature, a viton seat will be required. As the listed valve manufacturers are not available with the viton seat, is an ABZ valve acceptable product?

Answer: Yes.

5. **Question:** Section 463333 – “Sequencing Batch Reactor System” Part 2.29.B 11, 12, and 13 indicates that the Variable Frequency Drives, Transformers, and Transformer Primary and Secondary Fuses require three-phase power but Part 2.29.A indicates the SBR Control Panel should be 120 volt single phase power. Could you please clarify what needs to be supplied?

Answer: The SBR Control Panel will be 120 volt single phase power. The Variable Frequency Drives, Transformers, and Transformer Primary and Secondary Fuses are to be provided as part of Contract #1. Paragraphs 2.29.B.11, 2.29.B.12, and 2.29.B.13 have been removed from the specification section.

6. **Question:** Section 463333 – “Sequencing Batch Reactor System” Part 2.29.B.18 calls for a Three-Phase Type 1 Surge Protective Device. Should a single-phase equivalent be provided?

Answer: Yes. Part 2.29.B.18 has been corrected to reference single-phase type 1 surge protection.

7. **Question:** Is any proposal information or scope drawings required when submitting a bid for this project?

Answer: Paragraph 7.01 of the Bid Form has been edited to state that a design proposal and scope drawings are required to be included in Envelope #2 with the Bid Form.

E. GENERAL

1. Last day for receiving Contractor questions for Contract #2 will be the close of business, Friday, January 17, 2020.
2. B&O Taxes are required for Prime Contractor and any Sub-Contractor. B&O Rate is 1.0%, Building Permit Cost is 0.9%.
3. A City Building Permit IS required for this project. Contract Licenses run from June 30 to June 30 at \$90. The initial year will be pro-rated.
4. American Iron and Steel (AIS) requirements DO apply to this project.
5. The Engineer’s cost estimate for this project is \$900,000.00.

6. Bidders are hereby notified to acknowledge receipt of all addenda in space provided on the Bid Form.

If you have any questions or need any other information, please do not hesitate to contact me.

Sincerely,

THE THRASHER GROUP, INC.



COREY SMITH, PE
Project Manager



Enclosures

**CITY OF WINFIELD
PUTNAM COUNTY, WEST VIRGINIA
PROPOSED**

**CONTRACT #2 – WINFIELD WASTEWATER TREATMENT PLANT SBR EQUIPMENT
(VENDOR BID)**

THRASHER PROJECT #101-020-1559

BID FORM

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

*City of Winfield
12448 Winfield Road
Winfield, WV 25213*

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER’S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER’S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

Addendum No. **Addendum Date**

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work and including all AIS requirements.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect

to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

- E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.
- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.
- G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.
- H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

- A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
- B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
- C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and
- D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
 4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

GENERAL

The Bidder shall take notice of and shall be responsible for any local or state taxes levied and applicable, and the cost for the same shall be included as part of the submitted Bid.

The total Bid cost stated includes a complete operating installation including furnishing and installation of any and all changes or additions in plans, piping, mechanical work, additional electrical work, accessories, controls, etc. necessary to accommodate alternative equipment systems or materials used in construction.

BID PROPOSAL

The Bidder agrees to perform all required Work described in the detailed Specifications and as shown on the Plans for the complete construction and placing in satisfactory operation the City of Winfield Wastewater Treatment Plant SBR Equipment. The Project "Sequence of Construction" has been detailed in the Drawings and Specification Division 1, Project Summary, Section 011000. The Bidder agrees to perform all the Work proposed for the total of the following Bid prices.

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

**PROPOSED
CONTRACT #2 – WINFIELD WASTEWATER TREATMENT PLANT SBR EQUIPMENT
(VENDOR BID)
FOR THE

CITY OF WINFIELD
PUTNAM COUNTY, WEST VIRGINIA
THRASHER PROJECT #101-020-1559**

BID SCHEDULE

NOTE: Bid Unit PRICE amounts are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern. Bids shall include sales tax and all other applicable taxes and fees.

Item	Quantity	Description with Unit Price Written	Unit Price	Total Price
1	LS	To provide all services, materials and operational equipment for two (2) 47ftx47ft SBR Basins, one (1) 47ftx30ft Post-Equalization Basin, one (1) 47ftx16ft Aerobic Digester and all other necessary appurtenances		
			Dollars	
			Cents	

TOTAL BID: _____
(\$ _____)

(Amounts are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.)

NOTE: THE CONTRACTOR'S UNIT PRICES SHALL INCLUDE PURCHASE AND INSTALLATION, COMPLETE IN PLACE, PER BID ITEM IN ACCORDANCE WITH THE DETAILED SPECIFICATIONS.

Bidder acknowledges that (1) each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all unit price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

METHOD OF AWARD

If at the time this contract is to be awarded, the lowest total bid submitted by a qualified, responsible Bidder does not exceed the amount of funds then estimated by the Owner, as available to finance the contract, the construction contract will be awarded. If such bids exceed such amount, the Owner may reject all bids.

The owner may award the contract on the Total Bid submitted by a qualified responsible Bidder less the amount(s) of the Deductive Alternate(s) subtracted in numerical order, as listed in the contract to produce the lowest bid within the funds available for financing.

- A. Unit prices have been computed in accordance with paragraph 13.03.A of the General Conditions.
- B. Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
 - A. Bid Opening Requirements
 - B. Design Proposal and Scope Drawings submitted within Envelope #2

Note: Bid Opening Requirements (BOR-12) includes the American Iron and Steel Certification which needs to be filled out and signed by the Contractor. This certification also references two (2) attachments located in the Supplemental General Conditions (C-800) which were issued as part of RUS Bulletin 1780-35.

ARTICLE 8 – DEFINED TERMS

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

By:
[Signature] _____

[Printed name] _____
(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

Bidder's License No.: _____
(where applicable)

NOTE TO USER: Use in those states or other jurisdictions where applicable or required.

SECTION 463333 - SEQUENCING BATCH REACTOR SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. **SECTION INCLUDES:** The specifications for SBR equipment and controls supplied in this contract under this section supersede specifications for equipment and controls specified elsewhere in the contract documents. Purchased components such as gear reducers, pumps, motors, valves, and actuators shall be provided with standard recommended manufacturers paint, unless otherwise specified within this section.

The SBR area electrical classification shall be rated for Class I Division II Group D. Motors within the basin shall be rated for a temperature code T2A (280 Deg.C).

1.2 BASIN STRUCTURES REQUIRED

A. SBR STRUCTURE

1. The SBR system shall be field erected in two basins as shown in the Contract #1 drawings:

- a. Inside Dimensions: 47.0 ft. x 47.0 ft.
- b. Side Water Depth:
 - Minimum Operating Level: 13.4 ft. SWD
 - Maximum Operating Level: 21.0 ft. SWD
 - Top Of Wall: 23.0 ft.

B. POST-EQUALIZATION BASIN STRUCTURE

1. The Post-Equalization/Holding basin shall be field erected in one basin as shown in the Contract #1 drawings:

- a. Inside Dimensions: 47.0 ft. x 30.0 ft.
- b. Side Water Depth:
 - Minimum Operating Level: 1.5 ft. SWD
 - Maximum Operating Level: 9.4 ft. SWD
 - Top Of Wall: 23.0 ft.

