

**CITY OF BATON ROUGE
PARISH OF EAST BATON ROUGE
DEPARTMENT OF PUBLIC WORKS
SEWER ENGINEERING DIVISION**

October 28, 2016

ADDENDUM NO. 2

TO: ALL BIDDERS

SUBJECT: **NORTH WASTEWATER TREATMENT SUSTAINABILITY PROJECT**
CITY-PARISH PROJECT NUMBERS: 13-TP-MS-0045

ORIGINAL BID DATE: Tuesday, October 25, 2016 at 2:00 p.m.

CURRENT BID DATE: Tuesday, November 15, 2016 at 2:00 p.m.

The following revisions shall be incorporated in and take precedence over any conflicting part of the original contract document:

PART 1 – UNIFORM CONSTRUCTION BID FORMS:

1. For paper sealed bidders, with reference to page UCBF 1 of 4 of Part 1, Uniform Construction Bid Forms, the Bidder shall indicate the receipt of this addendum in the space provided. For online Bid Express bidders, an acknowledgement of this addendum will be prompted by the electronic bidding program prior to formally submitting the bid. Failure to indicate the receipt of this addendum shall be cause for the bid to be rejected.
2. Add the attached Unit Price Form (dated 10/28/16). This Unit Price Form **MUST** be used by all Bidders for this project. The UCBF on Bid Express has been updated to reflect the changes on the attached UCBF. **Failure to submit on the revised Unit Price Form shall be cause for the bid to be rejected.**
3. Acting in accordance with Louisiana Revised Statutes 38:2212, O.(1), the bid opening date is postponed by seven (7) calendar days. **Bids will be opened at 2:00 PM Tuesday, November 15, 2016 in Room 806 of City Hall**, in lieu of 2:00 PM Tuesday, November 8, 2016.

PART 2 – CONTRACT DOCUMENTS AND SPECIAL PROVISIONS:

1. For paper sealed bidders, with reference to page UCBF 1 of 4 of Part 1, Uniform Construction Bid Forms, the Bidder shall indicate the receipt of this addendum in the space provided. For online Bid Express bidders, an acknowledgement of this addendum will be prompted by the electronic bidding program prior to formally submitting the bid. Failure to indicate the receipt of this addendum shall be cause for the bid to be rejected.
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3. Acting in accordance with Louisiana Revised Statutes 38:2212, O.(1), the bid opening date is postponed by seven (7) calendar days. **Bids will be opened at 2:00 PM Tuesday,**

November 15, 2016 in Room 806 of City Hall, in lieu of 2:00 PM Tuesday, November 8, 2016.

SPECIFICATION CHANGES

SECTION 01 14 00; DELETE in its entirety and REPLACE with attached revised Spec Section 01 14 00.

SECTION 01 50 00; DELETE 2.1.G in its entirety and REPLACE with “Rooms: Minimum six private offices each with a window; one open office space with movable partition walls; two restrooms; one storage room; one break room with minimum 10 feet of base and wall cabinets and minimum 10 feet of countertop space including a kitchen style sink and faucet; and remainder configured as open meeting space.”

SECTION 01 50 00; ADD the following immediately after 2.1.J.19: “20. Full size refrigerator/freezer, minimum 18 cubic feet. 21. Microwave oven, countertop model, minimum 2.0 cubic feet.”

SECTION 01 50 00; ADD the following immediately after 2.1.K.2.a.4: “b. Items listed in K.2.a.1–4 above shall become property of the Owner at the end of the project.”

SECTION 03 30 00; CHANGE Table II title to “Concrete For This Project”.

SECTION 09 90 00; ADD “20. Surface=Exterior Gypsum Sheathing; Preparation=Clean and Dry; Generic=Water Based Epoxy; Coats = Sanitile 120 Primer, 1-2 DFT (mil thickness); Sanitile 100 Second Coat (block filler) 12 DFT (mil thickness); and Sanitile 155 Top Coat. 2-3 DFT (mil thickness)”.

SECTION 23 57 00; DELETE in its entirety and REPLACE with attached revised Spec Section 23 57 00.

SECTION 44 42 46.20; DELETE in its entirety and REPLACE with attached revised Spec Section 44 42 46.20.

SECTION 44 46 00.12; DELETE in its entirety and REPLACE with attached revised Spec Section 44 46 00.12.

DRAWING CHANGES

DRAWING M-108; in Note 4, CHANGE location of metal plate from interior to exterior of the building.

DRAWING M-108; in Note 5, CHANGE location of metal plate from interior to exterior of the building.

DRAWING A-301; Section A. ADD Note “Paint 1/2 “ Exterior Gypsum Sheathing”.

DRAWING A-301; Section B. ADD Note “Paint 1/2 “ Exterior Gypsum Sheathing”.

QUESTIONS and ANSWERS:

1. **QUESTION:** Please confirm that the fiberglass ductwork and fiberglass chemical storage tanks will not be a part of the re-bid scheduled for 10/25/2016.

ANSWER: The only new fiberglass ductwork is that called for on Sheet H-303. There are no new fiberglass tanks required.

2. **QUESTION:** Do you have an Engineer's estimate/budget available for the referenced project?

ANSWER: The Engineer's Estimate at the Pre-bid Meeting of \$4.6 million, has been revised to \$5.46 million.

3. **QUESTION:** For the waterproofing additive the subject 803-2 specification, item h.1.v. requires Xypex or equal. BASF Corporation produces a fully-equivalent waterproofing admixture/additive named MasterLife 300D (formerly Rheomac 300D). Please consider adding MasterLife 300D by BASF Corporation to your master concrete specs.

ANSWER: Specification section 803-2 will not be revised to include this product by name. Please refer to Section 6-3 of the Standard Specifications..

4. **QUESTION:** Regarding controls and electrical installation:

It is challenging to determine the required scope since all the documents from the prior bid are included. A paragraph detailing the general scope, the drawings that apply to controls and electrical to be supplied on this job would be helpful.

Is there a revised consolidated conduit schedule so that it is clear to electrical contractors what wiring is to be run?

Per 25 50 00 much of this wiring is to (two) Central Termination Cabinets. It appears one is existing (behind RTU5) and the other is to be supplied and placed next to RTU2 - please confirm, the plan drawings do not refer to them as Central Termination Cabinets.

ANSWER: The current bid set drawing only contains drawings for this project and the scope of work is clearly shown on the drawings. There are no drawings in the current bid set that show work that is not a part of this project.

There is no conduit schedule available. The bid set drawings only show the work included in this project and all conduit runs required are clearly shown on the electrical plan sheets.

The electrical cabinets referred to are the new Central Termination Cabinets.

5. **QUESTION:** Regarding Section 25 50 00 Description of Operation:

A 1 c and 3 b: microprocessor with digital display to control three digester sludge feed valves - this appears to require a PLC and HMI - confirm if required and if required provide guidance on specific requirements and proposed location.

I 3 and 4: primary digester level monitoring appears to require a PLC and HMI – confirm if required and if required provide guidance on specific requirements and proposed location.

If both of the above are required, can these be consolidated?

The plan drawings show some devices wired to RTU 2 and 5 but there is no indication of what is to be done with these signals. Can you confirm they are replacing existing signals?

Is additional I/O required in any of these RTUs?

Do these RTU's programs or the existing plant SCADA system screens/database/alarms need

modification?

ANSWER: There is a microprocessor specified in Section 26 09 16, para. 2.1.O. A PLC with HMI would also be acceptable. If a PLC is provided, it must be an Allen Bradley Micorlogics PLC with a Panel View 1000 HMI. Provide all necessary power supplies.

A microprocessor or PLC with HMI is required for monitoring the three digester level signals and providing alarm set points for each level signal. This microprocessor or PLC can be the same unit to be provided for control of the digester sludge feed valves. The three "Digester Low Level Alarm" contacts are to be wired in parallel to an existing digital input in existing RTU No. 5. The three "Digester High Level Alarm" contacts are also to be wired in parallel to an existing digital input in existing RTU No. 5. Any reprogramming of the existing control logic required will be provided by the Owner.

The new field devices wired to existing RTU-2 and RTU-5 will be wired to existing I/O points and it is to be assumed that no reprogramming will be required.

6. **QUESTION:** Section 53 27 00 (Actually 23 57 00) Digester Sludge Heat Exchanger

1.2.B.4 and 5, the specification requires "design pressure shall be 150 psig" and a factory test "at 80 psig (minimum)". Standard design pressure is half the test pressure. The factory test pressure requirement of 80 psig will typically require a specified design pressure of 40 psig. Walker Process can meet the currently specified heat exchanger system, but would require a max design pressure not to exceed 70 psig design with a 140 psig test pressure. Sludge flow rate for this system is called out to be 150 gpm with 4" tubes. What is the operating pressure required for these pumps? Please clarify and/or confirm the design and test pressures needed, and change the spec if applicable. Please note that fabricated steel return headers are supplied by one previously listed approved manufacture (Olympus/OTI), and can provide a design rating of 150 psig. Requirement of 150 PSIG design, if not necessary, would result in limitation of competition by other qualified manufacturers.

ANSWER: A revised Specification 23 57 00 – Digester Sludge Heat Exchanger will be issued in an addendum. The revised specification is being provided in this addendum, and now lists Walker as an approved named Manufacturer.

7. **QUESTION:** In section 03 30 00 Cast-In-Place-Concrete. On page 13, Table 1, Properties Of Cement Concrete.

Mix C calls for a Type III or IIA cement. It also requires a 2100 PSI break in 3 days.

Mix F calls for a Type III or IIIA cement. It also requires a 2800 PSI break in 3 days.

Are the early breaks the reason for using the type III Cement?

These early breaks can be attained with type I/II cement that we use on a daily basis, along with a high-range water reducing admixture, and depending on the ambient air temperature we may have to use a non-chloride accelerator.

ANSWER: In spec section 03 30 00 change Table II title to "Concrete For This Project". The only concrete to be used on this project is Group E in Table I.

8. **QUESTION:** Stewart & Stevenson would like to submit MTU Onsite Energy for approval to be listed as an approved generator manufacturer.

ANSWER: There are no generators included in the NWWTP Sustainability Project.

9. **QUESTION:** Concerning spec sections 11245 and 11343.

Both sections cover FRP tanks. Diamond is named in 11343 but not named in 11245. We do meet the ASME RTP-1 Certified Fabricator qualification under 11245 so I feel it may be an oversight.

We are being contacted by bidders for pricing but not being named on both sections is causing confusion to the bidders.

I would like to get this corrected as it makes sense to the project source all the tanks from the same shop.

I hope we can receive assistance in clarifying this issue.

ANSWER: There are no spec sections 11245 and 11343 in the NWWTP Sustainability Project.

10. **QUESTION:** Do you have the sign-in sheet from the pre-bid on this job that I may get?

ANSWER: The Pre-bid Meeting sign in sheet was emailed to all attendees on Tuesday, October 11, 2016.

11. **QUESTION:** Can the owner remove and dewater the sludge from the digesters?

ANSWER: Spec Section 01 14 00 will be revised such that the Contractor shall drain the digesters and remove all liquid/sludge etc. from the digesters. A revised spec section is included in this addendum.

The bid form will be revised for a separate pay line for this work.

The following items concerning the digesters, **IS FOR INFORMATION ONLY:**

Digester 1 – Has been emptied and is out of service. However, there may be residual liquid/sludge etc. in the digester.

Digester 2 – Owner currently cannot pump sludge from the cone due to larger solids content in the bottom. It is estimated that Owner could only pump it down to approximate elevation 46.00 +/- (in relation to elevations shown on Sheet M-202).

Digester 3 – Owner currently pumps sludge from the cone with no issue.

