

**ADDENDUM #11  
BID NO. 2009-T**

**Issue Date: August 28, 2009**

**Project: South Columbia County Regional Wastewater Treatment Plant**

Notice to all bidders is hereby given that the following modification is made to the Request for Bids referenced above:

**Specifications Revisions**

The following revisions have been made to the project specifications:

**SECTION 11219**

Section 11219 for non-potable water system has been deleted in its entirety.

**SECTION 11304**

Paragraph 2.03B has been revised. The head and power requirements for the Chlorinated Effluent Pump are corrected to 50 feet and 7.5 hp.

**SECTION 11307**

Section 11307 has been revised. Attached to this addendum is the current Specification Section 11307, which replaces, in its entirety, the previously issued Section 11307.

**SECTION 11377**

Section 11377 has been revised. Attached to this addendum is the current Specification Section 11377, which replaces, in its entirety, the previously issued Section 11377.

**SECTION 13500**

Section 13500 has been added to the project specifications. Attached to this addendum is Specification Section 13500.

**Each bid submitted in response to this Request for Bids shall include an acknowledgement of this addendum.**

SECTION 11307  
SUMP PUMP

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: The Contractor shall furnish materials, equipment and labor to furnish, install and test one (1) sump pump with motor, integral level switch, valves and appurtenances to transfer collective wastewater from the in-plant wet well to the headworks, as indicated on the contract drawings and as herein specified. The Contractor shall furnish a spare set of identical pump with motor, integral level switch and sufficient wiring leads to be connected in the nearest junction box.

B. Related Work Described Elsewhere:

1. Materials and Equipment: Section 01600.
2. Painting: Section 09900.
3. Process Instrumentation and Controls - Products: Division 13.
4. Electrical: Division 16.

1.02 QUALITY ASSURANCE

A. Qualifications

1. The sump pump specified herein is to be standard units for the intended service. The pump shall be capable of handling combined in-plant wastewater with solids and stringy materials without clogging as manufactured by reputable makers of long experience.
2. Unit responsibility. The complete sump pump unit and all specified accessories and appurtenances shall be furnished by the same source to insure compatibility and integrity of the individual components, and provide the specified warranty for all components.

1.03 SUBMITTALS

A. Shop Drawings and Manufacturer's Literature: All pumps to be furnished under this Section shall be in accordance with Section 01340: Shop Drawings, Working Drawings and Samples.

1. Manufacturer's literature and illustrations, including the total weight of the equipment and the weight of the single largest item.
  2. Manufacturer's certified curves showing pump characteristics of head, discharge, brake horsepower, and efficiency.
  3. Shop Drawings, including details of pump assembly and installation layouts and procedures, motor control wiring diagrams, types of materials used in pump construction, details of all pump accessories, drive guards and dimensions of major components.
- B. Operation and Maintenance Manuals: For all pumps furnished under this Section, the Contractor shall submit operation and maintenance manuals in accordance with Section 01730 Operating and Maintenance Data. In addition to the operating and maintenance manual submittal specified in Section 01730, the submittal shall include the following:
1. General - equipment function, description and normal and limiting operating characteristics.
  2. Installation instructions - assembly procedures and alignment and adjustment procedures.
  3. Operation instructions - start up procedures, normal operating conditions, emergency and normal shutdown procedure.
  4. Lubrication and maintenance instructions.
  5. Troubleshooting guide.
  6. Parts list and predicted life of parts subject to wear.
  7. Drawings - cross sectional view, assembly and wiring diagrams.
  8. Pump performance curves.

## PART 2 - PRODUCTS

### 2.01 GENERAL DESCRIPTION

- A. The equipment covered by these specifications is intended to include a complete functional pumping system to transfer in-plant wastewater from the collection wet well to the headworks and a spare set of pump and motor. The sump pumps shall

consist of pumps with motors, slide rail, and integrated motor controls and level-sensing.

- B. The equipment furnished shall be designed, constructed, and installed in accordance with the best practice and methods, and shall operate satisfactorily when installed as per manufacturer's instructions. Goulds/ITT HSU Series, Hydromatic Non-clog Series, or approved equal.

## 2.02 PERFORMANCE REQUIREMENTS

The pumps shall be constant speed and meet the following performance conditions:

Flow rate: 200 gpm at 34 feet of total dynamic head.

## 2.03 PUMP

The pumps shall be a custom designed, submersible, vertical rotor, motor driven, solids handling pumps with mechanical seal. All pump castings shall be cast iron. The impeller shall be fully recessed to allow large sized solids (minimum 3-inch diameter) and stringy or fibrous material to pass through without binding or clogging. The pumps shall have cast-in elbow and integral supporting legs for durability.

## 2.04 ELECTRIC MOTOR

- A. The motors shall be 5 HP, 1725 RPM, 230/460 Volt 60 Hertz, 3 Phase, permanently lubricated and sealed ball bearings, with Class F installation and 1.15 service factor standard. The motors shall have tandem mechanical seals form complete protection of motor internals. Inherent protection against running overloads or locked rotor conditions for the pump motors shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. This motor protector combination shall have been specifically investigated and listed by Underwriters Laboratories, Inc., for the application.
- B. The motors shall be protected by internal dual moisture probes for early detection of seal failure.
- C. The motors shall be UL and CSA approved explosion proof design and conform to NEMA, IEEE, ANSI, and NEC standards.