C. AEROBIC DIGESTER/SLUDGE HOLDING BASIN STRUCTURE

1. The Aerobic Digester/Sludge Holding basin shall be field erected in one basin as shown in the Contract #1 drawings:

- a. Inside Dimensions: 47 ft. x 16 ft.
- b. Side Water Depth:
 - Maximum Operating Level: 21.0 ft. SWD
 - Top Of Wall: 23.0 ft.

1.3 SBR DESIGN REQUIREMENTS

A. The manufacturer of the SBR system 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.

B. The jobsite conditions are:

1. 0.5 MGD Avg. daily flow
2. 1 MGD Maximum daily flow
3. Design Loadings

	Influent	Effluent
BOD	300 mg/l	10 mg/l
TSS	260 mg/l	10 mg/l
NH3-N	32 mg/l	
Total Nitrogen		5 mg/l
Phosphorus	8 mg/l	

- C. Wastewater temperature 50°F to 68°F
- D. Jobsite elevation 582 feet MSL
- E. Ambient air temperature 30°F to 85°F
- F. Alpha (maximum value allowed) 0.85
- G. Beta (maximum value allowed) 0.95
- H. F/M ratio 0.075 lb BOD5/lb MLSS - Day
- I. MLSS at low water level 4500 mg/l
- J. Maximum Cycles at Max. Daily Flow 4/day/basin
- K. Oxygen Requirements
 1.25 lbs O2/lb BOD5 applied
 4.60 lbs O2/lb NH3-N applied
- L. Minimum Aeration Time 2.1 hrs/cycle at maximum daily flow
 Minimum Mixing Time 4 hrs/cycle at maximum daily flow
 Minimum Settling Time 1 hrs/cycle at maximum daily flow

1.4 COORDINATION

- A. Section 013000: “Administrative Requirements: Requirements for Coordination.”
- B. Coordinate Work of this Section with piping and equipment connections as specified in other Sections and as indicated on Drawings.

1.5 PREINSTALLATION MEETINGS

- A. Section 013000: "Administrative Requirements: Requirements for Pre-Installation Meeting."
- B. Convene minimum one (1) week prior to commencing Work of this Section.

1.6 SUBMITTALS

- A. Submittals shall be submitted based on the requirements in Section 013300 - Submittal Procedures. Submittals shall include the following:
 - 1. A copy of this specification section and the referencing section and all other applicable specification sections governing the pump, drive and driver, supports and specified appurtenances. The specification copies shall be complete with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated and, therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications. The submittal shall be accompanied by a detailed, written justification for each deviation. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration
 - 2. Submit pump type and capacity.
 - 3. Submit certified pump curves showing pump performance characteristics with pump and system operating point plotted, including NPSH curve when applicable.
 - 4. Submit electrical characteristics and connection requirements.
 - 5. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
 - 6. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
 - 7. Manufacturer Reports: Certify that pumps have been installed according to manufacturer's instructions.
 - 8. Qualifications Statement:
 - a. Submit qualifications for manufacturer.

1.7 CLOSEOUT SUBMITTALS

- A. Section 017000: "Execution and Closeout Requirements: Requirements for Submittals."
- B. Project Record Documents: Record actual locations of piping, valves and other appurtenances, connections, and invert elevations.
- C. Complete system Operation and Maintenance manuals shall be available in hardcopy and electronic form. The electronic form shall be provided in .pdf format and be fully bookmarked. Manuals shall address:
 - 1. General project information

2. Installation and start-up
3. Process design and operational control description
4. Mechanical, electrical and field instrumentation component descriptions
5. Maintenance and troubleshooting
6. Mechanical and electrical drawings

1.8 QUALITY ASSURANCE

- A. Perform Work according to specified standards.
- B. Maintain one (1) copy of each standard affecting Work of this Section on Site.

1.9 QUALIFICATIONS

- A. The SBR System shall be supplied by a company of good reputation that is regularly engaged in the manufacture and fabrication of SBR wastewater treatment systems. The manufacturer's experience shall include a minimum of ten (10) installations where equipment of similar size and design has been in operation successfully in a similar process for a minimum of five (5) years. As a minimum, the supplier shall be the manufacturer of the following components: mixers, decanters, diffusers, and controls.
- B. The Contractor shall assign full responsibility for the functional operation of all SBR System components to a Single Source Supplier. This Supplier shall be responsible for all engineering necessary in order to select, furnish, inspect the installing contractor's equipment installation and connections, calibrate, and place into operation the SBR System along with all other equipment and accessories as specified herein.
- C. Ashbrook Simon-Hartley is considered an Engineers approved qual.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
- B. Store materials according to manufacturer instructions.
- C. Protection:
 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 2. Protect piping and appurtenances by storing off ground.
 3. Provide additional protection according to manufacturer instructions.

1.11 EXISTING CONDITIONS

- A. Field Measurements: Verify field measurements prior to fabrication and indicate on Drawings.

PART 2 - PRODUCTS

2.1 SBR EQUIPMENT

A. MANUFACTURER

The Owner and Engineer believe the following manufacturers are capable of producing equipment and products, which will satisfy the requirements of this Section. This statement, however, shall not be construed as an endorsement of a particular manufacturer's product, nor shall it be construed that a named manufacturer's standard product will comply with the requirements of this Section. It shall be the responsibility of the "selected" equipment manufacturer to coordinate with the contractor of Contract #1 of this project and by use of this specification and all related design drawings for any necessary adjustments, modifications or alterations to standard products to ensure that the product complies with all sections of this specification. Candidate manufacturers include Aqua Aerobics Systems, Inc., Ashbrook Simon-Hartley, or Engineers approved equal.

2.2 INFLUENT PLUG VALVE

- A. Description: Furnish two (2), 12 inch diameter electrically operated flanged plug valve for each basin to control the influent flow.

Valves shall be a PEC 125# flanged end connection, ASTM A-126 Class B cast iron body with welded in nickel seat, neoprene coated cast iron plug, assembled and tested with a 115 volt, single phase, 60 cycle open/close service electric actuator. The valve shall be a non-lubricated type with a port area of at least 80% of full pipe size.

Each valve shall include a manual override with limit switch feedback to the micro-processor in both the open and closed positions. Field wiring and junction/box disconnect shall be provided by the installing contractor.

Provisions for valve access shall be provided by the installing contractor.

Supply of valve vault(s) with drain for the valve(s) shall be the responsibility of the installing contractor.

2.3 DIRECT DRIVE MECHANICAL MIXER

- A. Description: Furnish two (2) mechanical floating mixer and related equipment accessories as described herein for each basin. Each mixer shall consist of a motor, direct-drive impeller driven at a constant speed, an integral flotation unit, and impeller volute. The equipment shall incorporate design enhancements that provide for three (3) years without routine maintenance (greasing). Mechanical Floating Mixer shall be manufactured by Aqua-Aerobic Systems, Inc.
- B. Motors shall be in compliance with the Energy Independence and Security Act of 2007 (EISA 2007).
- C. Mixer drive motor: Each mixer shall have a zone of complete mix of 47.0 feet square at 21.0 feet water depth and a direct pumping rate of 7,680 GPM with a recirculation rate of 253,000

GPM and a basin turnover of 1.4 minutes at maximum water level. Complete mix shall be defined as maintaining biological suspension of all mixed liquor suspended solids with an MLSS of 4500 mg/l or less without the introduction of air.

The motor shall be rated for 10 horsepower at 900 RPM and wired for 460 volt, 60 hertz, three-phase service. The motor shall be standard efficiency, 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 service factor of 1.15 shall be furnished.

