

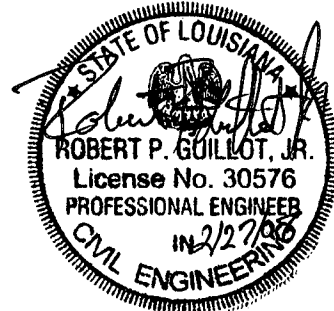
ADDENDA NO. 1

WASTWATER TREATMENT PLANT UPGRADE TOWN OF PEARL RIVER, LA

DATE ISSUED: February 27, 2008
BID DATE: March 4, 2008

EES PROJECT NO. 0635

This Addenda shall be considered as included and/or amended in the original Contract Documents and shall take precedence over any part of the original documents or previous addendum in conflict therewith. This Addenda contains 15 page. All bidders shall ensure all sheets of this Addenda are enclosed. If sheets are missing from this Addenda, it is the responsibility of the Bidder to notify the Engineer seventy-two (72) hours prior to the bid date and time.



I. SPECIFICATIONS

Technical Section

A. Section 11616-Aeration Mixing System

Delete the entire Section 11616-Aeration Mixing System and **Replace** it with the enclosed new Section 11616-Aeration Mixing System.

END OF SECTION

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

Part I. GENERAL

1.01 SCOPE OF WORK

- A. This section includes the design, manufacture, installation and start-up of a coarse bubble aeration system including in-basin aeration components and rotary positive displacement blowers as shown on the Drawings and as specified herein.
- B. The aeration system manufacturer shall provide single source responsibility for the complete aeration system including aeration and blower components
- C. Aeration equipment shall include all in-basin aeration components including lateral piping, diffuser assemblies and restraint components
- D. Blower equipment shall include complete blower assemblies with motor, blower, base, v-belt drive, belt guard, inlet filter, silencers, sound enclosure and all accessories as specified herein

1.02 DEFINITIONS

- A. **Tank**: Vertical walled reactor within which aeration occurs.
- B. **Diffuser Unit**: Wide band, nominal 24 inch long PVC assembly.
- C. **Diffuser Assembly**: Fabricated assembly including two diffuser units and assembly mounting components.
- D. **Air Drop Pipe**: Vertical piping section from out-of-basin header stub to in-basin aeration system.
- E. **Air Manifold Piping**: Air distribution piping from drop pipe to air distribution headers.
- F. **Air Header Distribution Piping**: Air distribution piping from air manifold and diffuser assemblies.
- G. **Air Header Piping**: Out-of-basin air distribution piping from the blower building to the header stubs.
- H. **Blower Manifold Piping**: Air distribution piping between the blower discharge and air header piping.

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

- I. **Aeration Grid**: Associated piping and diffuser components connected to a single drop pipe.
- J. **Standard Cubic Feet per Minute (scfm)**: Air at 68°F, 14.7 psia and 36% relative humidity.
- K. **Maximum Pressure**: Pressure in blower manifold piping at the specified airflow rate.
- L. **Oxygen Transfer Efficiency**: Percent of oxygen in the air stream that is dissolved to the wastewater under specified conditions of temperature, barometric pressure, airflow rate, and dissolved oxygen concentration.
- M. **Standard Oxygen Transfer Efficiency**: Percent of oxygen in the air stream that is dissolved to clean water under conditions of 68°F, 14.7 psia, and zero dissolved oxygen.
- N. **Air Distribution Uniformity**: Variation in air distribution between diffuser assemblies.

1.03 SYSTEM DESCRIPTION

A. **Design Requirements**:

- A. Design in-basin air piping and diffusers to diffuse air throughout the aeration tank(s) in accordance with the specifications.
- B. Design each diffuser assembly to provide uniform air release over the specified airflow range.
- C. Design the aeration system to provide the minimum specified oxygen transfer efficiency at the specified airflow and operating pressure.
- D. Design the blowers to provide the specified airflow at the specified operating discharge pressure.

1.04 SUBMITTALS

Submittals shall be furnished in accordance with Section 01300, Submittals and Section 01340, Shop Drawings, Product Data, and Samples.