12. **QUESTION:** The advertised budget is \$4,600,000.00. Will the owner award the project if the low bid is considerably more?

ANSWER: The Engineer's Estimate has been modified to \$5.46 million. The Owner will make a determination once the bids are received.

13. **QUESTION:** On sheet M-106 we are to remove the piping in the tunnel? Can you provide the length of the tunnel?

ANSWER: The tunnel is shown in its entirety on Sheet H-302.

14. **QUESTION:** Has any of the paint been tested for lead?

ANSWER: No

15. **QUESTION:** Per the specifications we are to remove the bottom cone of sludge would the owner be able to remove the sludge using the existing system?

ANSWER: Spec Section 01 14 00 will be revised such that the Contractor shall drain the digesters and remove all liquid/sludge etc. from the digesters. A revised spec section is included in this addendum.

The bid form will be revised for a separate pay line for this work.

The following items concerning the digesters, **IS FOR INFORMATION ONLY:**

Digester 1 – Has been emptied and is out of service. However, there may be residual liquid/sludge etc. in the digester.

Digester 2 – Owner currently cannot pump sludge from the cone due to larger solids content in the bottom. It is estimated that Owner could only pump it down to approximate elevation 46.00 +/- (in relation to elevations shown on Sheet M-202).

Digester 3 – Owner currently pumps sludge from the cone with no issue.

16. **QUESTION:** Sheet M-108 indicates on Note 4 & 5 to “Infill opening with CMU to match existing construction. Insert new metal panel at interior. Fill cavity with insulation. Paint to match existing.” According to the painting schedule systems exterior masonry will not be used. Clarification is needed on the extent of painting for these patches and painting systems to be used to match existing.

ANSWER: Drawing M-108 Notes 4 and 5, CHANGE location of new metal panel from interior to exterior of the building. Metal panel shall have trim around the opening. Fill opening with CMU at interior. Fill cavity with insulation.

Paint the CMU infill at the interior for limits of infill. Color of paint shall match adjacent construction. Metal panel shall be 1W-41A horizontal metal panels by Centria or approved equal. Metal panel shall be a prefinished aluminum panel with Duragard Plus coating. Metal panel color to be selected by Engineer from manufacturer’s standard colors.

17. **QUESTION:** The demolition plan for the digesters do not indicate that any of the existing surfaces will be repaired or coated. Clarification is needed on the painting schedule and system to be used.

ANSWER: Drawing A-301. Section A. ADD NOTE “Paint ½” Exterior Gypsum Sheathing”

Drawing A-301. Section B. ADD NOTE “Paint ½” Exterior Gypsum Sheathing”

Specifications Section 09 90 00 Painting. Painting/Coating Schedule. New or Previously Unpainted Surfaces. DELETE “NOT USED” from Surface Column, all occurrences.

Specifications Section 09 90 00 Painting. Painting/Coating Schedule. New or Previously Unpainted Surfaces. ADD “20. Surface=Exterior Gypsum Sheathing; Preparation=Clean and Dry; Generic=Water Based Epoxy; Coats = Sanitile 120 Primer, 1-2 DFT (mil thickness); Sanitile 100 Second Coat (block filler) 12 DFT (mil thickness); and Sanitile 155 Top Coat. 2-3 DFT (mil thickness).”

18. **QUESTION:** Regarding the roofing work required on sheet A-301 for the above listed project, is the existing roof under warranty? If so, who is the manufacture or contractor who installed it? If it is under warranty, whoever is providing the warranty will have to make the proposed modifications.

ANSWER: The existing roof is not under warranty.

19. **QUESTION:** Please review the attached specifications for a Hayward Gordon mixing system. Currently only one supplier is listed. Please review and consider for adding to specs.

Also only list Varec for just about every digester gas safety piece of equipment. Please review Shand & Jurs, and consider for adding to specs.

ANSWER:

1. Shand and Jurs is an acceptable vendor for the Gas Safety Equipment.
2. Siemens used to be the only company competing with the Vaughn Rotamix tank mixing systems and Siemens used Hayward Gordon chopper pumps for their mixing systems. Hayward Gordon is now selling their own tank mixing system. They have partnered with GE Water Technologies who supplies the mixing nozzles and performs the CFD mixing analysis. It is acceptable to add Hayward Gordon to the mixing system specs.

Revised Specification Section 44 42 46.20 Digester Mixing System and revised Specification Section 44 46 00.12 Gas Safety Equipment, are provided in this addendum adding Shand and Jurs, and Hayward Gordon to the appropriate specification.

20. **QUESTION:** Below is a listing of comments by Walker Process regarding the specific sections, and request for approval to bid.

A.) 23-57-00 Digester Sludge Heat Exchangers

- **1.2.B.4** Specifies a design pressure of 150 psig. As previously stated, I think this is in error, primarily due to the following paragraph which lists a test pressure of 80 psig. Normally, the test pressure is 2x design so if the test pressure is 80 psig, the design should be 40 psig. Walker's maximum design pressure is 70 psig with a test pressure of 140 psig.
- **1.2.C.2.c** Specifies an outlet sludge temperature of 103° F. The actual sludge outlet temperature based on the parameters specified will be about 109° F
- **1.2.C.3.b** Specifies 180° F hot water. This is what I used in my heat transfer calculations but be aware that hot water above 150° F can bake the sludge on the side of the tubes. I would have recommended limiting the hot water to 150° F but be aware that will increase the size of the exchanger to get the same heat transfer.
- **2.1** Specific to one manufacturer. Walker's design is very similar but uses cast iron return bends and collars with gaskets to seal against the sludge and water tubes, therefore eliminating the need for the specified couplings.
- **2.2.C** specifies urethane foam insulation. Walker uses fiberglass insulation in lieu of urethane foam.
- The specification does not name any approved manufacturers for the heat exchangers. Walker asks that a paragraph be added including Walker as an approved and named manufacturer.

ANSWER: Revised Specification 23 57 00 – Digester Sludge Heat Exchanger will be issued by addendum. The revised specification is provided in this addendum, and now lists Walker as an approved named Manufacturer.

B.) 23-52-23 High Efficiency Burner

- **23-52-23** Specifies a burner for their existing boiler (manufacturer not listed) and for the new boiler. Walker Process system is design around the Power Flame burner. Only one named manufacturer (Weishaupt Model WM-G or equal). Additional information would be required in order for Walker to supply a burner for their existing boiler. Specification calls out for the burner to be "high efficiency" but they never say the efficiency. Walker's Power Flame burner operates at approximately 80% efficient. Walker would request that Power Flame be approved as an equal.

ANSWER:

Power flame is not an equal to the Weishaupt Burner.

C.) 23-52-33.16 Steel Water Tube Boilers

- **23-52-33.16** Specifies a Cleaver-Brooks boiler. Cleaver-Brooks will be marketed and sold by representative of all other listed approved products in this section, per the Cleaver Brooks distributor for LA. Walker Process will provide a complete evaluation of the specification if it is the intent of the engineer to provide approval to additional bidders. Please note Walker will have exceptions to the provided Cleaver Brooks specification. Please see general data for HeatX/Boiler systems provided by Walker Process. Walker Process request approval to bid this section as a listed manufacturer.

ANSWER:

The design is not suitable for the Walker Process Boiler because of its integral heat exchanger.

RECOMMENDED:



Dennis E. Brestle, P.E.



Justin Sharper, P.E.

APPROVED:



Adam Smith, P.E.

UNIT PRICE FORM

To: CITY OF BATON ROUGE
 PARISH OF EAST BATON ROUGE
 DEPARTMENT OF PUBLIC WORKS

BID FOR: NORTH WASTEWATER TREATMENT PLANT SUSTAINABILITY
 PROJECT

Project Number: 13-TP-MS-0045

<i>Description:</i> Sustainability Improvements				
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION <i>(Quantity X Unit Price)</i>
9999901	1	LUMP	\$ _____ . _____	\$ _____ . _____
<i>Description:</i> Tank/Compartment/Piping Draining and Cleaning				
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION <i>(Quantity X Unit Price)</i>
9999902	1	LUMP	\$ _____ . _____	\$ _____ . _____

SECTION 01 14 00 - SPECIAL REQUIREMENTS**PART 1 - GENERAL****1.1 DESCRIPTION**

- A. The Contractor shall provide labor, materials, equipment and services, and perform all operations required for completion of Work of this Contract as specified and as indicated on the Contract Drawings.
- B. This section supplements Requirements provided in the Special Provisions.

PART 2 - PRODUCTS (NOT USED)**PART 3 - EXECUTION****3.1 MAINTENANCE OF PLANT OPERATIONS****A. General:**

- 1. Maintenance of plant operation includes, but may not be limited, to the items discussed and describe herein. There may be additional instances where temporary measures (Equipment, piping, wiring, bypass pumping, temporary bulkheads, etc.) are necessary to maintain plant operations and/or the construction sequence. The Contractor is responsible for all costs to provide these temporary measures and these costs shall be included in the Contractor's lump sum price for this project.
- 2. The Contractor shall maintain operator access to all treatment plant processes at all times.
- 3. No tanks or process system shall be taken out of service without the Owner's written approval. The Contractor shall submit a written request to the Owner and give the Owner a minimum of two (2) weeks prior notice, unless otherwise noted, to coordinate and revise plant operational procedures to accommodate the change, thereby enabling approval of the Contractor's request.
- 4. Under no circumstances will the Contractor allow raw or improperly treated wastewater or sludge to be discharged on the construction site or surrounding grounds. Any accidental discharge shall be reported to the Owner immediately.
- 5. The Contractor shall submit a written description and time schedule for maintaining plant operations.

B. Digesters:

- 1. Two of the three anaerobic digesters must be in operation at all times. Once a digester is taken out of service, it must be drained and cleaned and all work associated with that digester must be completed before it is placed back into service. This work would include all demolition work, installation of the internal mixing nozzles and associated piping, roof mounted gas safety equipment, new level transmitters, digester gas piping, gas flow transmitters, sludge piping, etc.
- 2. The exterior wall insulation for Digester No. 3 must be installed before the digester is placed back in service.

C. Digester Waste Gas Burner:

1. The existing waste gas burner is being replaced with the new waste gas burner being installed at the same location as the existing waste gas burner. A new flame arrestor and thermal shut off valve assembly and back pressure regulator is being installed on the waste gas burner supply line. The maximum amount of time the waste gas burner can be out of service is five working days, Monday thru Friday.
2. Prior to the waste gas burner being taken out of service, the new cover pressure relief valves and emergency relief manholes must be installed on all digesters and the installation of which must be approved by the startup representative of the gas safety equipment manufacturer. Also, the new digester level transmitters must be installed and fully operational.
3. Before the existing waste gas burner is taken out of service, the new waste gas burner control panel must be installed with all power and control wiring installed to the fullest extent possible. Also, the Contractor must have all new materials on site and ready to be installed. The Contractor must have the field startup representative scheduled to be on site to perform the check out and field startup of the waste gas burner as soon as the new equipment has been installed. This startup shall include the adjustment of the new back pressure valve, adjustment of the new waste gas burner fuel/air mixture ratio, and the complete electrical checkout of the new waste gas burner control system.

D. Digester Sludge Heat Exchangers:

1. If a digester is in service, then an existing or the new heat exchanger that serves that digester must be in service with the capability to heat the digester and maintain heating at all times.
2. The existing sludge heat exchangers are being replaced with new heat exchangers installed at a new location. Each existing sludge heat exchanger can be removed when the corresponding digester is taken out of service for renovations. The new sludge heat exchangers can be installed to the fullest extent possible prior to the digester being taken out of service. The new heat exchanger piping tie-in's can be completed when the digester is out of service and the new heat exchanger must be capable of being immediately placed into service when the digester is placed back into service.
3. It may be necessary to interrupt sludge or hot water flow to the remaining heat exchangers to make piping tie-in's to a new heat exchanger. The maximum length of time this interruption can take place is 8 hours.