The motor winding shall be nonhygroscopic, and insulation shall equal or exceed NEMA Class "F". A labyrinth 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.

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.

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

- D. Motor Mounting Base: The motor shall be securely mounted onto a solid 304 stainless steel base which is integral with the motor base extension. All submersed wetted motor mounting base components shall be constructed of 304 stainless steel.

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 the 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.

- E. Floatation: Each unit shall be equipped with a modular float constructed of fiber reinforced polyester skin (FRP) with a central float passage of a size to allow installation and removal of the pump impeller. The minimum diameter of the float shall be 84 inches and the minimum thickness 12-1/4 inches. 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.

The minimum reserve buoyancy shall be 1425 pounds.

- F. Impeller: 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.

- G. Intake Volute Assembly: The impeller shall operate in a volute made of 304 stainless steel plate, minimum 3/16 inch thick.
- H. Vibration: 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.
- I. Cable Mooring System: Each unit shall be provided with a maintenance cable mooring system complete with mooring cable, clips, thimbles, quick disconnects, anchors, and extension springs as shown on the drawings. Mooring cable, anchors, and hardware shall be 304 stainless steel. Field attachment of mooring points to the tank shall be the responsibility of the installing contractor.
- J. Cable Mooring Electrical Service Cable: Each unit shall include #12-four conductor power cable wired into the motor conduit box and terminating at the basin wall. Electrical cable shall be supplied with kellems grips at the float, and basin wall terminations. Electrical cable aerial cable ties for attachment of electrical service cable to the mooring cable shall be provided. Attachment of cable and supply of junction box/disconnect at the basin wall shall be the responsibility of the installing contractor.

304 stainless steel adhesive anchors for attachment of mooring system components to the basin wall shall be provided.

2.4 DECANTER ASSEMBLY

- A. Description: Furnish two (2) 8x7 mechanical floating decanter and related equipment accessories as described herein for each 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.
- B. Performance: 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.

Maximum allowable water level in the basin is 21.0 ft.
Minimum allowable water level in the basin is 13.4 ft.

The centerline of each decant pipe must be located 1.0 ft. below the low water level by the installing contractor.

Each decanter shall be rated for an average flow of 2083.0 gallons per minute.

- C. Weir Actuator: Weir actuator shall include a reversible electric motor operated linear actuator. The actuator shall be capable of operating with a closing force of 1500 lbs. 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 spring shall be included to provide for travel after the weir has closed and provide desired closure pressure. 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. Decanter power section shall include an aluminum band clamp heater. #14 AWG ten conductor power cable shall be provided from the NEMA 7 junction box of the unit to the basin wall. Supply of junction box/disconnect at the basin wall shall be the responsibility of the installing contractor.
- D. Weir: 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 or linkage which shall also function as the torque restraint.
- E. Flootation: Each unit shall be equipped with a modular float constructed of fiberglass filled with closed cell polyurethane foam having a minimum 2.0 lbs./ft³ density. Float shall be completely sealed to prevent the foam from being in contact with the external environment. Float shall have 875 lbs. reserve buoyancy to ensure stability and to provide support flotation required during decanter servicing. A urethane type seal shall be molded into the bottom of the float assembly to receive the decanter weir.
- F. Decanter Discharge Pipe: Each decanter shall include a 304 stainless steel elbow with 12" diameter 304 schedule 10 stainless steel discharge pipe. The installing contractor shall provide a ¾" valve with hose bib connection on the decant line between the decanter and the decant valve.

Each decanter shall include two 12" diameter stainless steel flex joints. Flex joints shall be constructed of 304L stainless steel flanges and 321 stainless steel bellows. Flex joints shall utilize heavy duty 304L stainless steel hinges with over-travel stops and full perimeter welds. Flex joints shall carry a minimum rating of 50,000 cycles per EJMA calculations, the Elastic Joint Manufacturer's Association. Flex joints shall be full port diameter, and not reduce flow area of the nominal pipe size. Flex joints shall be fully crated and provided with shipping bars that immobilize and protect the flex joint prior to final installation. Flex joints constructed of plastic or rubber material are not acceptable.

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

- G. Decanter Restrained Mooring System: Each decanter shall include a stainless steel mooring frame attached to the float. Two 4" diameter Schedule 40 stainless steel mooring post assembly with base plate shall be provided to assure consistent location of the decanter in the basin. Mooring post shall be filled with concrete by the installing contractor.

Stainless steel dewatering support posts consisting of two 4" diameter Schedule 40 vertical pylons with base plates shall be provided. Each support with base plate shall be affixed to the basin floor with 304 stainless steel adhesive anchors.

Top and bottom mooring post supports constructed of stainless steel shall be provided for attachment to the basin wall by the installing contractor.

- H. Decant Flow Control Valve: Furnish two (2) 12" diameter electrically operated butterfly valve for each basin to control the decant rate.

Valves shall be a BAW AWWA C-504 Class 150B butterfly valve with ANSI Class 125 flanged end ASTM A-126 Class B cast iron body, EPDM seat, cast iron disk with 316 stainless steel edge, 304 stainless steel shaft assembled and tested with a 460 volt, three phase, 60 cycle open/close service electric actuator. Each valve shall include a manual override with limit switch feedback to the microprocessor in both the open and closed positions. Field wiring and junction/box disconnect shall be provided by the installing contractor. Butterfly Valves shall be Milliken or DeZurik. Actuator shall be Rotork IQT 500.0

Provisions for valve access shall be provided by the installing contractor.

Each valve shall include a 15 ft. valve stem extension constructed of stainless steel. Intermediate valve supports and hardware required for mounting of the extension shall be provided by the installing contractor.

2.5 SBR TRANSFER PUMP

- A. Description: Furnish two (2) submersible non-clog sludge pump for each basin. Each pump shall be equipped with 3.5 HP, 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. The pump shall be supplied with a mating cast iron discharge elbow and be capable of delivering 130 GPM at 23 TDH. Each unit shall be fitted with an adequate length of galvanized steel lifting chain of adequate strength to permit raising and lowering the pump. Motors shall be in compliance with the Energy Independence and Security Act of 2007 (EISA 2007). SBR Transfer Pumps shall be per selected manufacturer.

The 3" 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.

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 watertight integrity to a depth of 65 ft.

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 installing contractor.

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

Valve shall be a 3" diameter PEC 125# flanged end connection, ASTM A-126 Class B cast iron body with welded in nickel seat, neoprene coated cast iron plug. The valve shall be a non-lubricated type with a port area of at least 80% of full pipe size. Plug Valve shall be Milliken, DeZurik, or Nibco.

Each pump shall include a 3" diameter check valve with cast iron body and bronze disk to prevent backflow. Check Valve shall be Milliken, Nibco, or DeZurik.

Valves shall be provided loose for installation within the discharge piping by the installing contractor. Valve gaskets and hardware shall be supplied by the installing contractor.

- B. Pump Hoist Assembly: Furnish one stainless steel portable hoist assembly. Each hoist shall be rated for a safe load of 500 lbs., lift of 30 feet, 36" minimum reach and a 60" maximum reach. Hoist shall consist of 1/4" diameter 304 stainless steel cable, painted steel lifting hook, zinc plated winch, painted cast iron sheave, and 304 stainless steel snap hook.

Furnish a total of seven stainless steel platform socket assemblies.