A. **Shop Drawings**:

- A. Detailed layout drawings for in-basin aeration components. Layout drawings shall include:

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

- a. Layout and configuration of aeration system.
 - b. Detail drawings of diffuser assemblies showing components, method of construction, and attachment mechanism to air header distribution piping.
 - c. Detail drawings of all piping connections including drop to manifold, manifold to header and inline connections for manifold and headers.
 - d. Detail drawings of pipe support components.
- B. Detailed layout drawings for blower components. Layout drawings shall include:
- a. Layout and configuration of blower components.
 - b. Detail drawings of discharge assembly piping.
- B. **Product Data:**
- A. Detailed listing of materials and materials of construction.
 - B. Product literature.
- C. **System Design and Performance Data:**
- A. **Aeration System**
 - a. Include complete air headloss calculations for the aeration equipment from the top of the dropleg to the farthest diffuser bubble release point.
 - b. Design calculations showing uniform air distribution (+10% maximum variation) through lateral piping and diffuser element orifice system.
 - c. Design calculations for piping and support components.
 - d. Product Experience:
 - 1) The supplier shall have experience in the design, manufacture, supply and commissioning of coarse bubble aeration equipment identical to the type specified for this project.
 - 2) The equipment submitted shall be of proven design and shall be referenced by at least three installations of similar size, having been in successful operation for a period of not less than five (5) years prior to bid date.
 - 3) If the Contractor fails to correct deficiencies identified by the Owner within six (6) months of the date first notified in writing, the Owner shall at it's own

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

discretion make all necessary repairs or replacement and deduct all associated costs from the Contractor's bond.

4) **Guarantee:**

- a) All equipment and workmanship furnished under this contract shall be guaranteed to be free of defects in materials and workmanship for a period of twelve (12) months from the date of system start-up or eighteen (18) months from the date of shipment, whichever occurs last. Any such defects, which occur within the stipulated guaranty period, shall be repaired, replaced or made good at no cost to the Owner.

B. Blower System

- a. Engineering calculations as detailed below shall be provided to show compliance with the specifications:
 - 1) Blower system calculations shall include calculation of blower temperature and horsepower draw on motors at normal and maximum airflow.
 - 2) Calculations for sheave sizing, overhung load on blowers and critical velocity of blower timing gear are also required.

D. Installation Instructions:

- A. Installation requirements and guidelines for all proposed equipment shall be provided.
- B. Information on the aeration system shall include but not be limited to:
 - a. Diffuser unit assembly.
 - b. Diffuser assembly attachment.
 - c. Piping components and assembly.
 - d. Piping support components.
- C. Information on the blower system shall include but not be limited to:
 - a. Blower skid mounting.
 - b. Inlet filtration and piping.
 - c. Ancillary components.
 - d. Motor wiring.

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

E. Operation and Maintenance Data:

- A. Operations and maintenance data for all proposed equipment shall be provided.
- B. Information on the aeration system shall include but not be limited to:
 - a. Air flow balancing.
 - b. Diffuser assembly maintenance.
- C. Information on the blower system shall include but not be limited to:
 - a. Blower and motor lubrication schedule.
 - b. V-Belt drive components.
 - c. Inlet filter element.
 - d. Pressure relief valve.

Part II. *PRODUCTS*

2.01 MANUFACTURERS

- A. Aeration Equipment
 - A. Environmental Dynamics Inc., Columbia, Missouri, or approved equal.
- B. Blower Equipment
 - A. Kaeser, Roots, Sutorbilt, or approved equal.

2.02 MATERIALS

- A. Welded Stainless Steel Components:
 - A. Sheets and plates of Type 304L stainless steel with 2D finish conforming to AISI 304L and ASTM A240.
 - B. Limit carbon content to 0.30% maximum.
- B. Non-welded Stainless Steel Components:
 - A. Sheets and plates of Type 304 stainless steel conforming to AISI 304 and ASTM A240.
- C. Fasteners and Anchorage Components:
 - A. 18-8 series stainless steel.
- D. PVC Pipe and Fittings (Schedule 40 and 80):

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

- A. Base material shall be ASTM D-1784.
- B. Pipe shall be manufactured in accordance with ASTM D-1785 and ASTM D-2665.

2.03 AERATION EQUIPMENT

A. System Performance:

A. The aeration-mixing system shall be designed to meet the following:

- a. Airflow = 170 scfm maximum
- b. Discharge Pressure = 5.8 psig
- c. Diffuser Unit DWP = 3 inches H₂O maximum
- d. Design Diffuser Submergence = 11 feet maximum

B. The diffusers shall not exceed the following:

- a. Airflow = 9.5 scfm per diffuser at the design airflow.