E. Digester Boiler:

1. One new boiler is being installed in the Heat Recovery Building to heat the digesters. An existing boiler must be maintained in operation at all times to maintain heat to the digesters until the new boiler is operable. The existing boiler will be shut down to allow the connection of digester gas piping to provide the unit with a dual fuel feed. The maximum amount of time the digesters can be without heat is 8 hours.

F. Digester Mixing Pumps:

1. Three new mixing pumps are being installed to mix Digesters No. 1 and No. 2 and two new mixing pumps are being installed to mix Digester No. 3. The Digester No. 1 and No. 2 mixing pumps are being installed at a location presently occupied by the two sludge heat exchanges

that serve Digesters No. 1 and No. 2. Therefore, the new sludge heat exchangers that will serve Digesters No. 1 and No. 2 must be installed and operational before the existing heat exchangers can be removed, allowing installation of the Digester No. 1 and No. 2 mixing pumps.

2. When a digester is taken out of service for renovations, its new mixing system must be capable of being immediately placed into operation when the digester is placed back into operation.

G. Digester Sludge Recirculation Pumps:

1. If a digester is in operation, a sludge recirculation pump must be in service to circulate sludge through a heat exchanger to maintain heating of that digester to the fullest extent possible. The maximum amount of time sludge heating can be interrupted is 8 hours. Sludge recirculation pumps are to be replaced one at a time while maintaining sludge recirculation to digesters in service.

H. Belt Press Feed Pumps:

1. The three existing feed pumps that feed sludge to the belt presses are being replaced. There are three belt presses. A minimum of two belt presses must be operational to the fullest extent possible. The maximum duration that belt press operation can be interrupted is two days. Belt press feed pumps are to be replaced one at a time while maintaining two belt presses in operation.

I. Maintenance of Electrical Power.

1. Electrical power must be maintained to the treatment plant process equipment at all times. If the main electrical service power is interrupted, standby power must be on-line. The maximum duration the utility power can be off-line is four (4) hours.
2. If temporary electrical generators are being utilized, provide an adequate fuel supply at all times and generator power output cables must be connected to the power distribution equipment at all times. Temporary electrical generation equipment must be protected from and able to operate in inclement weather.
3. All temporary electrical power distribution equipment and electrical generation equipment must be properly grounded.
4. The Contractor is responsible for providing temporary wiring as necessary to maintain operation of plant equipment
5. The Contractor shall plan the electrical work described in the documents to the sequence of construction described in this section.
6. The Contractor shall submit a written plan for review by the Owner and Engineer for all planned power outages, describing outage durations, affected equipment, and temporary measures being provided to keep process equipment operational. Describe safety procedures, grounding methods, and cable testing that will be provided. Electrical testing shall be performed in accordance with Specification Section 26 90 00 before placing equipment into service.

3.2 TANK/COMPARTMENT/PIPING DRAINING AND CLEANING

- A. The plant staff will dewater tanks/compartment to the depth indicated herein. The Contractor shall perform the final removal of tank contents and provide the final cleaning of the structures prior to commencing demolition or construction work.
- B. The Contractor is responsible to drain process piping as required for the connection of new pipe. For interior piping, the piping should be drained to existing sumps or floor drains. For yard piping, contain the drained material and transfer it to a manhole or tank designated to receive the material by the Owner.
- C. The Contractor shall give the Owner a minimum of 20 calendar days prior notice of when each tank needs to be dewatered.
- D. Digesters:
 - 1. The Contractor shall remove all liquid, sludge, snails, rags and grit from the digesters.
 - 2. Specific requirements are as follows:
 - a. The Contractor will be responsible for draining the digesters.
 - b. The Contractor will be responsible for providing the necessary manpower, pumps, equipment, hoses, etc. to remove the liquid, solids/grit, etc. in the tank. All materials removed from the tank must be dewatered and removed from the plant site within 24 hours of its being removed from the tank. Dewatering equipment may include portable belt filter press, centrifuge or other Owner approved device capable of producing 20 percent solids by weight in the dewatered cake. The Contractor shall provide a written Tank Cleaning and Spill Prevention Plan that addresses containment and procedures to follow in case of a spill of sludge, filtrate, fuel, etc. Refer to paragraph 3.3 of this specification section.
 - c. Contractor shall berm and line the working area on site in order to contain any spills should they occur. In case of a spill, procedures outlined in Contractor's submitted Spill Plan shall be followed.
 - d. Contractor shall perform general housekeeping, including but not limited to working area clean up and checking hoses condition and fittings, at least twice per day. Where necessary, lighting shall be supplied by the Contractor to allow night visibility and safe travel around any tanks or equipment by Contractor's and/or Owner's personnel.
 - e. The use of any of the Owner's machinery or equipment will not be permitted. The Owner does agree to supply utility water (plant effluent) for tank washdown, if it is available. The Contractor will assume any and all risks that may arise from his use of plant effluent water. If the Contractor chooses to utilize potable water, the Contractor shall make its own independent arrangements with the local water company.
 - f. The Contractor shall provide its own electrical power. Measures shall be taken to minimize and contain any fuel leakage from equipment or generators. Where necessary electrical devices and wiring used shall be explosion proof and carry appropriate UL approval. All lighting and wiring shall be properly grounded and made secure from electrocution hazard, physical or falling damage. All electrical installation and equipment shall comply with electrical safety codes.
 - g. Contractor shall check the work area for hazardous and explosive conditions. Where hazardous, explosive areas exist, Contractor shall provide intrinsically safe mechanical devices and equipment such as non-sparking aluminum wheels for fans, pneumatic

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- operators for dampers and aluminum clappers for check valves on pipelines conveying gaseous fuels, etc.
- h. Contractor shall designate a specific contained area within his working area to be used exclusively for fueling of construction equipment. Designated site will be approved by the Owner.
 - i. Water from leaking hoses and oil or fuel from equipment must be prevented from entering the plant storm drain system. The Contractor must directly address how he will address this preventive action in his submitted Spill Plan.
 - j. Liquid resulting from dewatering, spray water and cleaning may be pumped at a controlled rate not to exceed 500 gpm to a manhole on the plant site designated by the Owner.
3. Once all the liquid and sludge has been removed, the Contractor shall clean the interior walls, floor and ceiling of the tank by high pressure water blasting with a minimum of 3000 psi to remove all sludge, grease, rust, staining and dirt deposits to the satisfaction of the Engineer. Protect all instrumentation within the digesters during cleaning and construction activities.
 4. The Contractor may dispose of the dewatered materials at East Baton Rouge North Landfill, 16001 Samuels Road, Zachary, LA 70807 (contact Larry Moree, Landfill Superintendent, (225-389-5245) using the City's approval, given the following conditions are met:
 - a. The material may not contain free liquids.
 - b. The material must pass the paint filter test and contain minimum 20 percent solids by weight.
 - c. Certified Weight Slips for all residuals removed from the plant on a daily basis are to be provided to the Owner.
 - d. The Contractor is responsible for hauling cost and tipping fees and must set up its own payment terms with the landfill.
 5. The Owner will provide a signed manifest upon visual examination of each load to verify that it does not exhibit free-standing water. A grab sample for weight analysis will be taken by Owner's personnel from each load, prior to that load leaving the plant. When disposing of the waste material, the Contractor shall in no way jeopardize the Owner's ability to dispose of solids generated from daily plant operations
 6. If the landfill is not used as a disposal site, the Contractor must provide certification documents for any other site receiving the sludge from the digesters.
 7. No more than two (2) trailers may be staged on-site at any one time including the trailer that is being loaded. Trucks/trailers stored on-site and loaded with digester waste material must be covered. The Contractor shall insure that no odor is generated from the stored sludge.
 8. For hauling of the material removed, Contractor shall use the service of a state-approved and authorized waste transportation company. The Contractor shall provide copies of all required certificates and permits for waste hauling and sludge disposal to the Owner, prior to the initiation of tank cleaning. Hauling equipment must meet all state regulations. The back gate on all truck trailers or dumpsters must be sealed.
 9. Contractor shall have each trailer weighed prior to arriving and, after filling. The weight of each load shall be recorded on a ticket, a copy of which shall be issued to the driver of the vehicle. One copy of each ticket shall also be provided to the Owner with the appropriate disposal manifest number for verification purposes.
 10. Temporary dewatering equipment shall be placed in a location approved by the Owner.

11. Contractor shall provide electrical power for temporary dewatering operations.
12. Plant utility water may be used for temporary dewatering operations.
13. Rags and other un-filterable material may be removed by a vacuum truck or other Owner approved method. The vacuum truck must be decanted into a sewer drain inside the plant prior to disposing of materials at the landfill.
14. Payment for the tank/compartment/pipe draining and cleaning work will be made on a lump sum basis, which shall be full compensation for all work required in accordance with this Subsection 3.2.

3.3 WRITTEN TANK CLEANING AND SPILL PREVENTION PLAN

- A. Within thirty (30) days of Notice to Proceed with the work of this Contract and at least fourteen (14) days before commencing work in any digester. The Contractor shall submit a written plan. The plan shall include:
 1. A schedule the Contractor will follow to dispose of the dewatered sludge from the digesters. Should the Contractor decide that he must deviate from this written plan, he shall notify the Engineer in writing, in advance of the deviation. The Engineer must approve the deviation in advance of it being implemented. Failure to do so will result in immediate shut down of the sludge disposal operations until such time as the Engineer allows the operations to restart.
 2. Detailed cleanup plans for dealing with sludge, fuel, and dirty water leaks and spills, both inside the wastewater treatment plant, and outside the plant on public roads. Inside the plant, the concerns are that sludge or liquids will get into the storm water system and be flushed into a receiving stream, or get into a treatment flow and adversely affect plant treatment. In either case, a plant violation could be caused. Outside the plant, sludge or liquids getting on to road surfaces constitutes a hazard and are finable offenses under the Louisiana Highway Regulations. Sludge spilled on road shall be marked with traffic cones and cleaned up within 10 minutes of the spill. Inside or outside the plant, the Contractor will take any and all precautions to avoid spills whenever possible and should a spill occur, take action to clean up completely and immediately, as per the written plan. The Owner will not be responsible for any fines or violations incurred as a result of the Contractor's actions.

3.4 CONFINED SPACES

- A. Project includes confined space work areas. Compliance with the Owner's confined space entry requirements as well as applicable State and Federal regulations is required.
- B. The Engineer may need to enter a confined space to observe work and/or discuss technical issues while the Contractor is under an active entry permit. The Engineer may access the confined space under the Contractor's entry permit, however, will maintain a separate record of entry.

END OF SECTION 01 14 00

SECTION 23 57 00 - DIGESTER SLUDGE HEAT EXCHANGERS**PART 1 GENERAL****1.1 DESCRIPTION**

- A. The Work of this section includes, but is not limited to:
1. Three digester sludge heat exchangers.