Each socket assembly shall include 304 stainless steel adhesive anchors for anchoring the platform socket to the basin wall.

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

2.6 RETRIEVABLE FINE BUBBLE AIR DIFFUSER ASSEMBLIES

- A. Description: The aeration system shall be a fine bubble diffused air system and shall be a retrievable configuration as shown on the contract drawings. The aeration system shall be capable of delivering 785 SCFM per basin. Air Diffusers shall be per selected manufacturer.

Furnish three retrievable air diffuser assemblies for each basin. Each assembly shall consist of membrane diffusers, frame assembly, manifold weldment, vertical air column, track/beam, flexible air line, isolation valve, and lifting mechanism. A total of 25 duplex diffuser tubes shall be provided for each diffuser rack. The 4" diffuser manifold weldment shall be constructed of 304 stainless steel. The entire assembly shall be located such that each diffuser centerline is twelve (12) inches above the basin floor.

Air diffuser assemblies shall be of the tubular, non-clog, fine bubble type with a flexible perforated air release membrane. Disc and panel diffuser designs are not acceptable. The diffuser membrane shall be constructed from EPDM rubber and be suitable for continuous or intermittent aeration. Each membrane shall be held in place by two 304 stainless steel band

clamps. The membrane shall include UV inhibitor and compounds designed for resistance to chemical attack, weathering, fatigue, and aging. The diffuser assemblies shall have double backflow prevention to prevent liquid from passing into the aeration header. Backflow prevention shall consist of self sealing slits and membrane clamping over the circumference of the diffuser support pipe. The membrane exterior surface shall be smooth as to inhibit biological film growth. The membrane shall inflate during aeration and deflate when the airflow is discontinued, further restricting biological film growth. The membrane shall be cleanable in place with water from a high pressure wash. Each diffuser membrane shall be supported over its' full length and circumference by a support tube. Tube diffuser shall be of non-buoyant design. Diffusers which are of buoyant design are not acceptable.

The vertical air column shall be constructed of stainless steel. Each diffuser assembly shall include a 3" diameter wire reinforced EPDM flexible air line with quick disconnect end fittings, and a galvanized steel threaded flange, elbow and ny-glass (304 stainless steel) quick disconnect adapters. All air distribution piping, gaskets, and hardware beyond the threaded flange shall be supplied by the installing contractor. The vertical track/beam assembly shall be stainless steel. The vertical track/beam shall support the lifting mechanism assembly during operation and servicing.

Each assembly shall include a stainless steel diffuser hoist assembly with base socket to receive a portable electric winch. A total of (one) portable electric winch shall be provided for the diffuser assemblies. The winch mechanism shall be of sufficient design capacity to raise the diffuser rack assembly to the servicing position. The portable electric winch shall operate from a 115 volt, single phase, 60 hertz electrical supply rated for 12.6 full load amps. The winch shall be provided with a total of 8 feet of electrical cable. Supply of electrical power supply, wiring and junction box for winch shall be the responsibility of the installing contractor.

Each diffuser assembly shall include a 3" diameter manually operated isolation butterfly valve for connection to the main air distribution piping by the installing contractor. Valve gaskets and hardware are to be provided by the installing contractor.

Valve shall be a Wafer style butterfly valve with cast iron body, EPDM seat, aluminum bronze disk and one piece stainless steel shaft.

Adhesive anchors of 304 stainless steel shall be provided for anchoring the diffuser assemblies to the basin.

2.7 SBR BLOWERS

- A. Description: There shall be furnished three 30 HP, 460 volt, 60 cycle, three phase rotary lobe type, positive displacement blowers with premium efficient, T.E.F.C. U.S. Electric, Class F insulation, motor. Each blower shall be capable of delivering 393 SCFM of air at a discharge gauge pressure of 10.6 psig. The blowers shall be manifolded for individual and/or combined operation. Motors shall be in compliance with the Energy Independence and Security Act of 2007 (EISA 2007). Aeration Blowers shall be per selected manufacturer.

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.

Equipment shall include a blower, electric motor, belts and sheaves, inlet filter/silencer, discharge silencer, discharge check valve, rubber inlet sleeve and discharge connection, pressure relief valve, galvanized steel acoustic hood with oil drip pan, 6" butterfly discharge isolation valve, and rubber expansion joint. A personnel protection guard shall be included over the belts and sheaves.

2.8 AIR CONTROL VALVES

- A. Description: Furnish two (2) 6" diameter electrically operated butterfly valve for each basin to control the air flow.

Valves shall be a BAW AWWA C-504 Class 150B butterfly valve with ANSI Class 125 flanged end ASTM A-126 Class B cast iron body, EPDM seat, cast iron disk with 316 stainless steel edge, 304 stainless steel shaft assembled and tested with 115 volt, single phase, 60 cycle open/close service electric actuator. Valves shall be Milliken, DeZurik, or Nibco. Actuators shall be per selected manufacturer.

Each valve shall include a manual override with limit switch feedback to the microprocessor in both the open and closed positions. Field wiring and junction/box disconnect shall be provided by the installing contractor.

Provision for valve access shall be provided by the installing contractor.

2.9 SBR PRESSURE TRANSDUCER

- A. Description: Furnish one (1) submersible pressure transducer unit constructed of stainless steel for each basin. Transducer shall utilize a diffused silicone semiconductor sensor protected by an integral stainless steel diaphragm with seal fluid. Transducer output shall be a 4-20 mA signal. Electrical connection shall be 2-wire, loop powered through a shielded integral cable comprised of 22 AWG conductors and separate drain wire. Transducers shall be suspended on a removable mounting pipe assembly. 304 stainless steel pipe, 304 stainless supports and 304 stainless steel anchors shall be provided. Field attachment of the pipe and supports to the basin shall be the responsibility of the installing contractor. A moisture excluding aneroid bellows shall be supplied loose for installation in the junction box/ disconnect. Attachment and supply of the junction box/disconnect at the basin wall shall be the responsibility of the installing contractor. Transducer shall be per selected manufacturer.

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

2.10 SBR LEVEL SENSORS

- A. Description: Furnish one (1) level sensor assembly consisting of a float switch with a smooth, chemical resistant polypropylene casing, and 316 stainless steel mounting bracket for each basin. Each float switch shall be provided with a three conductor electrical cable. Electrical

cable shall terminate at a junction box/disconnect located at the basin wall. Field wiring and junction box/disconnect shall be provided by the installing contractor. Level Sensors shall be per selected manufacturer.

Adhesive anchors of 304 stainless steel shall be provided for anchoring the level sensor mounting bracket.

2.11 SBR JUNCTION BOX

- A. Description: NEMA 4X 304 stainless steel junction box shall be provided. The junction box shall contain intrinsically safe relays and terminal blocks for terminating electrical controls and components. Field wiring and installation of the junction box shall be the responsibility of the electrical contractor.

2.12 SBR CONTROLLER

- A. Description: Furnish one (1) Multi Parameter Probe Module(s) per basin. The module shall receive the digital input from a maximum of two devices. The controller will communicate with the main PLC via 4-20 mA signals. The module will have a NEMA 4X/IP66 metal enclosure with a corrosion-resistant finish and shall be AC powered from a 100-230VAC, 60Hz power source. Each probe module shall include a sun shield. Multi-Parameter Probe shall be per selected manufacturer.