## 2.05 PUMP REMOVAL SYSTEM

The on-duty pump shall be mounted on a slide rail system or secured with a cable and winch system for easy removal. If a slide rail system is proposed, it shall allow the removal of the pump without disturbing the discharge piping by utilizing a locking cam action with locator lugs and O-ring for positive sealing. If a cable and winch system is proposed, it shall

be capable of handling two times the weight of the pump and motor assembly and of the corrosion proof materials suitable for the wet well environment.

## 2.07 ALARM PANEL

Each grinder pump station shall include a NEMA 4X, UL-listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic polyester to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel.

The alarm panel shall contain one 15-amp, double-pole circuit breaker for the pump core's power circuit and one 15-amp single-pole circuit breaker for the alarm circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.

The alarm panel shall include the following features: external audible and visual alarm; push-to-run switch; push-to-silence switch; redundant pump start; and high level alarm capability. The alarm sequence is to be as follows when the pump and alarm breakers are on:

1. When liquid level in the wet-well rises above the alarm level, audible and visual alarms are activated and may be silenced by means of the externally mounted, push-to-silence button.
2. Visual alarm remains illuminated until the sewage level in the wet-well drops below the "off" setting of the alarm pressure switch.

The visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).

The entire alarm panel shall be listed by Underwriters Laboratories, Inc.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Installation shall be in strict accordance with the respective manufacturer's instructions and recommendations in the locations shown on the Drawings. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations.
- B. The contractor shall submit a certificate stating that the installation of the equipment is satisfactory, that the equipment is ready for operation, and that the operating personnel have been suitably instructed in the operation, lubrication and care of each unit.

- C. The spare pump and motor shall be pre-assembled and factory tested prior to delivering to the project location in a condition ready for installation.

### 3.02 FIELD PAINTING

- A. Unless otherwise specified in this section, field painting is specified under Section 09905. The primer and paint used in the shop shall be products of the same manufacturer as the field paint to assure compatibility.
- B. All nameplates shall be properly protected during painting.

### 3.03 INSPECTION AND FACTORY TESTS

- A. Each pump furnished under these specifications shall be tested at the factory to verify individual performance. Certified copies of all test reports shall be submitted to the Engineer for approval prior to shipment. Each unit shall be hydrostatically tested in accordance with the Hydraulic Institute Standards.

### 3.04 WARRANTY

- A. See Section 01740: Warranties and Bonds.

END OF SECTION

## SECTION 11377

### SEQUENTIAL BATCH REACTOR EQUIPMENT

#### PART 1 – GENERAL

##### 1.01 DESCRIPTION

- A. Scope of Work: The equipment furnished under this section shall be a complete Sequential Batch Reactor (SBR) treatment system. The sequential batch reactor manufacturer shall be responsible for overall supply and quality of all the items specified herein and shown on the drawings. The system shall be a two (2) basin fill and draw activated sludge process. Each of the basins shall, in turn, within a discrete time period, be filled with screened and degritted raw wastewater and aerated in a batch mode. After aeration, the mixed liquor shall be allowed to settle. The treated supernatant shall then be withdrawn from the basin utilizing a floating effluent decanter mechanism, and discharged. The system shall consist of jet aeration headers with a flush-out system, motive liquid pumps, sludge wasting system, blowers, floating effluent decanters, automatic influent valves, automatic decant valves, necessary automatic air control valves, Influent Distribution/Sludge Collection manifolds, preprogrammed process control panel, and in-basin liquid piping, air piping, and supports.
- B. Related Work Described Elsewhere:
1. Materials and Equipment: Section 01600.
  2. Painting: Section 09900.
  3. Piping, Valve, and Equipment Identification System: Section 09905
  4. Piping, Fittings, Valves, and Accessories: Section 15050
  5. Process Instrumentation and Controls - Products: Division 13.
  6. Electrical: Division 16.
- C. The sequence batch reactor manufacturer shall be responsible for testing, start-up, troubleshoot, and personnel training of the sequence batch reactor system specified herein and shown on the drawings.
- D. The Contractor shall install the sequence batch reactor system specified herein and shown on the drawings.

##### 1.03 QUALITY ASSURANCE

- A. Qualifications:

1. The equipment specified in this section shall be supplied by only those manufactures that are fully experienced, reputable, qualified and regularly engaged in the manufacture of the components to be furnished. The contractor shall not utilize individually purchased components and controls. The complete sequence batch reactor system including all components, controls and services shall be furnished by a single supplier who shall be responsible for the operation of the complete system. Equipment manufacturers, except those listed, that desire to supply equipment specified in this section must submit a qualification package for approval by the Engineer no later than three (3) weeks prior to the bid date. The Engineer will issue an addendum listing the acceptable suppliers prior to the bid date. Qualification packages received after the submittal deadline will not be considered. The qualification package must include as a minimum:
  - a. Design calculations and a complete description of the proposed operating strategy, including operating cycle descriptions for minimum, design, peak, and peak instantaneous flows.
  - b. Complete specifications describing the equipment proposed.
  - c. Drawings, diagrams, and catalog cuts, for all mechanical and electrical equipment which show all process, structural, or ancillary equipment modifications required to comply with the full intent of the job specifications.
  - d. A complete list of all exceptions to the specification, for both mechanical and process features.
  - e. Current SBR installation list, with names of contacts and phone numbers.
  - f. Certification of compliance with the materials of construction specified.
  - g. Listing of any additional utilities required other than those specified.
  - h. Maintenance schedule, method of maintenance performance, and life expectancy of all equipment when applied as intended in the specifications.
  - i. List of all recommended spare parts.
2. The SBR shall be a system as manufactured by Siemens Water Technologies, Fluidyne Corporation, or equivalent.