1.2 QUALITY ASSURANCE

- A. Codes and Standards:
1. The codes, specifications, and standards referred to by number or title shall form a part of this specification to the extent required by the references thereto.
 - a. AISC - American Iron & Steel Institute.
 - b. ANSI - American National Standards Institute
 - c. HI - Hydraulic Institute.
 - d. NEMA - National Electric Manufacturer's Association.
 - e. ASME - American Society of Mechanical Engineers.
 - f. AWS - American Welding Society.
- B. Qualifications and Control:
1. Manufacturer shall be engaged primarily in design and fabrication of wastewater treatment equipment including heat exchangers.
 2. To ensure quality and single point responsibility the manufacturer shall design and fabricate its equipment. The use of contract fabrication shops shall not be allowed.
 3. The manufacturer shall design the heat exchanger to ASME Section VIII, Div. 1 code for pressure vessels.
 4. Design pressure shall be 70 psig.
 5. The unit shall be factory hydrostatically tested at 80 psig (minimum) for 1 hour on both the water and sludge tubes.
 6. Perform field tests specified in this section.
 7. Heat exchangers shall be as manufactured by Siemens, Inc., Olympus Technologies, Inc., Walker Process Equipment, Inc. or equal.
- C. System Description:
1. Heat transfer requirements, each unit: 865,000 Btu/hr.
 2. Sludge conditions:
 - a. Sludge flow: 160 gpm average, 225 gpm maximum.
 - b. Sludge inlet temperature: 95 °F.
 - c. Sludge outlet temperature: 103 °F, minimum
 - d. Maximum pressure loss: < 5 ft.
 - e. Design solids concentration: 4% by weight.
 - f. Sludge from: anaerobic digester
 - g. Maximum Overall Heat Transfer Coefficient: 200 Btu/hr•ft²•°F
 - h. Sludge tube fouling factor: 0.0010 hr•ft².°F/Btu
 3. Hot water conditions:
 - a. Water flow: 160 gpm average, 225 gpm maximum.
 - b. Water temperature: 160°F.
 - c. Maximum pressure loss: < 15 ft.

1.3 SUBMITTALS

- A. Listed manufacturers and series are for reference only and do not promote any single product. Series are provided for reference, and should not be used as an ordering model number. Accessories and options may be custom components purchased separately.
- B. Product Data: Provide manufacturer's catalog sheet for equipment indicating rough-in size, finish, and accessories. Manufacturer's data sheets on each item of equipment and device, marked up to identify the items to be used on the project.
- C. Shop drawings showing general equipment arrangement, installation details, dimensions, weight, and materials.
- D. Descriptive information such as catalogs, performance data, and other product literature showing equipment meets specified design criteria.
- E. Catalog cut sheets on accessory equipment such as flexible couplings, thermometers, pressure gauges, etc.
- F. Description of manufacturer's shop coating materials.
- G. Equipment Certification:
 - 1. At the time of submitting shop drawings, submit, on the form provided, the equipment manufacturer's warranty and certification attesting that the manufacturer has examined the Contract Drawings and specifications and that the equipment provided will meet the performance criteria and conforms to specification requirements.
 - 2. Submit certified results of all start-up and performance tests.
- H. Maintenance Data and Operating Instructions:
 - 1. Submit required number of copies of Operation and Maintenance Manual for the equipment furnished including a detailed description of the function of each principal component, procedures for operation, instructions for overhaul and maintenance.
 - 2. Include lubrication schedule, safety precautions, test procedures, electrical schematics, and parts lists.
- I. Maintenance Material (Spare Parts):
 - 1. Provide one spare coupling gasket of each size coupling for the heat exchanger.
 - 2. Provide any special tools required for equipment maintenance; provide all special equipment and tools needed to maintain and calibrate equipment.
- J. Installation Certificate:
 - 1. Obtain and provide the Owner with an Installation Certificate signed by the equipment manufacturer's representative attesting that the equipment has been properly installed and is ready for start-up and performance testing.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Receive deliveries, handle, store, and protect equipment as recommended by manufacturer and as specified in other sections.

1.5 FIELD SERVICES

- A. Provide the services of a manufacturer's representative experienced in the installation and operation of the system supplied under this specification for not less than three (3) 8-hour workdays on-site for

installation inspection, start-up and performance testing, and instructing Owner's personnel in the operation and maintenance of the system and its equipment.

- B. Provide for the above services to be performed during three (3) separate visits to the project site.

PART 2 PRODUCTS

2.1 HEAT EXCHANGERS

- A. The heat exchanger shall be a concentric tube within a tube unit.
- B. Sludge shall circulate through the inner 4 inch tube.
- C. Water shall circulate through the surrounding 6 inch tube in a counter current arrangement.
- D. All tubes shall be constructed of carbon steel pipe with minimum nominal wall thickness of 1/4 inch. Tubes shall meet ASME A-53-B for steel piping.
- E. Pipe nozzles shall be designed with and provided class 150 flanges.
- F. Gasket materials shall be full faced, UL approved neoprene, EPDM with minimum thickness of 1/8 inch and rated for 200 psi and 230 °F.
- G. The sludge tubes shall be connected by full passage steel or cast iron return bend elbows having couplings or gasketed collars.
- H. Water tubes shall be connected by short coupled tubes.
- I. All tube connections shall be provided with grooved ends and flexible couplings to prevent leaking and prevent mixing of water with sludge.
- J. Flexible couplings shall meet ASTM A47/ASTM A536 requirements and be rated for 350 psi working pressure.
- K. Sludge inlet and outlet tubes and water inlet and outlet tubes shall be provided with 1 inch NPT couplings for temperature and pressure gauges.
- L. At high points and low points for sludge and water tubes, provide 1 inch NPT (minimum diameter) threaded couplings with plugs for draining and venting purposes.
- M. Provide the heat exchanger with a structural tube support structure which shall be bolted or welded to a structural support skid.
- N. Provide lifting lugs sufficient to lift the heat exchanger.

2.2 INSULATION PANELS

- A. Enclose all straight run sections of sludge and water tubes within a 16 gauge galvanized steel panel enclosure.
- B. Return bends and inlet and outlet nozzles shall not be enclosed or insulated.
- C. Provide a minimum 2 inches thick heat resistant urethane foam or fiberglass insulation on the inside of the galvanized steel panel enclosure sections.

2.3 SLUDGE HEAT EXCHANGER CONTROL PANEL

- A. The heat exchanger manufacturer shall provide a Nema 4X stainless 110V, single phase control panel having a circuit breaker with a thru-the-door operator to house the following for control of the sludge flow and hot water flow thru the heat exchanger:
1. Sludge inlet temperature controller.
 2. Sludge outlet temperature digital indicator.
 3. Hot water inlet temperature digital indicator.
 4. Hot water outlet temperature digitals indicator.
 5. Open/Close/Auto switch for control of an 110V, 1 phase, motorized hot water supply 3-way ball valve.
 6. Open and Closed relays, position indication lights and open and close failure lights and reset push button for the motorized valve.
 7. Continuous/Intermittent selector switch for control of the sludge recirculation pump.
 8. Run frequency and run duration timers for intermittent control of the sludge recirculation pump.
 9. TVSS unit
 10. Control power available light.
 11. Master Terminal strip.
- B. Panel Construction and components shall conform to specification Section 25 02 00 - Control Panels and Control Stations.
- C. The digital temperature indicators and temperature controller shall have a range from – 0 degrees F to + 200 Degrees F. Provide stainless steel thermowells in the heat exchanger sludge and hot water supply and return nozzles with platinum RTD sensors mounted in each thermowell and wired the temperature indicator or controller mounted on the door of the control panel. The RTD protection heads shall be weatherproof cast aluminum.
- D. The sludge temperature controller shall be microprocessor based, shall indicate the temperature, output a 4-20 ma signal proportional to temperature, and shall have adjustable setpoints for hot water on/off control. Provide auxiliary dry contacts wired to the panel master terminal strip for each alarm. The controller shall provide an adjustable time delay for each control and alarm function.
- E. Provide auxiliary dry contacts wired to the panel terminal strip for the “Auto” status of the valve O/C/A switch, the “Intermittent” position of the recirculation pumps Continuous/Intermittent selector switch and the “Open” and “Closed” positions of the hot water supply motorized valve. Also, provide an auxiliary dry recirculation pump “run command” contact wired to the panel terminal strip.
- F. Provide 4-20mA outputs wired to the panel master terminal strip for sludge inlet, sludge outlet, hot water inlet, and hot water outlet temperatures. Each digital temperature indicator shall have an auxiliary 4-20mA output proportional to the sludge or water temperature.
- G. When the sludge recirculation pump continuous/intermittent selector switch is in the continuous position, a dry contact on the switch wired to the panel master terminal strip will be field wired to the sludge recirculation pump start/stop control circuit via a central termination cabinet to start the pump and it will run continuously. When the selector switch is in the intermittent position, the run duration timer contact output will be routed through the switch contacts to the panel terminal strip and the pump VFD start/stop control circuit. If the sludge inlet temperature controller calls for the sludge to be heated when the sludge recirculation pump is called for by the run duration timer, the sludge temperature controller shall override the run frequency and duration timers and keep the sludge recirculation pump operating until the sludge controller temperature set point is reached. The sludge inlet temperature controller will open the hot water supply valve when heat is required and close the valve when the sludge inlet temperature temperature set point is reached. Provide time delay and

control relays for performing valve failed to open and failed to close monitoring and provide valve failed to open and failed to close alarm lights with reset push button.

PART 3 EXECUTION

3.1 FOUNDATION

- A. Examine foundation or support structure where the heat exchanger is to be located and make any modifications necessary for mounting the equipment.
- B. Anchor bolts shall be provided for the equipment and shall be located as required. Anchor bolts shall be 304 stainless steel adhesive type.

3.2 INSTALLATION

- A. Install the equipment and accessories in accordance with the drawings and manufacturer's written instructions.
- B. Check all piping and bolted connections to make sure they are properly tightened.
- C. Obtain and provide the Owner with an Installation Certificate signed by the equipment manufacturer's representative attesting that the equipment has been properly installed and is ready for start-up and performance testing.

3.3 SHOP PAINTING

- A. Exposed piping and support structure.
 - 1. Support base, framing members, and all steel piping exposed outside of insulation enclosure shall receive surface preparation of SSPC-SP2, hand tool cleaning.
 - 2. Painting shall be Hammerite Rust Cap, Hammer Finish, anti-rust paint, 7-9 mils minimum dft
- B. Steel enclosure.
 - 1. Steel enclosure shall be of galvanized steel gauge metal.
 - 2. Surfaces shall not require painting.
- C. Piping inside insulated enclosure shall not require painting.

3.4 TESTING

- A. Inspect the installation of the heat exchanger and make final preparations for testing.
- B. To check piping connections to the heat exchanger, fill the sludge and water tubes and delivery and discharge sludge and water piping with test water. Pressurize both water and sludge tubes and piping to a minimum of 80 psi and maintain pressure for at least 1 hr. to demonstrate water tight construction.
- C. Perform a one-hour test at design flows for both water and sludge tubes without malfunction or leakage.
- D. Calibrate all instrumentation.
- E. Demonstrate all control panel logic and alarm generation is working properly to the satisfaction of the Engineer.
- F. Verify sludge and hot water pressure losses are equal to or lower than the maximum allowable specified.

- G. Certify that the heat exchanger has been installed properly and is ready for normal operation. Provide equipment installation certificate.
- H. Operate each heat exchanger under normal conditions for a seven consecutive day period. Record the temperature of the sludge in and sludge out and the hot water supply in and out at two hour intervals for eight hours each day (four sets of readings each day) while the Contractor's staff is on-site. Compare results to the design criteria in paragraph 1.2.C.

3.5 EQUIPMENT ACCEPTANCE

- A. Adjust, repair, modify or replace any components which fail to perform as specified and rerun the tests. Make final adjustments under the direction of the manufacturer's representative and to the satisfaction of the Engineer.

3.6 START-UP

- A. Perform start-up in accordance with Section 01665 (VOL1).

3.7 TRAINING

- A. Perform training in accordance with Section 01665 (VOL1).