2.13 SBR DISSOLVED OXYGEN SENSORS

- A. Description: Furnish one (1) dissolved oxygen sensor per basin. The probe shall be a continuous-reading probe utilizing luminescent sensor technology, and shall provide electrolyte-free operation without requiring sample conditioning. Sensors shall be suspended on a removable mounting pipe assembly. 304 stainless steel pipe, 304 stainless supports and 304 stainless steel anchors shall be provided. Field attachment of the pipe and supports to the basin shall be the responsibility of the installing contractor. Field wiring, conduit, and installation of cable shall be the responsibility of the installing contractor. Dissolved Oxygen Sensors shall be per selected manufacturer.

2.14 POST-EQUALIZATION BASIN TRANSFER PUMPS

- A. Description: Furnish three submersible non-clog transfer pumps. Each pump shall be equipped with 5 HP, 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. The pump shall be supplied with a mating cast iron discharge elbow and be capable of delivering 350 GPM at 18 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. Motors shall be in compliance with the Energy Independence and Security Act of 2007 (EISA 2007). Pumps shall be Flygt, Meyers, or Engineers approved equal.

The 4" 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.

A stainless steel upper guide bar bracket shall be provided with each pump. The entire weight of the pumping unit shall be guided by stainless 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 watertight integrity to a depth of 65 ft.

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 installing contractor.

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

Valve shall be a 4" diameter PEC 125# flanged end connection, ASTM A-126 Class B cast iron body with welded in nickel seat, neoprene coated cast iron plug. The valve shall be a non-lubricated type with a port area of at least 80% of full pipe size. Plug Valve shall be Milliken, DeZurik, or Nibco.

Each pump shall include a 4" diameter check valve with cast iron body and bronze disk to prevent backflow. Check Valve shall be Milliken, Nibco, or DeZurik.

Valves shall be provided loose for installation within the discharge piping by the installing contractor. Valve gaskets and hardware shall be supplied by the installing contractor.

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

2.15 POST EQ FIXED PVC COARSE BUBBLE DIFFUSER SYSTEM

- A. Description: The aeration system shall be a coarse bubble diffused air system and shall be a fixed configuration as shown on the contract drawings. The aeration system shall be capable of delivering 199 SCFM per basin.

Furnish one (1) fixed coarse bubble diffuser system for each basin. The diffuser system shall consist of diffusers, supports, manifold, and riser pipe. Each diffuser section shall be constructed of Schedule 80 PVC. The diffuser manifold pipe internal to the basin shall be constructed of Schedule 80 PVC. Diffuser pipes shall be not less than three-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.

Each diffuser section and manifold pipe shall be supported at span lengths not greater than 6 feet by galvanized steel supports. No unsupported end shall be longer than 2 ft. Diffuser

sections shall be secured to the supports with a corrosion resistant retainer. Support brackets shall be adjustable to provide header leveling within $\pm 1/4$ inch of a fixed elevation for each aeration basin.

Diffuser system shall be field assembled by the installing contractor. All submerged PVC joints 8" 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 as shown on the drawings. Diffuser sections and internal manifold piping shall have flange connections for disassembly.

The 4" diameter galvanized 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 the provided by the installing contractor.

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

2.16 POST EQ BLOWERS

- A. Description: There shall be furnished one 10 HP, 460 volt, 60 cycle, three phase rotary lobe type, positive displacement blowers with premium efficient, T.E.F.C. U.S. Electric, Class F insulation, motor. Each blower shall be capable of delivering 199 SCFM of air at a discharge gauge pressure of 4.6 psig. The blowers shall be manifolded for individual and/or combined operation. Motors shall be in compliance with the Energy Independence and Security Act of 2007 (EISA 2007). Blowers shall be per selected manufacturer.

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.

Equipment shall include a blower, electric motor, belts and sheaves, inlet filter/silencer, discharge silencer, discharge check valve, rubber inlet sleeve and discharge connection, pressure relief valve, galvanized steel acoustic hood with oil drip pan, 3" butterfly discharge isolation valve, and rubber expansion joint. A personnel protection guard shall be included over the belts and sheaves.

2.17 POST EQ PRESSURE TRANSDUCER

- A. Description: Furnish one (1) submersible pressure transducer unit constructed of stainless steel for each basin. Transducer shall utilize a diffused silicone semiconductor sensor protected by an integral stainless steel diaphragm with seal fluid. Transducer output shall be a 4-20 mA signal. Electrical connection shall be 2-wire, loop powered through a shielded integral cable comprised of 22 AWG conductors and separate drain wire. Transducers shall be suspended on a removable assembly consisting of PVC support pipe and EPDM hose. Removable assembly shall be supported by 304 stainless steel supports and guide rail, and 304 stainless steel anchors. Field attachment of the guide rail and supports to the basin shall be the responsibility of the installing contractor. A moisture excluding aneroid bellows shall be supplied loose for installation in the junction box/ disconnect. Attachment and supply of the junction box/disconnect at the basin

wall shall be the responsibility of the installing contractor. Pressure Transducer shall be per selected manufacturer.

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

2.18 POST EQ LEVEL SENSOR

- A. Description: Furnish one (1) level sensor assembly consisting of a float switch with a smooth, chemical resistant polypropylene casing, and 316 stainless steel mounting bracket for each basin. Each float switch shall be provided with a three conductor electrical cable. Electrical cable shall terminate at a junction box/disconnect located at the basin wall. Field wiring and junction box/disconnect shall be provided by the installing contractor. Level Sensor shall be per selected manufacturer.

Adhesive anchors of 304 stainless steel shall be provided for anchoring the level sensor mounting bracket.

2.19 POST EQ JUNCTION BOX

- A. Description: NEMA 4X 304 stainless steel junction box shall be provided. The junction box shall contain intrinsically safe relays and terminal blocks for terminating electrical controls and components. Field wiring and installation of the junction box shall be the responsibility of the electrical contractor.

2.20 POST EQ CONTROLLER

- A. Description: Furnish one (1) Multi Parameter Probe Module(s) per basin. The module shall receive the digital input from a maximum of two devices. The controller will communicate with the main PLC via 4-20 mA signals. The module will have a NEMA 4X/IP66 metal enclosure with a corrosion-resistant finish and shall be AC powered from a 100-230VAC, 60Hz power source. Each probe module shall include a sun shield. Multi-Parameter Probe shall be per selected manufacturer.

2.21 POST EQ DISSOLVED OXYGEN SENSOR

- A. Description: Furnish one (1) dissolved oxygen sensor per basin. The probe shall be a continuous-reading probe utilizing luminescent sensor technology, and shall provide electrolyte-free operation without requiring sample conditioning. Sensors shall be suspended on a removable mounting pipe assembly. 304 stainless steel pipe, 304 stainless supports and 304 stainless steel anchors shall be provided. Field attachment of the pipe and supports to the basin shall be the responsibility of the installing contractor. Field wiring, conduit, and installation of cable shall be the responsibility of the installing contractor. Dissolved Oxygen Sensor shall be per selected manufacturer.

2.22 AEROBIC DIGESTER TRANSFER PUMPS

- A. Description: Furnish two submersible non-clog sludge pumps. Each pump shall be equipped with 3 HP, 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. The pump shall be supplied with a mating cast iron discharge elbow and be capable of delivering 130 GPM at 20 TDH. Each unit shall be fitted with an adequate length of 304 stainless steel lifting chain of adequate strength to permit raising and lowering the pump. Motors shall be in compliance with the Energy Independence and Security Act of 2007 (EISA 2007). Pumps shall be Flygt, Meyers, or Engineers approved equal.