## 1.4 SUBMITTALS

- A. See Section 01340, Submittals, for submittal requirements.
- B. Provide product Information and descriptive literatures for the following components:
  - 1. Jet aeration headers.
  - 2. Flush out system.
  - 3. Motive liquid pumps.
  - 4. Sludge wasting pumps.
  - 5. Blowers.
  - 6. Floating effluent dacenters.
  - 7. Automatic influent valves.
  - 8. Automatic decant valves.
  - 9. Automatic air control valves, if used.
  - 10. Influent distribution/sludge collection manifolds.
  - 11. Pre-programmed process control panel.
  - 12. In-basin liquid piping.
  - 13. Air piping.
  - 14. Supports.
- C. Submit following shop drawings:
  - 1. Design notes and calculations.
  - 2. Certified drawings.
  - 3. Performance curves.
  - 4. Foundation and installation plans.
  - 5. Wiring and piping schematics.

## PART 2 – PRODUCTS

### 2.01 GENERAL

- A. The SBR aeration system shall be designed to transfer 85 lbs. of standard oxygen per hour per basin. The operating strategy shall provide for the following discrete periods in each cycle for all flow rates:
  - 1. ANOXIC FILL. At design flow, a minimum of 30% of the total Fill period for each reactor shall be anoxic. The aeration system is not operated as the reactor is charged with incoming wastewater.
  - 2. AERATED FILL. The aeration system is operated during the latter stage of the fill cycle, allowing biodegradation to begin.
  - 3. REACT. Influent flow is diverted to the next basin in sequence; the aeration system is operated to complete biodegradation. A

minimum of 30% of the total aeration time in any cycle shall be React.

4. QUIESCENT SETTLE. Aeration is terminated, and the biomass is allowed to settle. The Settle period shall be a minimum of 45 minutes, and be accomplished under perfect quiescent conditions; no flow shall enter, or be withdrawn from, a reactor during the Settle period.
5. DECANT. Treated effluent is withdrawn from the upper portion of the reactor by a floating effluent decanter.

B. To insure consistent microorganism selection, reactor basins shall be intermittently fed, and operate in a "complete mix" mode. Processes utilizing continuously fed, or "plug flow" reactors will not be acceptable. A preprogrammed process controller shall control the process and incorporate each of the above periods in each cycle, under all flow conditions. Strategies that eliminate Anoxic Fill and/or React at peak flow rates will not be acceptable. The operating strategy shall automatically increase the percentage of total aeration (Aerated Fill plus React) in each cycle, directly proportional to total batch size. Systems utilizing float control, or level set points to increase aeration in "steps" will not be acceptable. Minimum total aeration percentages shall be:

Minimum Flow	17.5% of each cycle
Average Flow	37.5% of each cycle
Peak Flow	50% of each cycle

C. The SBR system shall be furnished in accordance with the following specifications and as shown on the plans. The valves, equipment, materials of construction, and controls specified under this section supersede any other specifications located elsewhere in the contract documents.

## 2.02 SEQUENCE BATCH REACTOR (SBR) SYSTEM

A. The SBR system shall be designed based on the following site and raw wastewater characteristics:

Average Flow	0.16 MGD
Peak Instantaneous Flow	0.48 MGD
Influent BOD5 at Avg. Flow	260 mg/l
Effluent BOD5	5 mg/l (Required)
Influent Suspended Solids	250 mg/l
Effluent Suspended Solids	5 mg/l (Required)
Influent TKN	95 mg/l
Effluent TN	3.0 mg/l (Required)
Effluent NH3	1.0 mg/l (Required)
Influent Phosphorus	7 mg/l
Effluent Phosphorus	1.0 mg/l (Required)

Site elevation, Ft. MSL	80 ft.
Wastewater temperature (Min.)	15 °C
Normal Max. SWD	18 ft.
Normal Min. SWD	15.5 ft.

2.02 JET AEREATION HEADER

- A. Two (2) identical aeration headers shall be provided. Each jet aeration header shall be comprised of a liquid duct, an air duct, and a minimum of nine (9) jet aerator assemblies. Each header shall be constructed such that the liquid duct, air duct, and jet aerator assemblies comprise one self-contained unit, and shall be shipped as such; complete and ready for installation. Headers in excess of forty (40) feet in length may be shipped in sections. A maximum of one "field joint" may be required for each forty (40) feet of header length.
- B. The liquid duct shall be a cylindrical member having a plurality of liquid nozzle entry orifices which are longitudinally spaced along its perimeter, and aligned on a common horizontal plane. The inner surface of the liquid duct shall be smooth and free of protrusions which might collect stringy material.
- C. The air duct shall be a cylindrical member which is parallel to and above the liquid duct. The air duct shall be jointed to, and supported by, the air manifolds, and additional support points as necessary. The air duct shall have a plurality of air manifold entry orifices longitudinally spaced along its perimeter, in corresponding number to, and in vertical alignment with the liquid nozzle entry orifices of the liquid duct. The provision of a separate air entry manifold with a fixed orifice for each jet assembly shall insure uniform air distribution.
- D. The liquid and air ducts shall be machine filament wound fiberglass reinforced thermosetting resin pipe. Liquid and air ducts shall be fabricated in strict accordance with ASTM Specification D-2996-01. Hand filament wound FRP piping (fabricated in accordance with NBS specifications), PVC or other thermoplastics are not acceptable. Minimum acceptable pipe wall thickness (including corrosion liner) shall be per the following table:

Diameter	Wall Thickness
4"	0.104
6"	0.146
8"	0.146
10"	0.188
12"	0.188
14"	0.230
16"	0.272
18"	0.272

20"	0.314
24"	0.356
30"	0.440

- E. The minimum pressure rating of the aeration header shall be 75 PSI. Minimum pressure rating is an internal rating and must have a minimum 5:1 safety factor against short term burst hoop tensile strength and 1.8:1 safety factor against long term hydrostatic design basis. If the manufacturer proposes a system that utilizes flush-out, the header shall be designed for an appropriate external vacuum rating for the service conditions and shall have a minimum of 3:1 safety factor against hoop tensile strength. Manufacturer shall provide calculations and structural wall thickness in regard to the intended service conditions.
- F. Each jet aerator assembly shall consist of an inner liquid nozzle, and an outer air/liquid delivery nozzle. The inner and outer nozzles shall be aligned on a common centerline, joined together, and laminated to form a single unit. The jet aerator assembly shall be joined to the liquid duct and the air manifold and laminated for strength to form a single integrated unit. Systems with non-integral jets will not be accepted. The matting surface of the jet aerator assembly shall match the contour of the liquid duct and be stepped to match the liquid nozzle entry orifices of the liquid duct to insure proper alignment, and provide a smooth contoured liquid flow path. No portion of the liquid nozzle or aerator assembly shall protrude into the liquid duct.
- G. In order to reduce the plugging potential, the liquid nozzles shall be of constantly reducing cross-sectional area in the direction of flow. There shall be no parallel section in the liquid flow path between the liquid duct and the exit orifice of the liquid nozzle. The distance between the exit orifice of the inner nozzle and the exit orifice of the outer nozzle shall be such that substantial air entrapment by the liquid stream occurs prior to its discharge from the outer nozzle.
- H. The outer nozzle exit orifice shall have a cross-sectional area of at least 2.5 times that of the inner nozzle exit orifice. The outer nozzle shall be of constantly reducing cross-sectional area in the direction of flow with an included angle of at least 20° for at least nine inches along the flow path to increase the velocity of the air/liquid stream.
- I. Both inner and outer nozzles shall be of non-clog design, free from all protrusions which might collect stringy material, and be capable of passing a 1½" spherical solid. Inner and outer nozzles shall be fabricated of isophthalic, corrosion resistant laminating resin, reinforced with glass fibers, and a surfacing material of a commercial grade chemical-resistant glass having a coupling agent. The interior of each air and liquid nozzle shall contain a "coabrasion" liner to specifically achieve optimum chemical and abrasion resistance. Each nozzle shall contain a specific liner separate from the structural fiberglass wall of the nozzle. The liner shall be constructed of a glass laminate utilizing a minimum of 2 layers of 0.010 inch

synthetic, apertured “Nexus” or “C glass” veil. The interior liner shall be a resin-rich surface layer containing no more than 20% by weight of either synthetic or “C-glass” veil, and shall be free from cracks and crazing. Exterior of outer nozzles shall be protected with a separately cured, pigmented, paraffinated gel coat to protect from UV degradation. All construction shall be in accordance with the American Voluntary Standard PS 15-69, or the Canadian Voluntary Standard 41 GP-92.

- J. The air manifolds shall be enclosed conduits which convey the compressed air from the air duct to the jet aerator assembly. The air manifolds shall be fabricated of an isophthalic, corrosion resistant laminating resin, reinforced with glass fibers, and a surfacing material of commercial grade chemical-resistant glass having a coupling agent. Air manifolds shall be fabricated in accordance with NBS Specification PS 15-69.

### 2.03 INFLUENT DISTRIBUTION/SLUDGE COLLECTION (ID/SC) MANIFOLD

- A. An Influent Distribution/Sludge Collection Manifold shall be provided for each reactor basin. Manifolds shall be designed and sized to distribute the influent flow evenly across the reactor floor during Anoxic Fill, and collect settled sludge through the same manifold during the sludge waste operation. Manifolds shall be sized such that the maximum exit velocity of the influent at peak flow conditions is 0.5 feet per second.
- B. ID/SC manifolds shall be constructed of fiberglass reinforced plastic meeting the Voluntary Product Standard NBS 15-69, or Schedule 40 PVC.
- C. All necessary supports for the ID/SC manifold shall be provided and shall be fabricated of Type 304 stainless steel.

### 2.04 FLUSH-OUT/WASTE SLUDGE SYSTEM

- A. A combined positive flush-out system and waste sludge system which is composed of the jet aeration recirculation pump, out-of-basin crossover pipe configuration, and valve arrangement, shall be utilized. The flush-out system shall draw liquid only in a reverse direction through the liquid nozzles at a velocity of at least 10 feet per second. The flush-out operation shall be accomplished by closing the pump suction and discharge valves, and opening two crossover valves, thereby reversing liquid flow through the aeration jets, and discharging out the ID/SC manifold. No air shall pass through the liquid nozzles during the flush-out operation. The piping and valve network shall also provide for the capability of wasting sludge with the same recirculation pump and the ID/SC manifold. The aeration system manufacturer shall provide all necessary valves for the flush-out and waste sludge system. Butterfly valves are not acceptable. All out-of-basin piping, including pump suction pipe, discharge pipe, flush-out crossover pipe, air release valve, and waste sludge line with

supports and hardware necessary to complete the system shall be furnished by the contractor.