END OF SECTION 23 57 00

SECTION 44 42 46.20 - DIGESTER MIXING SYSTEMS**PART 1 GENERAL****1.1 DESCRIPTION**

- A. The Work under this Section includes, but is not limited to, the following:
1. Three (3) complete mixing systems shall be furnished consisting of floor mounted mixing nozzle assemblies and associated chopper pumps. The nozzles shall be designed to produce a rotational mixing pattern within the tank. The rotation will create a homogeneous state throughout the entire process suspending both organic and inorganic solids. The mixing pattern shall effectively prevent mounding in the center of the process. The vendor shall be responsible for determining mixing assembly quantity, location, and appropriate nozzle angles and nozzle throat sizes. Each mixing system shall include an upper mixing nozzle assembly through which a portion of the mixing pump discharge flow will be routed and utilized to provide mixing at the upper portion of the tank surface inhibiting the buildup of scum on the tank surface. The selection of the upper mixing nozzle throat size shall be based on a comparison of the headloss through the lower mixing nozzles versus the upper mixing nozzle to insure that adequate flow can be maintained to the upper mixing nozzle. Three (3) mixing pumps shall be provided for mixing Digesters No. 1 and No. 2 and two (2) mixing pumps shall be provided for mixing Digester No. 3 for a total of five mixing pumps to be provided.
- B. Related Work specified elsewhere:
1. Section 09 90 00 - Painting.
 2. Section 40 23 19 - Pipe and Pipe Fittings
 3. Section 40 23 20 - Valves and Piping Specialties
 4. Division 26 - Electrical

1.2 QUALITY ASSURANCE

- A. Service Conditions:
1. The mixing system shall be sized for the following service conditions:
 - a. Tank Diameter: 65.0 feet.
 - b. Side Wall Depth: 33.0 feet.
 - c. Maximum Water Depth: 29.0 feet.
 - d. Minimum Water Depth: 20.00 feet.
 - e. Percent Solids: 2.5 – 6.5%.
 2. Each pump shall be capable of running dry without damage.
 3. Pump shall be of the end suction, horizontal, constant speed, centrifugal type; the pump shall be of the chopping type specifically designed and constructed to macerate and condition solids such as plastics, rags, grease, hair, wood and stringy materials as an integral part of the pumping action, with the impeller edges shearing across the cutter bar that extends completely across the inlet opening.
- B. Design Conditions:
1. Number of Mixing Systems Required: 3
 2. Number of Pumps Required: 5
 3. Pump Design Flow: 3,300 gpm
 4. Design TDH: 32 feet
 5. Minimum shutoff Head: 55 feet
 6. Minimum Motor HP: 50 hp
 7. Maximum Speed: 890 RPM

8. Mixing system shall provide 90% mixing of solids in digester within 30 minutes of starting.
 9. Mixing System: Rotamix™ of Vaughn Co, Inc., (360)249-4042, Hayward Gordon, or equal.
 10. Mixing pumps shall be Vaughn or Hayward Gordon Chopper Pumps.
- C. Reference Standards:
1. American Society for Testing and Materials (ASTM):
 - a. ASTM A148 - Standard Specification for Steel Casings, High Strength, for Structural Purposes
 - b. ASTM A536 -Standard Specification for Ductile Iron Castings

1.3 SUBMITTALS

- A. Shop Drawings and Product Data: Submit detailed certified dimensional shop drawings and manufacturer's product data for materials and equipment, including wiring and control diagrams. Show complete information concerning materials of construction, fabrication, protective coatings, installation and anchoring requirements, fasteners, and other details. Provide field installed vibration limits for equipment.
- B. Equipment Certification:
1. At the time of submitting shop drawings, submit, on the form provided (Section 00 62 33.10), the equipment manufacturer's warranty and certification attesting that the manufacturer has examined the Contract Drawings and specifications and that the equipment provided will meet the performance criteria and conforms to specification requirements.
 2. Before shipment, submit certified pump performance curves showing head/capacity relationships and required horsepower after pump assemblies have been fabricated and performance tested at the factory.
 3. Submit certified results of all start-up and performance tests.
- C. Maintenance Data and Operating Instructions:
1. Submit required number of copies of Operation and Maintenance Manual for the equipment furnished including a detailed description of the function of each principal component, procedures for operation, instructions for overhaul and maintenance.
 2. Include lubrication schedule, safety precautions, test procedures, electrical schematics, and parts lists.
- D. Maintenance Material (Spare Parts):
1. The manufacturer does not recommend spare part storage by Owner as all parts are available within 24 hours. Provide listing of spare parts and cost of each part.
 2. Provide any special tools required for equipment maintenance; provide all special equipment and tools needed to maintain and calibrate equipment.
- E. Installation Certificate:
1. Obtain and provide the Owner with an Installation Certificate, Section 00 62 33.12 signed by the equipment manufacturer's representative attesting that the equipment has been properly installed and is ready for start-up and performance testing.

1.4 FIELD SERVICES

- A. Provide the services of a manufacturer's representative experienced in the installation and operation of the system supplied under this specification for not less than six (6) 8-hour workdays on-site for installation inspection, start-up and performance testing, and instructing Owner's personnel in the operation and maintenance of the system and its equipment.
- B. Provide for the above services to be performed during three (3) separate visits to the project site.

1.5 WARRANTY

- A. Nozzles shall be warranted by the manufacturer for ten (10) years with a non-prorated warranty, commencing on the system start-up date.

PART 2 PRODUCTS**2.1 PUMP**

- A. Casing: Shall be ASTM A536 ductile cast iron with all water passages to be smooth and free of blowholes and imperfections that inhibit good flow characteristics. Provide pump with 150 lb. flanged inlet nozzle having a top cleanout and bottom drain plug. Provide pump with a standard 150 lb. discharge flange.
- B. Impeller:
1. Shall be semi-open type with pump out vanes to reduce seal area pressure and to draw lubricant down from the reservoir should seal leakage occur.
 2. Chopping/maceration of materials shall be accomplished by the action of the cupped and sharpened leading edges of the impeller blades moving across the cutter bar at the intake openings, with a set clearance between the impeller and cutter bar of .010" to .015".
 3. Impeller shall be cast from ASTM A148, Gr. 90-60 alloy and heat treated to 550 Brinell hardness and dynamically balanced; the impeller shall be rigidly held in place with an impeller bolt and have no axial adjustments and no setscrews.
- C. Cutter Bar: Shall be recessed into the pump bowl, with a funnel shaped inlet opening, and shall extend diametrically across entire pump suction opening; cutter bar shall be cast from ASTM A148, Gr. 90-60 cast alloy steel and heat treated to 60 Rockwell C hardness.
- D. Upper Cutter: Shall be threaded into the casing above the impeller, designed to cut against the pump out vanes and the impeller hub, reducing and removing stringy materials from the mechanical seal area; upper cutter shall be cast from ASTM A148, Gr. 90-60 cast alloy steel and heat treated to 550 Brinell hardness.
- E. Pump Shafting:
1. The pump shaft and impeller shall be supported by ball bearings.
 2. All shafting shall be AISI 4140 heat treated.
- F. Bearings: Shaft thrust in both directions shall be taken up by two back-to-back mounted single-row angular contact ball bearings. Two back-to-back mounted single-row radial bearings shall also be provided. B10 bearing life shall be minimum 100,000 hours.
- G. Bearing Housing: Shall be A536 ductile cast iron, and machined with piloted bearing fits for concentricity of all components. Bearing housing shall be oil bath lubricated with ISO Gr. 46 turbine oil and a side-mounted site glass to provide a permanently lubricated assembly. Viton double lip seals riding on stainless steel shaft sleeves are to provide sealing at each end of the bearing housing.
- H. Shaft Sleeve: Shaft sleeve shall be 316 stainless steel.
- I. Mechanical Seal:
1. Provide pump with a silicon carbide faced mechanical seal that requires no flushing water to keep seal cool and clean.
 2. There shall be a 316 stainless steel protective shroud enclosing the seal bellows as a part of the rotating seal member.

3. Seals shall be tested for flatness within two helium light bands under a helium light source and optical flat.
- J. Pump and motor shall be flexible coupled. Provide an OSHA approved coupling guard.
- K. Pump Base Plate: Heavy duty common fabricated structural steel base for pump and motor, designed to resist torsional movement and to support the combined weight of pump and motor without deflection at rest and under load. After leveling and alignment, the base shall be grouted and completely filled with an epoxy grout.
- L. Stainless Steel Nameplates: Shall be attached to the pump and drive motor giving the manufacturer's model and serial number, rated capacity, head, speed, and all pertinent data.

2.2 MOTOR

- A. Motor shall be suitable for operation on 230/460 volt, 3 phase, 60 Hz alternating current.
- B. Motor shall be in accordance with all current applicable standards of NEMA, IEEE, Anti-Friction Bearing Manufacturers Association, Hydraulic Institute, NEC and ANSI.
- C. Motor shall be TEFC, NEMA Design B, Class F insulated, squirrel cage induction type having a 1.15 service factor.
- D. Motor to be premium efficiency.
- E. Motor shall be capable of carrying full load current continuously without injurious temperature in an ambient temperature of 40 C.
- F. Motor shall be of sufficient size so there will be no overload on the motor without exceeding a 1.0 service factor under any condition of operation from shutoff to zero head.

2.3 TANK MIXING ASSEMBLIES

- A. Floor and wall mounted assemblies shall accommodate a total recirculation flow of 3,300 GPM for three (3) dual nozzle floor assemblies (total of 6 nozzles) per tank and one (1) single wall mounted assembly. Base elbows and fittings shall be glass lined ductile iron pipe. Provide a 1/2" thick 1018 HR steel base assembly for support of the elbow. Nozzle shall be 1.0 inch wall thickness, cast steel, heat treated to 450+ Brinell hardness. Associated hardware shall be 316 stainless steel. Inlet flange shall have 150 lb. drilling. Provide Victaulic couplings on nozzles to allow 360 degree adjustment of nozzle position. The maximum headloss through the bottom mixing nozzle shall not exceed 23 feet at the design flow rate. The wall mounted scum suppression nozzle shall be capable of passing 515 GPM.

2.4 MATERIAL PROTECTION

- A. Sandblast all ferrous metal surfaces to SSPC-SP 10, White Metal Blast. Shop coat with primer suitable for the intended service and compatible with the intended finish coating system specified in Specification Section 09 90 00.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install the pumps and nozzle assemblies where indicated on the Drawings and in accordance with the manufacturer's instructions and the approved shop drawings.
- B. Provide and connect piping, accessories, and power as required to ensure a complete operable unit as intended.

- C. Obtain and provide the Owner with an Installation Certificate, Section 00 62 33.12, signed by the equipment manufacturer's representative attesting that the equipment has been properly installed and is ready for start-up and performance testing.

3.2 INSPECTION

- A. Make the following checks before operating the chopper pumps:
 1. Check pump/motor alignment according to standards of the Hydraulic Institute.
 2. Assure that all piping connections are complete and all piping is clear of debris which might clog pump.
 3. Check for proper motor rotation.
 4. Vent air from system to assure water in the pump.

3.3 START-UP AND PERFORMANCE TESTING

- A. Partially fill the digester with water to the minimum depth recommended by the pump manufacturer for safe operation of the pump.
- B. Operate pump unit on water for a minimum of two continuous hours under the supervision of the manufacturer's representative and in the presence of the Engineer.
- C. Check motors and pumps for excessive vibration and high bearing temperatures. Check for motor overload by taking ampere readings at pumps start and every 15 minutes during the operating time listed in 3.3.B. Record suction and discharge pressure every 15 minutes. Check oil level in the bearing housing after the time period specified in 3.3.B.
- D. Based on the recorded pressures during the two hour test, determine pump running TDH and pump rate from performance curves and compare the rate to the design rate.
- E. After the initial two hour test, operate the pump unit on water for a minimum of eight hours each day for seven consecutive days during the day while the Contractor's staff is on site. Twice daily check and record suction and discharge pressures and the motor amp reading. Check the motors and pumps for excessive vibration and high bearing temperatures.
- F. After a successful seven day test, fill the digester with sludge and verify pump performance using the installed pressure gauges on the pump suction and discharge. Calculate pump running TDH and compare to performance curve.
- G. Mixing performance shall be tested by sampling sludge from the sludge holding tank. Samples shall be taken from at least three (3) locations and depths in the digester. Samples shall be taken no more than 30 minutes after the system is started up. Each sample shall be tested for total suspended solids. Mixing performance shall be considered acceptable if each sample's total suspended solids concentration is within 10% of the geometric mean of the sample concentrations. The sample analysis shall be performed by an independent laboratory paid for by the Contractor and approved by the Engineer.