The 3" 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.

A 304 stainless steel upper guide bar bracket shall be provided with each pump. The entire weight of the pumping unit shall be guided by 304 stainless 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 watertight integrity to a depth of 65 ft.

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 installing contractor.

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

Valve shall be a 3" diameter PEC 125# flanged end connection, ASTM A-126 Class B cast iron body with welded in nickel seat, neoprene coated cast iron plug. The valve shall be a non-lubricated type with a port area of at least 80% of full pipe size. Plug Valve shall be Milliken, DeZurik, or Nibco.

Each pump shall include a 3" diameter check valve with cast iron body and bronze disk to prevent backflow. Check Valve shall be Milliken, Nibco, or Dezurik.

Valves shall be provided loose for installation within the discharge piping by the installing contractor. Valve gaskets and hardware shall be supplied by the installing contractor.

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

2.23 AEROBIC DIGESTER FIXED PVC COARSE BUBBLE DIFFUSER SYSTEM

- A. Description: The aeration system shall be a coarse bubble diffused air system and shall be a fixed configuration as shown on the contract drawings. The aeration system shall be capable of delivering 474 SCFM per basin.

Furnish one (1) fixed coarse bubble diffuser system for each basin. The diffuser system shall consist of diffusers, supports, manifold, and riser pipe. Each diffuser section shall be constructed of Schedule 80 PVC. The diffuser manifold pipe internal to the basin shall be constructed of Schedule 80 PVC. Diffuser pipes shall be not less than three-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.

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

Diffuser system shall be field assembled by the installing contractor. All submerged PVC joints 8" 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 as shown on the drawings. Diffuser sections and internal manifold piping shall have flange connections for disassembly.

The 6" diameter galvanized 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 the provided by the installing contractor.

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

2.24 AEROBIC DIGESTER BLOWERS

- A. Description: There shall be furnished one 30 HP, 460 volt, 60 cycle, three phase rotary lobe type, positive displacement blowers with premium efficient, T.E.F.C. U.S. Electric, Class F insulation, motor. Each blower shall be capable of delivering 474 SCFM of air at a discharge gauge pressure of 9.6 psig. The blowers shall be manifolded for individual and/or combined operation. Motors shall be in compliance with the Energy Independence and Security Act of 2007 (EISA 2007). Blowers shall be per selected manufacturer.

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.

Equipment shall include a blower, electric motor, belts and sheaves, inlet filter/silencer, discharge silencer, discharge check valve, rubber inlet sleeve and discharge connection, pressure relief valve, galvanized steel acoustic hood with oil drip pan, 6" butterfly discharge

isolation valve, and rubber expansion joint. A personnel protection guard shall be included over the belts and sheaves.

2.25 AEROBIC DIGESTER PRESSURE TRANSDUCER

- A. Description: Furnish one (1) submersible pressure transducer unit constructed of stainless steel for each basin. Transducer shall utilize a diffused silicone semiconductor sensor protected by an integral stainless steel diaphragm with seal fluid. Transducer output shall be a 4-20 mA signal. Electrical connection shall be 2-wire, loop powered through a shielded integral cable comprised of 22 AWG conductors and separate drain wire. Transducers shall be suspended on a removable assembly consisting of PVC support pipe and EPDM hose. Removable assembly shall be supported by 304 stainless steel supports and guide rail, and 304 stainless steel anchors. Field attachment of the guide rail and supports to the basin shall be the responsibility of the installing contractor. A moisture excluding aneroid bellows shall be supplied loose for installation in the junction box/ disconnect. Attachment and supply of the junction box/disconnect at the basin wall shall be the responsibility of the installing contractor. Pressure Transducer shall be per selected manufacturer.

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

2.26 AEROBIC DIGESTER LEVEL SENSOR

- A. Description: Furnish one (1) level sensor assembly consisting of a float switch with a smooth, chemical resistant polypropylene casing, and 316 stainless steel mounting bracket for each basin. Each float switch shall be provided with a three conductor electrical cable. Electrical cable shall terminate at a junction box/disconnect located at the basin wall. Field wiring and junction box/disconnect shall be provided by the installing contractor. Level Sensor shall be per selected manufacturer.

Adhesive anchors of 304 stainless steel shall be provided for anchoring the level sensor mounting bracket.

2.27 AEROBIC DIGESTER JUNCTION BOX

- A. Description: NEMA 4X 304 stainless steel junction box shall be provided. The junction box shall contain intrinsically safe relays and terminal blocks for terminating electrical controls and components. Field wiring and installation of the junction box shall be the responsibility of the electrical contractor.

2.28 AEROIC DIGESTER DISSOLVED OXYGEN SENSORS

- A. Description: Furnish one (1) dissolved oxygen sensor per basin. The probe shall be a continuous-reading probe utilizing luminescent sensor technology, and shall provide electrolyte-free operation without requiring sample conditioning. Sensors shall be suspended on a removable mounting pipe assembly. 304 stainless steel pipe, 304 stainless supports and 304 stainless steel anchors shall be provided. Field attachment of the pipe and supports to the basin

shall be the responsibility of the installing contractor. Field wiring, conduit, and installation of cable shall be the responsibility of the installing contractor. Dissolved Oxygen Sensors shall be per selected manufacturer.

2.29 CONTROL PANEL

- A. Description: The control system shall be designed to optimize the 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.

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.

A complete control system shall be provided as described in the following and as shown on the contract drawings: The control system shall include a circuit breaker disconnect, control transformer, branch protection, motor starters, microprocessor control, indicator lights, HAND-OFF-AUTOMATIC selector switches.

The incoming service of the control system shall be 120 volt, 60 hertz, single-phase.

- B. Controls included in panel:
1. UV System Control: The SBR control panel will send a signal to the UV system to control the UV based on quantity of post EQ pumps operating.
 2. SBR Equipment Description
 - a. Two (2) 10 HP Mixers*
 - b. Two (2) 3.5 HP Sludge Pumps*
 - c. Three (3) 30 HP Blowers*
 3. Aerobic Digester Equipment Description
 - a. Two (2) 3 HP Sludge Pumps* (Pump operation to be provided from the Belt Filter Press Control Panel. See specification 463333.)
 - b. One (1) 30 HP Blowers*
 4. Post SBR Holding Equipment Description
 - a. Three (3) 5 HP Transfer Pumps*
 - b. One (1) 10 HP Blower*
 5. In addition, controls (as shown on the contract drawings) for the following equipment shall be included within the SBR control panel:
 - a. SBR Equipment Description
 - Two (2) Influent Valves
 - Two (2) Decanter Actuators
 - Two (2) Decanter Valves
 - Two (2) Air Control Valves
 - Two (2) 4-20 mA D.O. signals
 - Two (2) 4-20 mA Pressure Transducers
 - Two (2) Level Sensors

- One (1) Common Alarm
- b. Aerobic Digester Equipment Description
 - One (1) 4-20 mA D.O. signal
 - One (1) 4-20 mA Pressure Transducer
 - One (1) Level Sensor
- c. Post SBR Holding Equipment Description
 - One (1) 4-20 mA D.O. signal
 - One (1) 4-20 mA Pressure Transducer
 - One (1) Level Sensor

6. Control Panel Wiring and Assembly: All control enclosures shall be custom assembled and wired in an Underwriters Laboratories (UL) certified cabinet shop using quality materials and labor. Short circuit rating of control enclosure shall be 5 kA RMS symmetrical @ 480VAC maximum.