## 2.05 AIR PIPING

- A. In-basin air drop pipe shall be provided as a part of the aeration system. The piping shall be of adequate length and diameter to transport the compressed air from a point at the top of the basin wall, as shown on the plans, to the air duct of the aeration header. A flanged connection shall be furnished for connection to the out-of-basin air piping, provided by others. Hardware required to complete this flanged connection will be supplied by the contractor. In-basin air piping shall be machine filament wound, fiberglass reinforced thermosetting resin pipe fabricated in strict accordance with ASTM Specifications D-2996-01.

## 2.06 LIQUID PIPING

- A. In-basin liquid piping shall be provided as a part of the aeration system. The piping shall be of adequate length and diameter to transport the motive liquid from the pump discharge wall sleeve flange, to the aeration header. A flanged connection shall be provided at this interface point, and hardware to complete this flanged connection shall be supplied by the contractor. In-basin liquid piping shall be machine filament wound, fiberglass reinforced thermosetting resin pipe fabricated in strict accordance with ASTM Specification D-2996-01.

## 2.07 SUPPORTS

- A. All necessary supports for the aeration headers, in-basin liquid and air piping, ID/SC manifolds, and decanters shall be provided as a part of the system. Header supports shall be of the "H" type, having two support legs with a minimum of six anchor bolts. The supports shall be fabricated of Type 304 stainless steel.
- B. The supports shall consist of a contoured saddle and a supporting base. The base shall be anchored with anchor bolts and grouted in place, if necessary. The saddle shall be provided with a Buna-N rubber pad to avoid abrasion. A contoured clamp with an accompanying Buna-N rubber pad shall hold the piping to the saddle. Fastening hardware shall be Type 18-8 stainless steel.

## 2.08 ANCHOR BOLTS

- A. Anchor bolts of sufficient size and quantity shall be provided for mounting of all manufacturer supplied SBR equipment and piping in the basin. The anchor bolts shall be two part stud and acrylic resin system. The anchor system shall consist of acrylic resin and hardener contained in a dual cartridge with static dispensing nozzle. Each anchor bolt shall be supplied with a stud, flat-washer, lock-washer & nut of Type 18-8 stainless steel.

## 2.09 SBR PROCESS PUMPS AND BLOWER

- A. Blower shall be 230/430 V/3Ø/60 Hz and made to deliver 360 scfm at 10 psig. Process blowers shall include angle frame table top, base, silencers, air filter, v-belt drive with guard, 20 HP electric motor, changeable pulleys, starter panel with NEMA 4x enclosure, motor starter, blower run lights, hand-off-auto switch, surge suppressor, and terminal strip for auto control.
- B. Circulation pumps shall be 230/430 V/3Ø/60 Hz and made to deliver 1650 gpm at 22 feet TDH. The pumps shall be powered by 15 HP electric motors and shall be equipped with starter panel with NEMA 4x enclosure, motor starter, pump run lights, hand-off-auto switch, surge suppressor, and terminal strip for auto control.

## 2.10 DECANTER

- A. There shall be a total of two (2) floating decanters to extract final effluent from the reactor basins. Fixed decanters will not be acceptable. Each decanter shall consist of an effluent withdrawal manifold, having several solids excluding orifice assemblies, with a single foam filled float, and shall be capable of intermittent operation. The decanter assembly shall be constructed of machine filament wound, fiberglass reinforced thermosetting resin pipe fabricated in strict accordance with ASTM Specification D-2996-01. The decanter shall be designed to be capable of withdrawing the effluent at an average rate of 685 gallons per minute. Decanters must employ positive mechanical type seals for excluding solids from the draw tube.
- B. The draw tube, containing the orifices for removal of effluent shall be integrally attached to the foam filled float such that the float remains level throughout the full range of operation, and to maintain submergence of the orifices of the main body. The main body will be connected to the effluent piping by means of a 8" flanged stub. The effluent pipe shall include a "knee" joint to allow vertical movement. The "knee" joint shall be wire reinforced rubber hose with a flange at each end, and include a support mechanism that allows vertical articulation, but precludes lateral or twisting movement. Hose shall be Type "E" suitable for abrasive materials, and shall be rated at 30 inches mercury vacuum and 15 PSI working pressure. The effluent pipe shall be provided with a flanged connection for mounting the decanter system to the installed pipe through the basin wall. Flange connection shall be in accordance with ANSI standard 150 pound bolt pattern. Hardware at this flanged connection interface shall be furnished by the contractor.
- C. The solids excluding orifice assemblies shall be field replaceable, and attached to the effluent withdrawal manifold. The assembly shall consist of a 304 stainless steel orifice plate, 302 stainless steel constant compression spring, 304 stainless steel spring housing, a PVC drive rod, a hard rubber plug, and a 304 stainless steel support/alignment cage assembly. The solids excluding orifice assemblies shall be

factor aligned and welded to form a complete assembly. The drive rod shall seat against the spring, in the spring housing, and be attached by a threaded rod to the sealing plug. The hydraulic differential provided shall be a minimum of 3.5 feet in addition to the pipe friction losses determined as the differential head, under flowing conditions, between reactor bottom water level and top water level at the downstream discharge. The point of decanted effluent discharge downstream of the SBR shall be either constantly submerged, or designed with a water trap.