3.4 EQUIPMENT ACCEPTANCE

- A. Adjust, repair, modify or replace any components which fail to perform as specified and rerun the tests. Make final adjustments under the direction of the manufacturer's representative and to the satisfaction of the Engineer.

3.5 TRAINING

- A. Provide training to the Owner in accordance with Section 01665 (VOL1).

END OF SECTION 44 42 46.20

SECTION 44 46 00.12 - DIGESTER GAS SAFETY EQUIPMENT**PART 1 GENERAL****1.1 DESCRIPTION**

- A. The Work of this section includes, but is not limited to:
1. Pressure/Vacuum Relief Valve and Flame Arrester
 2. Safety Selector Valve
 3. Sampling Hatch
 4. Emergency Pressure Relief Manhole Cover
 5. Condensate Accumulator
 6. Low Pressure Manual Drip Trap
 7. Low Pressure Drip Trap with Electric Actuator
 8. Low Pressure Check Valve
 9. Thermal Shutoff Valve
 10. Pressure Relief and Flame Trap Assembly
 11. Flame Trap Assembly
 12. Flame Check
 13. Well-Type Manometer
 14. Waste Gas Burner with Automatic Pilot Ignition System
- B. Related Work specified elsewhere:
1. Section 09 90 00 - Painting
 2. Section 40 23 19 - Pipe and Pipe Fittings
 3. Section 40 23 20 - Valves and Piping Specialties
 4. Section 40 23 21 - Testing Piping Systems

1.2 QUALITY ASSURANCE

- A. Products shall be new, the latest standard products of reputable manufacturers, and shall have replacement parts available.
- B. Materials contaminated with gasoline, lubricating oil, liquid or gaseous fuels will be rejected.
- C. The product list in this equipment specification in most cases lists model numbers for equipment manufactured by Varec Biogas. Equivalent equipment manufactured by Shand and Jurs will be acceptable also.

1.3 SUBMITTALS

- A. Shop Drawings and Product Data:
1. Submit detailed certified dimensional shop drawings and manufacturer's product data for each system component, including wiring and control diagrams if applicable.
 2. Show complete information concerning materials of construction, fabrication, capacities, protective coatings, installation and anchoring requirements, fasteners, and other details.
- B. Equipment Certification:
1. At the time of submitting shop drawings, submit, on the form provided (Section 00 62 33.10), the equipment manufacturer's warranty and certification attesting that the manufacturer has examined the Contract Drawings and specifications and that the equipment provided will meet the performance criteria and conforms to specification requirements.

2. Submit certified results of all start-up and performance tests.
- C. Maintenance Data and Operating Instructions:
1. Submit the required number of Operation and Maintenance Manuals for the equipment furnished including a detailed description of the function of each principal component, procedures for operation, instructions for overhaul and maintenance.
 2. Include lubrication schedule, safety precautions, test procedures, electrical schematics, and parts lists.
- D. Maintenance Material: (Spare Parts)
1. Provide a list of the manufacturer's recommended spare parts for each piece of equipment and a price list for the spare parts.
 2. The Owner may choose to purchase spare parts at a later date.
- E. Installation Certificate:
1. Obtain and provide the Owner with an Installation Certificate, Section 00 62 33.12 signed by the equipment manufacturer's representative attesting that the equipment has been properly installed and is ready for start-up and performance testing.

1.4 FIELD SERVICES

- A. Provide the services of a manufacturer's representative experienced in the installation and operation of the equipment supplied under this Specification for not less than three (3) 8-hour workdays on-site for installation inspection, start-up and performance testing, and instructing Owner's personnel in the operation and maintenance of the equipment.
- B. Provide for the above services to be performed during three (3) separate visits to the project site.

PART 2 PRODUCTS

2.1 PRESSURE/VACUUM RELIEF VALVE AND FLAME ARRESTER

- A. Pressure and vacuum relief valve with flame arrester shall have 6 inch size flanged connections. Pressure relief shall be set at 12" WC.
- B. Capacity shall be not less than 12,000 SCFH digester gas at 2" WC overpressure.
- C. Vacuum relief shall be set at 2" WC.
- D. Capacity shall be not less than 12,000 SCFH digester gas at 1" WC underpressure.
- E. Relief valve and flame arrester shall be two independent items of equipment. Valve shall be field installed on the flame arrester by means of a bolted and gasketed flanged connection.
- F. Valve pressure and vacuum ports shall be oversized to keep overpressure to a minimum. Pallets and seat rings shall be replaceable and interchangeable. Pallets shall be dead weight loaded, and both center and side guided for stability. They shall incorporate replaceable "air cushion" Teflon® seat inserts. HDPE protective screens shall be provided at the pressure and vacuum ports, located external of the pallets.
- G. The valve body and cover and spun hood shall be low copper cast aluminum construction. Spun hood, seat rings, and pallet assemblies shall be stainless steel. Guideposts shall be 304 stainless steel.
- H. Flame arrester net free area through the bank assembly shall be not less than three times the corresponding size standard pipe. Entire bank assembly shall slide easily out of the arrester housing to facilitate inspection and cleaning. Removing or replacing the bank assembly shall not require removing

the pressure and vacuum relief valve off-line, nor shall it require support for the valve and proper alignment, jackscrew for extending the housing. Bank frame shall be extensible and shall be filled with corrugated rectangular shaped bank sheets. Alternating flat and crimped ribbon sheets are not an acceptable substitute. Flame arrester shall be self -draining.

- I. Arrester housing construction shall be low copper cast aluminum. Bank assembly shall include a low copper aluminum frame and 316 stainless steel bank sheets. Flanges shall be drilled to ANSI 125 FF flanged dimensions. Flame arrester shall be leak proof to 10 psig. Flame arrester for horizontal service shall be VAREC 5010 Series.
- J. Flanges shall be drilled to ANSI 125 FF Flanged dimensions. Relief valve and flame arrester combination shall be VAREC 5811B Series, or equal

2.2 SAFETY SELECTOR VALVE

- A. Install a Safety Selector Valve (SSV) with the two pressure and vacuum relief valve and flame arrester assemblies on each digester to allow performing maintenance on one unit while the other is kept in operation.
- B. The valve design shall prevent the possibility of leaving the digester unprotected at any time during the switch-over of the operating pressure and vacuum relief (PVR) valve and flame arrester assembly.
- C. Valve shall have built in seat equalization. This is defined as the pressure being uniform and equalized across the SSV seat during changeover in order to -facilitate the changeover process. During the changeover pressure shall be applied to both sides of the seating surface. Valves in which pressure is applied to only one side of the seating surface during changeover shall not be allowed. No special tools shall be required to operate the unit. The SSV shall require no more than 80 foot-pounds of torque to equalize the seat. Units requiring more than 80 foot-pounds shall be supplied with explosion proof electric actuators.
- D. A bright red indicator manufactured in stainless steel shall be included to provide positive indication of active pressure and vacuum relief and flame arrester.
- E. There shall be means to accommodate a locking device shall be provided to prevent unwanted access to either of the Pressure and Vacuum Relief (PVR) Valve and Flame Arrester Assembly.
- F. The SSV shall have a pressure drop through the active device of not greater than 3% of the flow with the pressure relief valve fully open. Valve design shall have Cv values which are verified in an ASME certified flow test facility. Testing shall have been witnessed by an ASME observer and test reports shall be supplied as part of the submittal process. Cv shall, at a minimum, be as defined in the following tables:

1.	4"	1061
2.	6"	2713
3.	8"	4512
- G. Packing design shall be tested to ASTM E427, Method A Halogen Leak Test, to reduce the possibility of fugitive emissions.
- H. The SSV shall come with threaded ports on both process sides. The threaded ports shall come with 1" manual hand valves constructed in stainless steel. This will allow pressure testing of each process side and subsequently allow field testing and calibration of the pressure and vacuum relief valve and flame arrester.

- I. The safety selector valve shall be rated for a minimum pressure of 15 psig at 100 degrees F and shall be rated for a maximum temperature of 400 degrees F.-The unit shall come with ANSI 150 FF flanged connections.
- J. Material shall be as follows:
 1. Body, Base:
 - a. Aluminum; Rotor
 - b. Indicator and Seat 316 SS
 - c. Isolation Disk
 - d. Index Shaft
 2. Retraction Bushing:
 - a. Stainless steel
 - b. Body/Base Nut and Process Connection Nut spa 94 stainless steel
 - c. Body/Base Stud and Process Connection Stud: SA193-B8M stainless steel
 3. Soft Goods: Teflon.
- K. Safety selector valve shall be as manufactured by Varec, or equal.

2.3 SAMPLE HATCH

- A. Sampling hatch shall have 8-inch size flanged connections. Hatch shall include inclined foot pedal to facilitate opening.
- B. Locking pin with stops shall be provided to ensure a positive seal. Locking pin shall be replaceable to allow pad locking of the unit. Construction shall be low copper aluminum. Replaceable BUNA-N cover insert shall be provided for non-sparking operation. Flange shall be drilled per ANSI 150 (ANSI 125) FF flanged dimensions. Maximum working pressure shall be 3 psig.
- C. Sampling hatch shall be VAREC 4310 Series, or equal.

2.4 EMERGENCY PRESSURE RELIEF MANHOLE COVERS

- A. Cover to provide emergency pressure relief when pressure exceeds 12" WC. Each cover shall be hinged and shall be provided with weather hood and screen. A restraining cable is not an acceptable substitute for the hinged design. The cover shall reseal properly after venting. All hardware shall be stainless steel. Diaphragms shall be PTFE.
- B. The manhole cover shall be of aluminum base and cover construction. Provide unit with 150 lb. flange connection.
- C. Emergency relief manhole covers shall be Varec Biogas 400W Series, or equal.

2.5 CONDENSATE AND SEDIMENT TRAP

- A. Storage capacity shall be a minimum of 6 gallons (23 liters) sediment and 6 gallons (23 liters) condensate. The operating principle for removing sediment from gas shall be centrifugal force developed by a circular motion of gas passing through at high velocities and gravity. Inlet elbow shall be specifically designed to swirl the gas inside the reservoir. An internal baffle shall be located at the base of the reservoir to provide efficient separation of entrained droplets. A 2" (50 mm) NPT blowout connection, a 1" (25 mm) NPT drain connection, and two ½" (15 mm) NPT connections for a sightglass shall be provided. A removable top cover for interior access with integral ¾" (20 mm) NPT inspection pipe for sediment level measurement shall be provided. Construction shall be 316 stainless steel. Provide with the following minimum wall thickness:
 1. 2"-6" = 0.250"

2. 8"-12" size = 0.375"
- B. Flanges shall be drilled to ANSI 150# FF dimensions. Maximum working pressure shall be 25 psig (172kPa).
- C. Sight glass assembly shall have ½" NPT connections and shall be of the correct length to fit the required sight glass connections. Sight tube shall be 5/8" (16 mm) O.D. Stainless steel guard rods shall protect the sight tube. Assembly shall include two stainless steel isolation valves to facilitate cleaning. Lower valve shall include a stainless steel drain cock.
- D. Maximum working pressure shall be 15 psig. Condensate accumulator shall be Varec Biogas 248 Series, or equal.