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

Wire colors are as follows:

208 VAC or higher	-	Black
120 VAC control power	-	Red
Neutral	-	White
Ground	-	Green
AC Power from remote source	-	Yellow
Neutral from remote source	-	White with Yellow Stripe
24 VDC (+)	-	Blue
24 VDC (-)	-	White with Blue Stripe
VDC (+) from remote source	-	Orange
VDC (-) from remote source	-	White with Orange Stripe
Intrinsically Safe	-	Light Blue

All wires shall be clearly marked with an identification number consistent with the wiring schematic drawing. Wire markers shall be a thermal transfer printable type. The material shall be a self-laminating vinyl. Labels shall be Brady THT-9-427-10 or approved equal.

Wiring inside the control panel shall be run in PVC wiring duct rated for continuous temperatures up to 122° F (50°C). Devices mounted in the enclosure door shall have wires run in spiral wrap to avoid pinch points when opening and closing the door.

Control components mounted internal and external to the enclosure shall be mounted with stainless steel hardware and clearly labeled with a plastic identification nametag. The tag shall be white with black lettering.

7. Control Panel Quality Assurance: All Control panels shall be UL certified. Testing by manufacturer's electrical engineering prior to releasing for shipment shall be completed. Testing shall consist of the following:

Point to point testing of all wiring prior to application of power
Intended supply voltage shall be applied to the enclosure

All components shall be tested for proper operation and calibration
The PLC and operator interface program shall be loaded and functionally checked
All components shall be checked to confirm proper mounting specifications have been followed
Enclosure shall be inspected for defects and repaired if necessary
All labeling of wires and devices are correct, properly installed and clean

The manufacturer shall finalize the factory checkout by completing a control panel checklist to document all testing completed above.

Upon the successful completion of the control testing of the enclosure assembly, all applicable documentation (i.e. finalized drawing set, signed control checklist cover page, device data sheets, etc.) shall be placed in the drawing pocket of the enclosure.

8. Control Enclosure: 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. 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. The enclosure shall have white polyester powder paint inside with ANSI 61 gray polyester powder paint outside over phosphatized surfaces. The enclosure shall include a painted white mild steel (10 gauge) sub-panel mounted with collar studs. Enclosure shall be manufactured by per selected manufacturer.
The control enclosure shall be mounted remotely.
9. Corrosion Inhibitor: Each control enclosure assembly shall be provided with corrosion 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 per selected manufacturer
10. Main Disconnect Circuit Breaker: 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. The disconnect breaker shall have a door mounted operating mechanism with trip indication. Power distribution connectors shall be mounted integrally to the circuit breaker for multiple load connections. Integral connectors shall be provided. The disconnect circuit breaker shall be a Square D/FAL, HDL, JDL, LAL, MGL, PGL or approved equal.
11. REMOVED
12. REMOVED
13. REMOVED

14. **Circuit Breaker:** 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 per selected manufacturer.
15. **Fuse:** Properly rated fuses and fuse holders shall be provided for protection of individual control devices (discrete and analog signals) mounted outside of the enclosure. Each fuse shall be housed in a hinged type fuse block to protect against contact with the fuse. Fuses shall be rated up to 250 VAC and be Littelfuse or approved equal. Fuse holders for discrete devices shall be rated to 600 VAC and 30 Amps. Fuse holders for analog devices shall be rated to 300 VAC and 15 Amps. Fuse holders shall be Allen Bradley, Rockwell Automation, or engineers approved equal.
16. **Operator Device:** Operator devices (pushbuttons and selector switches) shall be mounted through the control enclosure door for all automatic controlled equipment. Transformer type pilot lights and illuminated pushbuttons shall be provided for indication of an operation status. Lights shall be a 6 VAC incandescent type lamp. Color coding shall be applied as required and is as follows:
 - Amber – Alarm active, caution
 - Green – Valve open, motor running
 - Red – Valve closed
 - White – Information

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. Operator device function shall be identified with an engraved white Gravoply nameplate with black letters. Operator devices shall be Allen-Bradley 800H, Square D 9001, or approved equal.

17. **High Frequency Noise Filter:** 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 120/240VAC operating at 47 to 63 Hz. The unit shall reduce normal mode transients to plus or minus 2 volts, provide surge capacity of 45,000 amps and protect in all modes (Line to neutral, line to ground and neutral to ground). The noise filter shall be an Islatrol IC+ or approved equal.
18. **Single-Phase Type 1 Surge Protective Device:** A UL Listed type 1 surge protective device shall be provided in the control enclosure to protect incoming single-phase power from external surges caused by lightning or power switching. The surge protector shall be a Square D SDSA3650 or approved equal.
19. **Uninterruptible Power Supply:** A UL listed uninterruptible power supply suitable for location in a UL 508 panel shall be provided to protect the HMI and PLC from short power outages by switching to an emergency battery backup without data loss or downtime. Nominal input voltage and output voltage shall be 120VAC with an autosensing input frequency of 47 to 63 Hz. The output power capacity shall be 650W / 1000VA. The UPS shall be provided with an audible alarm and LED status indicators and operate from 32° to 122°F (0° to 50°C). The UPS shall be an Allen Bradley 1609-B1000N.

20. Ground Fault Duplex Receptacle: 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. The receptacle shall be protected with a 5 Amp circuit breaker. The receptacle shall carry a 20A / 120VAC rating. 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 circuitry from voltage transients. Receptacle shall be per selected manufacturer.
21. 24 Volt DC Power Supply: A UL listed, industrial grade, compact power supply shall be supplied to provide 24 VDC power to such rated components. The power supply shall be DIN rail mounted and functional with input voltage of 100 to 240 VAC (single-phase) incoming control power. 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, Rockwell Automation, or engineers approved equal.
22. Control Rely: 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. The relay socket shall be panel or DIN rail mounted inside the enclosure. 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.
23. Terminal Block: Standard feed-through screw terminal blocks, DIN rail mounted, shall be supplied for all point to point wiring connections. All terminals shall be numbered per the wiring schematic with printed markers. Terminals shall carry a 600V AC/DC voltage rating. Terminal blocks shall be per selected manufacturer.
24. Programmable Logic Controller: Automatic operation of the SBR shall be controlled through a programmable logic controller (PLC) mounted inside the main control panel. The PLC components shall consist of a power supply, CPU, discrete input and output modules and analog input and output modules. The processor unit shall include built-in USB and two (2) Ethernet IP communication ports. All input and output points supplied (including unused) shall be wired to terminal blocks. 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 per selected manufacturer.

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-OF4 – Analog output (4 point) modules.

25. PLC Power Supply: 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.
26. Discrete Input Module: 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.

27. Discrete Output Module: 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, UL Listed.
28. Analog Input Module: 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.
29. Analog Output Module: 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, UL Listed.
30. Remote Access Ethernet Modem: A UL listed, remote access Ethernet modem shall be supplied to provide connection capability between the Ethernet PLC network to a standard analog phone line. The device shall be complete with 4 RJ-45 10/100 full/half duplex network ports with on RJ-12 modem port capable of line rates (V90) of 56K thru 28K bps. The unit shall meet compliance with FCC Part 68,

Part 15-Class b, UL/CSA Certified, CTR 21, CE. Mounting shall be on 35 mm-din rail with an operating input of 8 to 48V DC. The remote access Ethernet modem shall be a Rockwell Automation, Allen-Bradley, or engineers approved equal.