B. Coarse Bubble Diffusers:

- A. The EDI MaxAir Simplex diffuser assembly or approved equal shall be furnished and installed.
- B. Each diffuser assembly shall be factory assembled and include one diffuser unit and mounting saddle.
- C. Diffusers unit shall have nominal dimensions of 3.5 inches in diameter and 24 inches long.
- D. The diffuser support frame shall be approximately 24 inches long and have a full diameter mounting connection.
 - a. Use of non-full diameter mechanical connections including threaded connections is not acceptable.
- E. Individual diffuser units shall be provided with an internal end cap.
- F. Diffuser assemblies shall be completely factory assembled with diffuser units and mounting saddle factory installed.
 - a. Field solvent welding or assembly of diffuser is not acceptable.
- G. Diffuser assemblies shall be shipped to the jobsite assembled and properly crated and protected for shipment and handling.

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

- H. Diffuser saddle mount shall be schedule 80 PVC construction and shall be capable of withstanding an external force of 4,800 inch-pounds without structural failure of the air distribution pipe, diffuser units connection or mounting saddle.
 - a. Small diameter threaded connections to attach diffusers to the air distribution header are not acceptable.
- I. Saddle mount shall fully encompass the air distribution header and reinforce the pipe section at the diffuser assembly connection.
- J. An O-ring gasket shall be provided to ensure an air tight seal between the mounting saddle and air header.
- K. A minimum 3 inch diameter connection shall be provided between the saddle mount and diffuser assembly.

C. Aeration System Piping:

- A. Out-of-basin air piping including blower manifold, air header, and header stubs are required and are to be supplied by the Contractor.
 - a. Header stubs shall extend to the inside top of the wall and terminate with a full diameter, vertical face flange.
 - b. Out-of-basin piping may be unlined ductile iron, galvanized steel, stainless steel, or painted carbon steel.
 - c. The Contractor shall provide an isolating/balancing valve for control and distribution of air to the aeration grid and to allow isolating of the grid for inspection and maintenance on the header stub.
 - d. Isolation/balancing valve shall be positioned for accessibility from the top of the tank.
- B. Drop pipe shall be provided with a flanged top connection and plain end.
 - a. Drop pipe shall extend from the top connection to within 2 feet of the air manifold.
 - b. Material of construction for the drop pipe shall be schedule 5, stainless steel.
 - c. Drop pipe shall connect to air manifold piping by means of a wrap-around clamp adapter.

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

- C. All submerged manifolds and header components shall be Schedule 40 PVC minimum.
 - a. Use of PVC piping shall only be employed when diffuser mounting system reinforces pipe wall at each mounting location.
 - b. Use of non-reinforced diffuser connections including threaded diffuser mounts is not acceptable.
- D. Pipe supports shall be all stainless steel construction.
 - a. Supports shall accommodate longitudinal movement in the piping components due to the thermal expansion and contraction over a temperature range of 100°F.
 - b. Supports shall restrain the axial and rotational movement of the pipe while providing for unrestrained longitudinal movement.
 - c. Supports shall allow leveling of the air piping with 2 inch minimum vertical adjustment at each support.
 - d. Each pipe support shall be connected to basin floor by at least 2 anchor bolts.
 - e. The integrated pipe support assembly shall be designed to withstand the associated uplift force of the piping and diffuser assemblies with a minimum design factor of safety equal to ten (10).
- D. Spare Parts:
 - A. The Contractor shall furnish the following spare parts and store as directed:
 - a. One (1) - diffuser assembly completely factory assembled.