2.6 LOW PRESSURE MANUAL DRIP TRAP

- A. Low pressure manual drip trap shall have 1 inch size NPT inlet and outlet connections. Drip trap shall be the rotating disc type. Gas escaping to atmosphere is not possible regardless of the disc position. An air inlet port shall be provided to permit free flow of condensate from reservoir when draining. All ports shall be "O" ring sealed. Storage capacity shall be 6 quarts. Construction shall be low copper cast aluminum body, cover plate, disc, and handle. Disc shall be anodized. Internal working parts and fasteners shall be stainless steel. "O" rings shall be neoprene. Maximum working pressure shall be 5 psig. Low pressure manual drip trap shall be Varec Biogas Model 246.

2.7 LOW PRESSURE DRIP TRAP WITH ELECTRIC ACTUATOR

- A. Low pressure drip trap shall have 1 inch size NPT inlet and outlet connections. Drip trap shall be the rotating disc type. The escape of gas shall not be possible regardless of the disc position. An air inlet port shall be provided to permit free flow of condensate from reservoir when draining. All ports shall be "O" ring sealed. Storage capacity shall be 6 quarts. Construction shall be low copper cast aluminum body, cover plate, disc, and handle. Disc shall be anodized. Internal working parts and fasteners shall be stainless steel. "O" rings shall be neoprene. Maximum working pressure shall be 5 psig. Low pressure manual drip trap shall be Varec Biogas Model 246, or equal.
- B. An electric actuator shall be provided to open and close the drip trap automatically. The actuator shall be rated for Class 1, Divisions 1 and 2. The electric actuator shall include a manual override and not be operable electrically while the manual override is engaged. The actuator shall include a high torque reversible motor with built-in overload protection.
- C. Control Panel:
 1. A local control panel shall be provided to operate the drip trap.
 2. The control panel shall be NEMA 7, aluminum enclosure, and operate on 110V, 1 phase power source. Provide panel with a circuit breakers having a thru-the-door operator.
 3. The control panel will include the following:
 - a. Timer to open and close the drip trap automatically and at specified set intervals. The adjustable timing range shall activate drain every 4-hour intervals for 4 minutes.
 - b. Two (2) two-position selector switches. One selector switch shall initiate automatic or hand modes and the other two-position selector switch shall be provided to open or close the drip trap while in hand mode.
 - c. The indicating lights will be used to determine drip trap position, FILL (Red LED) and DRAIN (Green LED) status while in automatic or hand modes.
 - d. Fault alarm shall be provided for the drip trap by the control panel. The alarm will come on when the trap does not close at the specified timer setting.
 - e. Provide remote contacts for "Fill" or "Drain" status and fault alarms wired to the panel terminal strip.

- D. A stainless steel shaft coupling shall be provided with stainless steel hardware to connect the actuator to the drip trap. A mounting bracket constructed in aluminum with stainless steel hardware shall be included between the electric actuator and drip trap to properly secure actuator to the drip trap.
- E. The low-pressure electrically actuated drip trap shall be Varec Biogas Model 246AT, or equal.

2.8 LOW PRESSURE CHECK VALVE

- A. Provide a 6 inch size low pressure check valve for installation in the biogas piping to prevent reversal of flow. The valve shall utilize a free swing (pendulum) pallet. Positive pressure shall force the pallet away from the valve seat permitting gas to flow through the piping system. Reversal of flow or line pressure shall force the pallet to close against the valve seat preventing back flow through the line.
- B. Valve body and cover shall be constructed of low copper cast aluminum. The pallet, pallet arm and removal seat ring are also constructed of low copper aluminum. The pallet arm shaft and all hardware are stainless steel. The check valve shall be manufactured to ANSI 125 FF flanged dimension (NPT threaded connection).
- C. Check valve shall be Varec Biogas 211F, or equal.

2.9 PRESSURE RELIEF AND FLAME TRAP ASSEMBLY

- A. Pressure relief and flame trap assembly shall have 6 inch size flanged connections. Valve shall be set to relieve pressure at 10.25" WC. Capacity shall be not less than 9,520 SCFH gas at 0.75" WC pressure increase above setting.
- B. A large spring loaded diaphragm shall control regulator valve. Regulator shall provide tight shut-off. It shall maintain a back pressure within approximately 10% of the setting. The spring barrel shall include a glass-enclosed pointer and scale to indicate setting. A spring adjusting screw shall permit setting adjustments without disassembling the diaphragm housing. Setting range shall be from 2" WC to 12" WC pressure.
- C. Construction shall be low copper cast aluminum body, diaphragm and spring housings, and diaphragm inner plate. Inner valve shall include low copper aluminum pallet with 304 SS stems and bushings. Diaphragm shall be molded Buna-N rubber with Nylon reinforcement. Setting spring shall be zinc plated steel.
- D. Valve shall include 1/2" NPT connections for the pressure sensing line and atmospheric vent line. Tubing provided by Contractor per the manufacturer's recommendations.
- E. Flame arrester net free area through the bank assembly shall be not less than three times the corresponding size standard pipe. Entire bank assembly shall slide easily out of the arrester housing to facilitate inspection and cleaning. Removing or replacing the bank assembly shall not require support for alignment, jackscrew for extending the housing, and shall not place a strain on the connecting piping. Bank frame shall be extensible and shall be filled with corrugated rectangular shaped bank sheets. Alternating flat and crimped ribbon sheets are not an acceptable substitute. Flame arrester shall include an offset housing with a 1/2" NPT drain connection.
- F. Arrester housing construction shall be low copper cast aluminum. Bank assembly shall include a low copper aluminum frame and 316 stainless steel bank sheets.
- G. The assembly shall be interconnected with a thermal bypass shut-off valve. Valve shall be the spring-actuated double acting needle type. Bypass valve shall operate within 15 seconds when the thermal element reaches 260° F.

- H. Bypass valve shall automatically close the regulator by applying full upstream gas pressure on the upper portion of the diaphragm. Fusible element shall be replaceable without disassembling the valve. Bypass valve assembly shall be constructed of aluminum and stainless steel with Buna-N "O" rings.
- I. Regulator, flame arrester, and bypass valve shall be factory assembled as a single unit. Flanges shall be drilled to ANSI 125 FF flanged dimensions. Assembly shall be leak proof to 5 psig. Pressure relief and flame trap assembly shall be Varec Biogas 440 Series, or equal.

2.10 FLAME TRAP ASSEMBLY

- A. Flame trap assembly shall have 4 inch or 6 inch size flanged connections as indicated on the Contract Drawings. Flow capacity shall be not less than 10,000 SCFH gas. Total pressure drop shall not exceed 1" WC. Assembly shall include thermal shut-off valve and flame arrester. Unit shall be suitable for installing in horizontal or vertical piping.
- B. Thermal valve shall include a fusible element designed to close the valve within 15 seconds upon reaching 260° F. Fusible element shall control a spring operated pallet. An isolated sight glass shall be provided so that pallet position can be determined without having to remove the valve from service. Fuse plug shall be gas tight and shall be removable for replacement of the fusible element.
- C. Valve construction shall be low copper cast aluminum body and cover. Inner valve shall include low copper aluminum pallet assembly, with 304 stainless steel compression spring. Sightglass shall be acrylic with neoprene gaskets.
- D. Flame arrester net free area through the bank assembly shall be not less than three times the corresponding size standard pipe. Entire bank assembly shall slide easily out of the arrester housing to facilitate inspection and cleaning. Removing or replacing the bank assembly shall not require support for alignment, jackscrew for extending the housing, and shall not place a strain on the connecting piping. Bank frame shall be extensible and shall be filled with corrugated rectangular shaped bank sheets. Alternating flat and crimped ribbon sheets are not an acceptable substitute. Flame arrester shall include an offset housing with a 1/2" NPT drain connection.
- E. Arrester housing construction shall be low copper cast aluminum. Bank assembly shall include a low copper aluminum frame and low copper aluminum bank sheets.
- F. Thermal shut-off and flame arrester shall be factory assembled as one unit. Flanges shall be drilled to ANSI 125 FF flanged dimensions. Assembly shall be leak proof to 5 psig. Flame trap assembly shall be Varec Biogas 450 Series, or equal.

2.11 FLAME CHECK

- A. Flame check shall have 2 inch size NPT connection. Flow capacity shall be not less than 1,000 SCFH gas at 0.25" WC pressure drop. Housing shall be of "pipe union" design to permit easy disassembly for inspection and cleaning. Element shall be replaceable and be made of compressed 316 SS woven wire. Housing shall be constructed of low copper cast aluminum. Maximum working pressure shall be 25 psig. Flame check shall be VAREC 5200 Series, or equal.

2.12 WELL-TYPE MANOMETER

- A. Well-type manometer shall be a single tube pressure gauge with direct reading scale. It shall be suitable for pressure, vacuum, or differential pressure. Range shall be 20" WC. Scale shall be graduated in English units, inches and tenths WC for use with indicating oil. Zeroing of scale adjustment shall be accessible from exterior of housing. Housing shall be suitable for indoor and outdoor service and shall be fitted for wall or panel mounting. Indicating tube shall be gland packed to prevent leakage. Manometer housing shall be extracted aluminum with epoxy paint finish. Housing shall include

machined end blocks and a tight fitting, polished plate glass window to protect internals. Gas connection shall be 1/4" NPT. Indicating fluid shall be red or green oil. Manometer shall be Varec Biogas 217 Series, or equal.

- B. Venting Petcock: A venting petcock shall be supplied for field installation at the inlet of the manometer to permit routine maintenance calibration. When closed, the petcock bleeds the gas from the manometer well to atmosphere, allowing the manometer's zero position to be checked. Material shall be brass. Connection shall be 1/4" NPT.
- C. Float check Valve: A float check valve shall be supplied for field installation at the outlet of the manometer. It shall be used to protect fluid from being blown-out by pressure increase beyond the manometer pressure range. Construction shall be stainless steel body and head with Teflon® float. Connection shall be 1/4" NPT.

2.13 WASTE GAS BURNER WITH AUTOMATIC PILOT IGNITION SYSTEM

- A. Low Pressure Pilot Ignition System with Pre-Mix Blower:
 - 1. Waste gas burner shall have a 6- inch size flanged waste gas connection. Burning capacity shall be not less than 9,520 SCFH gas of 0.8 specific gravity at 60 degrees F with 0.5" WC pressure drop. Burner shall be designed for waste gas composed primarily of methane.
 - 2. Burner shall be self-supporting on 150# ANSI flange for winds to 150 mph and shall meet Seismic. Zone 4 requirements. Burner shall be constructed with 304 stainless steel shroud and upper 24" of stack and pilot piping. Remainder of burner stack shall be mild steel 316 Pilot nozzles, 316.Type K thermocouple.
- B. Pilot Gas Supply:
 - 1. Continuous flame nozzle shall be mounted integral to the burner and shall have a long profile flame. Pilot shall be inclined 30 degrees off vertical. Pilot flame shall extend through waste gas flow profile to ensure ignition of waste gas regardless of the flow rate.
 - 2. Unprotected pilot shall withstand winds up to 110 mph without the use of downdraft protectors, vortex vanes or other flow restricting devices.
 - 3. Pilot shall burn at an elevated temperature to assist in the conversion of hydrogen sulfide and subsequently, odor control.
 - 4. Provide a waste gas burner that will allow operation using pilot gas supply pressure of 4" WC minimum to a maximum of 0.75 psig.
 - 5. Waste gas burner shall operate using natural gas as the pilot at 4" WC supply pressure:
 - 6. Pilot gas only runs continuously when there a demand to flare or combust waste gas, otherwise the burner remains on standby and does not continuously use pilot gas.
 - 7. Pilot gas and air shall be mixed and ignited at ground. level, remote from the burner stack. Specifically, no component of the ignition system shall be mounted to the burner stack or shroud; nor shall heat shields be substituted in an attempt to protect such devices from the heat of combustion.
 - 8. During ignition, the gas and air are mixed and ignited remote, from the burner stack. The flame retention nozzle captures the flamefront as it exits the continuous flame nozzle establishing pilot. The pilot burns a stoichiometric (ideal gas-to-air burning ratio), non-smoking flame at all times, allowing for variations in the biogas flow to BTU content, thus ensuring compliance to 40 CFR Part 60.18, paragraph C.2 and F.
 - 9. Either a plant signal or pressure switch installed on the main gas line, initiates start-up sequence on the controller through the remote Start contacts. This contact closure energizes the Remote Start time delay relays to eliminate nuisance switching and false starts. Pressure switch shall have a Class 1, Div 1, rating. Pressure switch shall have a 4"-20" adjustable range, a 0.5" deadband and 15 amp SPDT contacts.