- D. All necessary supports for the decanter mechanism shall be provided. The supports will be located on the basin floor, and will support the decanter mechanism when the basin is dewatered. The supports shall be fabricated of Type 304 stainless steel. The supports shall consist of a support plate welded to a supporting base. The base shall be anchored with anchor bolts and grouted in place if necessary. Fastening hardware shall be Type 18-8 stainless steel.
- E. Stationary decanters will be considered only if the design is such that the mixed liquor has no possibility of entering the decanters in any conditions (e.g., including power outage or equipment failure) during any point of the operational cycle. If stationary decanters are proposed, all operation conditions, performance specifications, and applicable material of construction as described in Paragraph 2.10 of this section shall be adhered to. Stationary decanters and the associated equipment, if proposed, are subject to the Engineer's approval.

## 2.11 VALVES AND VALVE ACTUATORS

### A. GENERAL

Valves shall be furnished per the following schedule:

- Two (2) 6" automatic plug valves (influent control).
- Two (2) 8" automatic butterfly valves (effluent control).
- Two (2) 6" automatic butterfly valves (air control).
- Two (2) 12" automatic plug valves (pump discharge).
- Two (2) 12" manual plug valves (pump suction).
- Four (4) 8" manual plug valves (vacflush header cleaning system).
- Two (2) 6" automatic plug valves (waste sludge).

This valve specification shall take precedence over any other valve specifications in the contract documents. Different valves numbers and/or types will be considered, but justifications shall be provided if so proposed.

### B. ECCENTRIC PLUG VALVES

1. All eccentric plug valves shall be permanently lubricated and shall be of the tight-closing, rubber seat type. Valves shall be suitable for sewage and wastewater application, shall have throttling capability, and shall be rated 150

lb. WOG. Valve bodies shall be cast iron. Valve plugs shall be balanced type and constructed of either cast iron or ductile iron. Passage size shall be a minimum of 80% of the full port area for valves through 20" size and a minimum of 70% of the full port area for valves 24" and larger. Upper and lower bearing shall be either stainless steel or bronze and permanently lubricated. Packing shall be U-cup, O-ring or V-type, self adjusting, and wear compensating. Packing shall be replaceable without removing the valve bonnet or plug. All valves shall be leak tested to their full rating prior to shipment. Manual plug valves shall have worm gear actuators with handwheels. Actuators shall be sized for 50 PSI shut off pressure against the face of the plug. Gearing shall be enclosed in a semi-steel housing and be suitable for running in a lubricant. Seals shall be provided on all shafts to prevent entry of dirt and water into the actuator.

#### C. BUTTERFLY VALVES

1. Valves shall be specifically designed for air service and clean water service. All valves shall have a maximum of 50 PSI pressure rating and valves for air service shall have a temperature rating of 250°F. Valves shall be either wafer or lug design with cast iron body. Valve disc shall have an uninterrupted 360° seating surface and shall be aluminum bronze, ductile or cast iron with an appropriately suitable edging. Shafts shall be one piece and shall be of hi-strength carbon steel with phosphate coating, or stainless steel. Shaft bearings shall be self-lubricating, and corrosion resistant. Packing materials shall be either adjustable or self-adjustable and shall be suitable for the intended temperature and service conditions. Manual butterfly valves shall be provided with lever actuators or geared actuators with handwheels, and shall be sized appropriately for the service conditions and specific application. Lever operated valves shall latch in the open, closed, or several intermediate positions.

#### D. QUARTER TURN ACTUATORS

1. The electric motor operator shall consist of motor, reduction gearing, position limit switches and torque limiting switches mounted in a NEMA IV housing. Actuators shall be rated for 50 PSI working pressure. Local open / close pushbutton stations are not required on the actuators. Open / close switches shall be provided for hand operation of valves at the SBR control panel.
2. The motor shall be of the high torque type, designed for continuous duty rating. Motors and wiring shall have Class "B" or better insulation. Overload protection shall be provided by auto-reset thermal trip circuit breakers embedded in the motor windings. All motor leads shall be terminated at an internal terminal strip. The motor will operate on an AC power supply of 120 volts, single phase, 60 cycle.. Actuators shall be provided with integral motor starters (if required). Power for all automatic

valves shall be the responsibility of the installing contractor. Valve power shall not be provided through the SBR control panel.

3. The integral self-locking power gearing shall be compound epicyclic or combined helical and worm gear type only. Motor breakers are unacceptable. Gearing shall be grease or oil lubricated with high speed parts running on anti-friction bearings. Motor shall operate from open to full close in 60 seconds. Disassembly of gears shall not be required to remove the motor.
4. The handwheel shall not rotate during electrical operation. When the unit is being operated manually, it shall automatically return to electric operation when the handwheel is released. The transfer from electrical operation to manual operation shall be accomplished by a declutching mechanism, which will disengage the motor mechanically. The unit shall be capable of being clutched or declutched while the motor is energized with no damage to the clutch or gear mechanism. Clockwise rotation of the handwheel shall close the valve. If the motor is energized during manual operation, the unit shall remain in manual mode without endangering personnel operating the unit.
5. Failure of the motor or motor gearing shall not hinder manual operation. Limit switches set at the open and close positions shall be provided.
6. A double-acting torque limiting switch shall be provided, which is responsive to the mechanical torque developed by seating or an obstruction.