2.04 BLOWER EQUIPMENT

- A. System Performance:
 - A. The blower system shall perform as an integrated component with the aeration system and provide the required volume and pressure capacity as required for the aeration system.
 - B. The blower package shall have a capacity of 170 scfm at the following conditions:
 - a. Discharge Pressure: 5.8 psig
 - b. Inlet Temperature: 100°F

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

- c. Process Gas: Air
- d. Maximum Horsepower: 7.0 Bhp at the respective airflows.
- C. The blower unit shall not exceed the following:
 - a. Operating Speed = 85% of maximum rated speed maximum
 - b. Differential Pressure = 85% of maximum rated differential pressure
- D. Minimum of two (2) 100% blower units are required. One unit shall deliver the design air requirement and one unit shall serve as an online spare.
- E. A pressure relief valve shall be provided on each individual blower unit.
 - a. The pressure relief valve shall operate at a minimum of 0.5 psig above the design discharge operating pressure.
 - b. Each blower shall be capable of operating under a full relief condition with 100% of the discharge vented through the relief valve without operating in the motor service factor.
- B. Blower Unit:
 - A. Positive displacement blowers to be designed for oil-free discharge air with vertical inlet and outlet ports.
 - B. Accurately cut steel timing gears, secured directly to rotor shafts for a non-slip synchronization of rotors.
- C. Motor:
 - A. Each motor shall provide power to the blower without operating in the motor service factor at the design operating speed and full pressure relief valve discharge.
 - B. Motor is to be TEFC enclosure, 10 horsepower, 230/460 volt, 3 phase and 60 Hz.
 - C. Motor shaft speed shall be less than 1,800 rpm.
 - D. Service factor is 1.15 for the nameplate horsepower.
 - E. Minimum operating efficiency equal to 90 percent.
- D. Sliding Motor Base:
 - A. Each sliding motor base shall have a NEMA frame matching the motor.
 - B. Each motor base to be equipped with two adjusting screws to maintain sheave alignment and allow for uniform belt tension.

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

E. V-Belt Drive:

- A. Each V-belt drive set shall be capable of transmitting the larger of:
 - B. Motor horsepower including 1.15 motor service factor, or
 - C. Blower torque for each sheave set with a 1.4 service factor.
- D. Blowers shall have sheaves, belts and bushings to deliver 100% of the design airflow as specified.
- E. V-belts shall be "3VX or 5VX" style.
 - a. Two belts per blower are required with each belt capable of handling the horsepower draw of the blower at the design maximum airflow and full pressure relief valve pressure.
 - b. Blowers designed to operate at multiple set points shall have properly sized belt sets.
 - c. All belt pairs shall be "matched sets".
- F. Sheaves to be two-groove "3V or 5V" style.
 - a. Sheaves shall be sized to deliver the required airflow at the specified differential pressure.
 - b. Blowers designed to deliver multiple airflow conditions shall have corresponding motor/blower sheave combinations.
 - c. Motor sheaves to be appropriately sized to prevent failure of motor bearings or shaft.
 - d. Blower sheaves are to be sized to prevent bearing failure from excessive "overhung loads".
 - e. Bushings: "Full-grip" style bushings are "wedge-lock" fit to the shaft with a key and set screw. Bushing is mounted independent of sheave to allow alternate sheaves to be installed without having to realign sheaves.

F. Belt Guard:

- A. Each belt guard is comprised of a safety guard and backing plate conforming to OSHA standards.
- B. Belt guard shall be designed to allow adjustment of motor base and allow greasing of blower and motor bearings without having to remove safety guard.

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

G. Blower base:

- A. Each blower base is to be fabricated from heavy-duty steel channel and angle iron with legs.
- B. All joints shall be connected by continuous welds and to be chipped and brushed before painting.
- C. Blower bases to be primed and painted with standard gray machine enamel.

H. Inlet filter/silencer:

- A. Inlet filter/silencer shall be of heavy-duty construction and shrouded for weather protection.
- B. Noise attenuation to be a minimum of 8 dB at 125 hertz and greater.
- C. Inlet filter to be 99.5% efficient on 2-micron particles and 97% efficient on 1-micron particles.

I. Filter restriction gauge:

- A. Indicator shall recall the point of highest vacuum to determine filter element condition and have a reset option for use when filter is cleaned or new.

J. Inlet and discharge silencers:

- A. One inlet silencer and one discharge silencer to be supplied for each blower unit.
- B. Each silencer must have a minimum noise attenuation of 30 decibels between 125 hertz and 500 hertz.
- C. Silencers shall be heavy-duty; all welded constructed using carbon steel plates.
- D. Critical grade inlet silencer shall be provided for applications operating at a blower timing gear, pitch line velocity greater than 3,300 ft/.
- E. Critical grade discharge silencer shall be provided for applications operating at a blower timing gear, pitch line velocity greater than 2,700 ft/.
- F. Silencer supports shall be provided to mount silencers to blower base.