31. Human Machine Interface: 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). The display type shall be color active matrix thin-film transistor (TFT) with 800 x 600 pixel resolution. The rated operating temperature shall be 32° to 131° F (0° to 55° C). The operator interface shall be an Allen Bradley PanelView Plus 7 Performance 10".

2.30 SCADA MONITORING SYSTEM

A SCADA (Supervisory Control And Data Acquisition) system shall be provided by the SBR equipment supplier as described herein and as shown on the contract drawings.

The SCADA functionality includes custom designed software with the following distinct features:

- Detailed, dynamic graphics depicting regions of the facility and specific equipment within each area
- Drill-down feature to provide detailed pop-up windows for pieces of equipment
- Simple, intuitive navigation
- System setpoint and preset adjustments
- Consolidated alarm summary for all monitored areas, plus an alarm log
- Event log which may capture operator commands as well as process/equipment functions
- Historical data logging, providing long term storage of data to assist with plant optimization

- Historical trending of analog and/or discrete variables. Trends also provide real time values, zoom/pan, and pause features
- Security – both the operating system and graphical package have multiple levels of logins.
- Picture/video screen captures – allows screen captures to be saved to a file or sent to a printer

The SCADA system includes remote access capabilities through either a dial-up modem or broadband access. The remote access not only facilitates support from the SCADA supplier (to address concerns or future upgrades), but also allows remote access by the operations personnel to help assess a situation when away from the site.

The SCADA system shall be designed, programmed and functionally tested by the SCADA manufacturer prior to shipment. All software packages shall be provided with licenses that can be transferred to the end user.

The SCADA system shall be provided loose for installation, interconnection, and field wiring by the installing contractor.

1. Monitored Equipment

The SCADA system shall provide monitoring and control of remote functions and processes for the following wastewater applications.

- Sequencing Batch Reactor System
- UV Disinfection System

The SCADA system shall provide monitoring of remote functions and processes for the following wastewater applications.

- Packaged Headworks
- Influent Flow
- Effluent Flow
- Belt Press and Post Lime Equipment
- Non-Potable Water System
- Plant Pump Station
- Collection System Lift Stations for Future SCADA Monitoring (7 Total Sites)

2. SCADA System Hardware

The SCADA system provided shall meet or exceed the following hardware specifications. At the time of manufacture, components specified below shall be subject to "or equal" or "upgrade" status to provide for the most current model available.

3. Personal Computer (Pc)

Dell Precision Tower 5810 XL, with 5-Year ProSupport
Processor: Intel® Xeon® E5-1620 v3 Quad Core, 3.5GHz
Memory: 16GB DDR4, 2400MHz RDIMM ECC
Monitor: Dell UltraSharp™ 24 inch Widescreen
Video: 1GB
Boot Hard Drive: 500GB SATA, 16MB DataBurst Cache™
Second Hard Drive: Identical to boot hard drive

Operating Mode: RAID 1
Removable Media: 16X DVD+/-RW, with read/write support software
Keyboard: USB Quiet Keyboard
Mouse: USB Optical mouse with scroll
NIC: 10/100/1000 Ethernet

4. Printer

Color inkjet printer with printer cable

5. Uninterruptable Power Supply (Ups)

APC battery backup UPS, 1000VA minimum

6. PC Operating System And Productivity Software

Operating system: Microsoft® Windows 10 Professional
Productivity software: Microsoft® Office Home and Business 2016
Anti-virus / Anti-spam / Firewall: 10 year subscription
Screen capture/edit software: TechSmith® SnagIt®

7. Graphical Software

Rockwell Software FactoryTalk View SE Station
Rockwell Software FactoryTalk View SE Development

8. Programming Software For PLC

Rockwell Software RSLogix 5000 (IEC-61131-3 compliant)

9. Programming Software For HMI

Rockwell Software FactoryTalk View Studio ME

10. Autodialer

Furnish one (1) (Raco Verbatim) Automatic Dialing Remote Monitoring system. The autodialer shall have 8 channels and dial up to 16 phone numbers, 60 digits in length, and operate on a standard telephone line. Telephone line shall be provided by the installing contractor. When an alarm condition occurs, the autodialer shall automatically dial preprogrammed telephone numbers and report the station identification and specific alarm condition that exists. Calls may also be made directly to the unit at any time from any telephone for a complete status report. Front panel LED indicators shall show system operation, alarm status, battery condition, and provide system operation information at the site. User-entered programming shall be kept intact for up to ten years, even when all power is removed from the unit. A rechargeable gel cell battery shall keep the system operating in the event of a power failure.

2.31 SOURCE QUALITY CONTROL

- A. Section 014000: "Quality Requirements: Requirements for Testing, Inspection, and Analysis."
- B. The floating mixer(s) shall be shop inspected and tested prior to shipment. Testing shall consist of the following:
 - 1. Project and nameplate data verification per assembly documentation
 - 2. Dynamic balancing
 - 3. Final inspection
- C. Actuated valves shall be tested to manufacturer test protocol prior to shipment. Testing shall consist of the following:
 - 1. Project and nameplate data verification per assembly documentation
 - 2. Limit switch and torque switch setup and cycle test
 - 3. Hydrostatic test (two pressurization cycles) for all plug and butterfly valves

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 017000: "Execution and Closeout Requirements: Requirements for Installation Examination."
- B. Verify that field dimensions are as indicated on Drawings.

3.2 PREPARATION

- A. Section 017000: "Execution and Closeout Requirements: Requirements for Installation Preparation."

3.3 INSTALLATION

- A. The installation of the equipment furnished by the manufacturer shall be the responsibility of the installing contractor in accordance with all requirements of the contract documents.

3.4 FIELD QUALITY CONTROL

- A. Section 014000: "Quality Requirements: Requirements for Inspecting and Testing."
- B. Inspection:
 - 1. Inspect for damage to valve lining or coating and for other defects that may be detrimental as determined by Engineer.
 - 2. Repair damaged valve or provide new, undamaged valve.
 - 3. After installation, inspect for proper supports and interferences.

3.5 START-UP: The equipment manufacturer shall furnish the services of a factory 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.

3.6 SPARE PARTS TO BE SUPPLIED

A. The following spare parts shall be supplied by the SBR equipment manufacturer:

<u>Quantity</u>	<u>Description</u>
One (1)	Decanter linear actuator with capacitor.
One (1)	Decanter limit switch with arm.
One (1)	Input card.
One (1)	Output card.
Fifty (50)	Membrane Kits
One (1)	Crimping Tool Oetiker #1098
Two (2)	3" Blower inlet filter
Ten (10)	6" Blower inlet filter
One (1) set	10 HP V-belts
Four (4) sets	30 HP V-belts

3.7 WARRANTY

A. Section 017000 - Execution and Closeout Requirements: Requirements for warranties.

B. All equipment provided under this Section shall be furnished with a two (2) year extended warranty on materials and workmanship from the date of Substantial Completion. The Owner will return any equipment found defective to the manufacturer for inspection and validation of the defect. Defective equipment will be repaired or replaced at manufacturer's discretion and shipped back to Owner at no charge. The maximum cumulative liability to the SBR system manufacturer shall not exceed 100% of the purchase price of the equipment.

END OF SECTION 463333