## 2.12 SUBMERSIBLE PRESSURE TRANSDUCER

- A. Submersible pressure transducers shall be specially designed for direct submergence in wastewater. Units shall be constructed of stainless steel.
- B. Standard transducer shall have an operating range of zero to 34.6 ft. of water with a temperature range of -40 to 80°C, with compensated range of zero to 50°C. Accuracy of measurement shall be  $\pm 0.5\%$  including linearity, hysteresis, and repeatability.
- C. Transducer output shall be a 4 to 20 mA signal. Electrical connection shall be to an attached three wire, 20 gauge polyethylene shielded cable.
- D. Transducer shall be suspended within a 4" diameter stilling well attached to the basin wall. The stilling well shall contain equalization ports spaced as required. The stilling well shall be continuous from a point six inches above the floor to a point six inches below the top of the wall.

## 2.13 PROCESS CONTROL PANEL

- A. Panels designed for indoor use shall utilize NEMA 12 enclosures. Finish paint to be two part high build epoxy. All selector switches and push buttons shall be industrial heavy duty oil tight. Enclosures shall be by Hoffman. The panel shall be capable of controlling and monitoring SBR functions and activities. The control panel shall as a minimum be capable of controlling:
  - 1. SBR blowers.
  - 2. SBR recirculation pumps.
  - 3. Automatic influent, decant, and air control valves.
  - 4. SBR effluent pumps in equalization tank.
- B. A uninterruptable power supply of sufficient capacity to sustain power to this panel for a minimum of four hours shall be included.

## 2.14 PROGRAMMABLE LOGIC CONTROLLER (PLC)

### A. GENERAL

- 1. A nationally recognized brand of industrial rated hardware shall be implemented for execution of SBR process software. Programmable controllers with CMOS RAM and EPROM memory cartridges shall be utilized. Coprocessors shall be utilized to off-load primary CPU for high level functions. All programs shall be permanently stored on EPROM memory chips. Local I/O expansion, remote I/O and peer CPU I/O shall be available within the same family. Multiple serial ports shall be available with communications (RS232 and RS422). Real time clock with day of week, and operator interface ports shall be standard features.
- 2. The PLC shall be capable of allowing remote access of data through telephone lines.

### B. FLOW PROPORTIONAL SOFTWARE

- 1. Flow and time adaptive algorithms are utilized to make the treatment step adjustments fully automatic. Software shall be configured for as many SBR tanks as will operate in sequence. Provisions for detection of pump, blower and valve failure shall be provided. SBR tank failure based upon equipment failure shall be selectable on an equipment item list as well as on a tank-by-tank basis. Tank failure shall occur 5 minutes after equipment failure allowing the operators time to respond. SBR operation will resume unchanged following short power outages. Software will recognize long power outages, and initiate plant restart based upon length of outage and tank levels upon power restoration. Submersible pressure transducers, high level float switch, stilling well and mounting hardware for each tank shall be provided.

### C. I/O CARDS

1. Input and output cards shall have removable wiring terminal strips. All wiring to module will terminate on terminal strip. Individual lamps for each input or output shall be provided on each card. Analog input and output cards shall have a minimum resolution of 12 bits.

#### D. OPERATOR INTERFACE

1. All setpoints and progress monitoring shall be accessible with the standard panel mounted operator interface. Interface shall consist of a display and membrane keypad, and software for communications to the PLC hardware system. Display shall consist of a 20 character by 4 line vacuum fluorescent display. Memory programming shall be in a "menu" structure, allowing easy access to all points. Function keys shall be programmed for one key access to most commonly used data. Direct access to any setpoint shall be available. Individual data points as well as group data points shall be password protected as directed by the owner. All setpoints shall be described with text that explains specifically what the setpoint or monitoring point is. Operator interfaces that refer to PLC memory register locations are unacceptable. All numeric values shall be represented with floating point decimal in correct position, sign (for negative numbers), and annotated with units designation (i.e. feet, gpm, minutes). Setpoints shall be protected by low and high limits. All operator interface programming and configuration data shall be permanently stored in EPROM.
2. Control circuits shall allow for manual override of PLC system by selector switches on the panel front. Panel mounted indicator lamps for operation and failure of equipment shall be provided. Overload cutout and seal failure indication shall be provided for submersible pumps. Float switch detection of high level in each SBR shall override the transducer level signal to initiate an emergency decant. All failure lamps and alarm horn operations shall annunciate following I.S.A. sequence "A".

#### E. PRINTER

1. A data logging printer and software shall be provided. A steel print shelf designed for the printer shall be mounted to the right side of the control enclosure. The printer shelf shall be painted to match the controls enclosure. The printer shall document treatment step changes, time of change, length of treatment step, tank levels and flow rate at the time of change. Printer software shall document time of alarms and clearing of same. Printer shall operate at 300 characters per second, use a bottom feed paper path, and have a 23K-byte print buffer.

#### F. WIRING

1. All wiring to module will terminate on terminal strip. Panel wiring shall be:

- Type MTW, sized per applicable codes.
- 16 gauge minimum wire size for 120 VAC.
- 20 gauge minimum wire size for 24 VDC.