K. Flex connectors:

- A. Sleeve shall be pressure rated at 20 psig for continuous temperatures of 250°F.

L. Pressure relief valve (PRV):

S:\Ees\2006\0635\40\11616.doc

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

A. PRV shall be capable of relieving the full design maximum airflow without operating in the service factor of the motor, blower or drive assembly.

M. Check Valve:

A. Check valves shall be the split flapper-type with a body of steel or lightweight cast iron.

B. Internal flappers are to be aluminum with EPDM seals suitable for continuous operation at temperatures up to 350 F.

C. Flappers to be loaded with 304 stainless steel springs.

N. Shut-off valve:

A. Shut-off valve shall be provided to seal off each blower from the main air header.

B. Valves are to be rated for temperatures from -40°F to 300°F and pressures up to 20 psig.

C. Valve shall be wafer style.

O. Discharge thermometer:

A. Thermometers for discharge side of blower shall have a 30 °F to 300 °F temperature range.

P. Pressure gauge:

A. Pressure gauge shall be provided for each blower and mounted vertically in the blower piping downstream of the discharge silencer to provide stable pressure readings.

B. Scale range is 0-15 psig with scale divisions by 0.1 psig and accuracy of $\pm 2\%$.

C. Each pressure gauge shall be equipped with a snubber to prevent wear of the movement and reduce shock on the gauge.

D. Gauge cocks shall be provided to isolate each gauge from the air supply system.

Q. Vibration Pads:

A. Vibration pads shall be installed between blower base and concrete blower pad.

B. Vibration pads shall be sized to handle vibrations and loading of blower base assembly.

R. Skid mounting:

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

- A. Blower package to be factory assembled with the following components mounted to the blower base:
 - a. Silencers to be firmly mounted above and below the blower with silencer supports attached to the blower base.
 - b. Silencer supports are to be designed to allow vertical adjustment of piping height.
- B. Components after discharge silencer shall be assembled into a "header assembly" and shipped unattached to blower assembly for protection during transit.
- C. Some instruments may be packed loose for further protection such as the high temperature shutdown switch, temperature gauges, pressure gauges, etc. The associated wells or piping connections to these instruments to be installed in the "header assembly".

Part III. EXECUTION

3.01 INSTALLATION

- A. Contractor shall furnish, inspect, store, and install aeration system and blower components in accordance with manufacturer's written instructions and approved submittals.
- B. Diffuser assemblies on a common grid shall be installed within an elevation tolerance of $\pm 1/2$ inches.
- C. Contractor shall provide all valves, air header piping, wall sleeves with seals, wall pipes, and concrete pedestals as necessary to complete the system as shown on the plans.
- D. Air piping including blower manifold, header, and in-basin piping must be clean prior to delivering air up the diffusers.
- E. Contractor shall be responsible for cleanliness of piping and may be required to manually clean pipe, or air or water flush piping as required.

3.02 START-UP

S:\Est2006\0635\40111616.doc

TECHNICAL SECTION
DIVISION 11 – EQUIPMENT
SECTION 11616 – AERATION MIXING SYSTEM

- A. After installation is completed, the Contractor shall perform the following field tests in the presence of the Engineer and the Owner.
 - A. Fill the reactor to the bottom of the diffuser assemblies.
 - B. Adjust the pipe supports and diffuser assemblies such that all diffuser units are installed within $\pm 1/2$ inches of the design diffuser elevation.
 - C. Fill the reactor to a level of 2 feet above the top of the diffusers.
 - D. Release air to the system and inspect the system for air leaks at all piping or diffuser connections.
 - E. Adjust any piping or diffusers that show leaks or disproportionate amount of airflow.
 - F. Operate the blowers at the design air rate and observe air release and air distribution patterns.
 - G. All water, air, power and labor associated with testing and adjustment of diffuser assemblies are to be supplied by Contractor.

B. MANUFACTURER'S FIELD SERVICES

- A. A manufacturer's representative shall be present at the job site to inspect the installation of the equipment, start-up the system, and train operations and maintenance personnel on the supplied equipment.
- B. Services including a total of one (1) trip with a total of one (1) day onsite shall be provided.