Wiring shall be color coded as follows:

- 1. 120 VAC (unswitched).....black
- 2. Neutral.....white
- 3. Ground.....green
- 4. +24 V.D.C. ....blue
- 5. 24 V (return) .....red

2.15 D/O CONTROL

- A. A dissolved oxygen control system shall be provided by the SBR system manufacturer. The D.O. control system shall utilize operator adjustable D.O. setpoints to control blower on / off operation during the aeration period. One (1) D.O. probe with mounting bracket and one (1) analyzer shall be provided for each SBR basin. Probes shall be continuous reading type utilizing luminescent sensor technology. Probes shall be Hach LDO with Hach SC100 analyzer, Insite 2000 Analyzer, or equal.

2.16 FIELD SERVICE

- A. The SBR system manufacturer shall provide an installation dry check consisting of one trip for three (3) man-days; equipment / controls start-up, operator instruction and training service consisting of two trips for six (6) man-days; and follow-up operator training, within three months of initial start-up, consisting of one trip and three (3) man-days. All service shall be carried out by a qualified service engineer. Written service reports of each service phase shall be distributed to the Engineer and Owner.

PART 3 – EXECUTION

3.01 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery shall be by the manufacturer’s own personnel and delivery vehicle. The delivery person shall be capable of giving the contractor guidance on the installation of the system. Delivery by independent freight carrier is unacceptable.

3.01 INSTALLATION

- A. Install the sequential batch reactor equipment as indicated on the drawings and specified and in compliance with the manufacturer’s instructions.

### 3.02 INSPECTION AND TESTING

- A. Upon completion of installation, a full operating test shall be performed in the presence of the Engineer and a qualified direct company employed manufacturer's representative. The Contractor shall furnish all labor, materials and equipment required for such test and shall correct any deficiencies noted.
- B. The manufacturer shall provide the following services specified:
  - 1. Mechanical and Process Start-Up Services
    - a. One (1) session of mechanical and process start-up services.
  - 2. Operator Training Services
    - a. One (1) session of instructions to operating personnel on the operation and maintenance of the system.

### 3.03 OPERATION & MAINTENANCE MANUALS AND PRODUCTION RECORDS

- A. Operating and maintenance manuals prepared specifically for this project shall be provided. Manuals shall include all procedures, drawings, parts lists, etc. required to instruct personnel unfamiliar with such equipment. Operation and maintenance manuals shall be prepared in accordance with all specifications of this project. Complete operating and maintenance manuals shall be provided in PDF electronic format with bookmarks and index for easy navigation.

### 3.04 WARRANTY

- A. See Section 01740: Warranties and Bonds.

END OF SECTION

## SECTION 13500

### GROUNDWATER MONITORING WELL CONSTRUCTION

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Figure 5, Proposed Monitoring Well Location Map and Figure 6, Typical Monitoring Well Construction Details, located in Appendix A – Geotechnical Investigation Report, apply to this Section.
- B. Florida Department of Environmental Protection Bureau of Water Facilities Regulation 2008 “Monitoring Well Design and Construction Guidance Manual”. This manual is available as a free download on the internet at the following link location: <http://www.dep.state.fl.us/WATER/groundwater/docs/monitoring-well-manual-formatted-final.pdf>
- C. Facility Permit Number FLA632759, Section III. Ground Water Requirements, Construction Requirements

##### 1.2 SUMMARY GEOLOGICAL/WELL CONDITIONS

Site geology consists of a surface cover of loose fine sand which is continuously present at a thickness of 5 to 12 feet or more across the site. The medium stiff clays, silts and silty fine sands underlying those soils are also largely present throughout the subsurface at thicknesses of 20 feet or greater. In none of the site borings were there any evidence of a perched, unconfined water table acting as a surficial aquifer. As such, it is our opinion that the first encountered aquifer at the site is within the soft carbonates of the Upper Floridan aquifer.

A total of four monitoring wells are proposed for this site. Background well MWB-1 is proposed to be placed at the southeastern corner of the proposed spray field. The compliance wells will be placed on the potential down gradient side. Monitoring wells MWC-1, MWI-2, and MWC-3 are proposed at the locations along at the northern border, in the middle, and at the southwest corner of the spray field (See Figure 5, Appendix A).

##### 1.3 WELL CONSTRUCTION STANDARDS

Well design will follow the Florida Department of Environmental Protection Bureau of Water Facilities Regulation 2008 “Monitoring Well Design and Construction Guidance Manual”. The screen interval should be installed at least four feet below the anticipated mean low water table within water bearing lithology that is free of mud and clays. At

this site depth to groundwater is at approximately 60 feet BLS; therefore, the total depth of the monitoring wells will be approximately 75 feet.

Permit requirements include 72 hour notification to FDEP prior to well construction and that a soil boring first be installed at each well location in order to determine water table conditions to establish well depth and screen interval.

A 10 foot screen interval will be required that is totally submerged below the water table. A sand filter pack will be applied the screen interval to retain particulate matter that could be carried through the lithology. Actual well construction will depend on the site-specific conditions found during the drilling event. The sand pack will have a bentonite seal above the screened interval with the remaining annulus sealed with Type II cement grout to the land surface. Stick up protectors, secured with locking caps, will be set in 2' x 2' concrete footers. A typical well construction detail is presented on Figure 6, Appendix A. Upon completion of the installation, the monitoring wells will be properly developed in accordance with the standard drilling procedures.

Following proper development, groundwater samples will be collected from all the monitoring wells to establish the baseline conditions.

#### 1.4 SUBMITTALS

- 1 Within 30 days after installation of a new monitoring well, submit to the Department's Northeast District Office detailed information on the well's location and construction on the DEP Form(s) 62-522.900(3), Monitor Well Completion Report.

END OF SECTION 13500