10. The start-up sequence will open the continuous pilot solenoid valve and the ignition retention solenoid valve and start the blower.
 11. The continuous pilot line receives a constant air/gas supply from the mixing chamber.
 12. The continuous pilot line receives a constant air/gas supply from the mixing chamber.
 13. The system will purge for "spark interval set time" minutes.
 14. The controller fires the spark plug and this ignites the air/gas mixture on the continuous flame line and generates a flame front, which ignites the pilot gas flowing through the flame retention nozzle.
 15. The thermocouple located inside the continuous flame nozzle heats up. When it exceeds its temperature set point, it signals the controller to close the retention solenoid valve.
 16. The controller timer stops cycling and ignition stops.
 17. Any alarms will clear.
 18. The burner and the pilot will remain lit as long as there is no contact change-over in the panel via a plant or through a pressure switch permissive.
 19. The time delay will delay switching until it times out and its contacts change thus providing a delayed burner shutdown time; and prevents nuisance switching.
 20. If the thermocouple cools below its set point, the control panel will switch to alarm status and re-ignition will be attempted-if the plant or pressure switch permissive is still present.
 21. If the plant or pressure switch permissive, the thermocouple alarm relay will switch contacts signaling "Pilot Off" indication. The LED indicator light will switch to "Pilot Off" (red).
 22. A system alarm turns on indicating a pilot flame failure if the thermocouple does not heat up above its setpoint within the set number of attempts in the System Failure Counter. The System Failure Counter is factory set at 5 attempts and can be adjusted. The unit would have to be manually reset.
- C. Pilot Gas Control Components:
1. The pilot gas control components shall be mounted on a stainless steel plate having a stainless steel weatherhood. The control panel will also be mounted on the same plate.
 2. It must be installed a maximum of 15 feet horizontal distance from the flare. The pilot gas piping from the pilot gas control components panel to the waste gas burner connection may have 45 deg. elbows to connect to the pilot gas connections in the combustion stack assembly. The pilot gas piping and venturi are at an incline to maximize air-gas mixing.
 3. Pilot Gas Components include:
 - a. Solenoid valves with aluminum construction and stainless steel inserts.
 - b. Pressure gauges, 0-15 inches WC range.
 - c. Isolation valves.
 - d. 2-inch 347 SS inspirating venturi.
 - e. Air blower
 - f. All tubing and threaded fittings shall be provided in stainless steel construction.
 - g. Provide with pressure regulator to regulate pilot gas from 2-5 psig to 12" WC.
 - h. Gas inlet connection shall be 1" NPT. Gas outlet connections shall be 2" NPT to the continuous flame line and ½" NPT to the flame retention line. Pilot gas and air shall be mixed and ignited remote from the burners of the combustion stack assembly. Specifically, no component of the ignition system shall be mounted to the burner stack assembly.
 4. Burner Controls:
 - a. Control Panel shall include the following features:
 - 1) NEMA 4X, 316 SS construction.
 - 2) Three-position selector switch for standby/auto/manual modes.
 - 3) Pilot flame monitoring.

- 4) Status lights for "Pilot Lit", "Pilot Out", "Spark", Ignition Retention Valve Open" located inside the panel.
 - 5) Adjustable thermocouple set point.
 - 6) Heater and thermostat.
 - 7) Manual ignition button.
 - 8) Blower contactor.
 - 9) SPDT contacts for remote indication of Pilot On/Off and Pilot Flame Failure functions.
 - 10) Operate on a 120 VAC, single phase, 60 Hz.
 - 11) Capability for repeated ignition cycle.
 - 12) 10 amps, grounded neutral.
 - 13) Certified to UL 508A.
- b. The control panel shall include necessary pilot controls to provide automatic re-ignition of the burner. It will provide flame sensing and re-ignition sequence in case the pilot is lost. In case of a pilot flame failure, the solenoid valves shall fail close.
- D. Waste gas burner shall be Varec 244W Series, or equal.

2.14 MATERIAL PROTECTION

- A. Sandblast all ferrous metal surfaces to SSPC-SP 6, commercial finish; shop coat with primer suitable for the intended service and compatible with the appropriate finish coating system indicated on the Painting/ Coating Schedule of Section 09 90 00.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install equipment where shown on the Contract Drawings and in accordance with the manufacturer's instructions.
- B. Inspect valve joint surfaces for structural soundness, and thoroughly clean before installation.
- C. Provide and connect piping, accessories and power as required to ensure a complete and operable gas piping system.
- D. Obtain and provide the Owner with an Installation Certificates signed by equipment manufacturer's representative attesting that the gas safety equipment has been properly installed and is ready for start-up.
1. Submit a separate certificate for each item in this specification.

3.2 START-UP AND PERFORMANCE TESTING

- A. Demonstrate proper operation of the gas safety equipment and waste gas burner and control system. Simulate all control and alarm functions. Set pressure settings for the back pressure valve and pressure switch, and cover pressure relief valves. Adjust waste gas burner air to gas mixture ratio.

3.3 EQUIPMENT ACCEPTANCE

- A. Adjust, repair, modify or replace any components which fail to perform as specified and rerun the tests; make final adjustments under the direction of the manufacturer's representative and to the satisfaction of the Engineer.

3.4 TRAINING

- A. Provide training to the Owner in accordance with Section 01665 (VOL1).

END OF SECTION 44 46 00.12

**CITY OF BATON ROUGE
PARISH OF EAST BATON ROUGE
DEPARTMENT OF PUBLIC WORKS
SEWER ENGINEERING DIVISION**

PART 1

UNIFORM CONSTRUCTION BID FORMS

FOR

**NORTH WASTEWATER TREATMENT PLANT
SUSTAINABILITY PROJECT**

CITY-PARISH PROJECT NO. 13-TP-MS-0045

BID DATE: TUESDAY, NOVEMBER 15, 2016

BID TIME: 2:00 P.M., LOCAL TIME

INSTRUCTIONS FOR SUBMITTING BID

1. Submit "PART 1A, BID FORMS REQUIRED BY STATUTE OR BY THE LOUISIANA ADMINISTRATIVE CODE" prior to the opening of bids.
2. Submit "PART 1, UNIFORM CONSTRUCTION BID FORMS" **ONLY** as your bid.
3. Retain "PART 2, SPECIAL PROVISIONS AND CONTRACT DOCUMENTS" for your records.

Louisiana Uniform Public Work Bid Form

TO: City of Baton Rouge
Parish of East Baton Rouge
Purchasing Division, Room 826
222 Saint Louis St., City Hall
Baton Rouge, Louisiana 70802

(Owner to provide name and address of owner)

BID FOR: North Wastewater Treatment Plant
Sustainability Project
C.P. Project No. 13-TP-MS-0045

(Owner to provide name of project and other identifying information)

The undersigned bidder hereby declares and represents that she/he; a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: The Department of Public Works and dated: September, 2016 (Owner to provide name of entity preparing bidding documents.)

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following ADDENDA:

No. ___ Dated: ___ No. ___ Dated: ___ No. ___ Dated: ___
No. ___ Dated: ___ No. ___ Dated: ___ No. ___ Dated: ___

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices* but not alternates) the sum of:

_____ Dollars (\$_____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates.

Alternate No. 1 (Owner to provide description of alternate and state whether add or deduct) for the lump sum of:

_____ Dollars (\$_____)

Alternate No. 2 (Owner to provide description of alternate and state whether add or deduct) for the lump sum of:

_____ Dollars (\$_____)

Alternate No. 3 (Owner to provide description of alternate and state whether add or deduct) for the lump sum of:

_____ Dollars (\$_____)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

** If someone other than a corporate officer signs for the Bidder/Contractor, a copy of a corporate resolution or other signature authorization shall be required for submission of bid. Failure to include a copy of the appropriate signature authorization, if required, may result in the rejection of the bid unless bidder has complied with La. R.S. 38:2212(A)(1)(c) or RS 38:2212(O) .

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA RS 38:2218.A is attached to and made a part of this bid.

BIDDER'S ORGANIZATION (If the bid is by a joint venture all parties to the bid must complete this form):

BIDDER IS:

AN INDIVIDUAL

Individual's Name: _____

Doing business as: _____

Address: _____

Telephone No.: _____ Fax No.: _____ Cell No.: _____

E-Mail Address: _____

A PARTNERSHIP

Firm Name: _____

Address: _____

Name of person authorized to sign: _____

Title: _____

Telephone No.: _____ Fax No.: _____ Cell No.: _____

E-Mail Address: _____

A LIMITED LIABILITY COMPANY

Company Name: _____

Address: _____

Name of person authorized to sign: _____

Title: _____

Telephone No.: _____ Fax No.: _____ Cell No.: _____

E-Mail Address: _____

A CORPORATION

IF BID IS BY A CORPORATION, THE CORPORATE RESOLUTION MUST BE SUBMITTED WITH BID.

Corporation Name: _____

Address: _____

State of Incorporation: _____

Name of person authorized to sign: _____

Title: _____

Telephone No.: _____ Fax No.: _____ Cell No.: _____

E-Mail Address: _____

CORPORATE RESOLUTION

A meeting of the Board of Directors of _____, a Corporation organized under the laws of the State of _____ and domiciled in _____, was held this ____ day of _____, 20____, and was attended by a quorum of the members of the Board of Directors.

The following resolution was offered, duly seconded and, after discussion, was unanimously adopted by said quorum:

BE IT RESOLVED, that _____ is hereby authorized to submit proposals and execute agreements on behalf of this corporation with the City of Baton Rouge, and Parish of East Baton Rouge.

BE IT FURTHER RESOLVED, that said authorization and appointment shall remain in full force and effect, unless revoked by resolution of this Board of Directors and that said revocation will not take effect until the Purchasing Director of the Parish of East Baton Rouge, shall have been furnished a copy of said resolution, duly certified.

I, _____, hereby certify that I am the Secretary of _____, a corporation created under the laws of the State of _____ domiciled in _____; that the foregoing is a true and exact copy of a resolution adopted by a quorum of the Board of Directors of said corporation at a meeting legally called and held on the ____ day of _____, 20____, as said resolution appears of record in the Official Minutes of the Board of Directors in my possession. This ____ day of _____, 20____.

Secretary

BID BOND
(Required for Bids Over \$25,000)

That we, the undersigned, _____, as Principal (Bidder), and _____, as Surety, are hereby held and firmly bound unto the City of Baton Rouge and Parish of East Baton Rouge as Owner, in the penal sum of five percent (5%) of the amount bid for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

The Condition of the above obligation is such that whereas the Principal has submitted to the Owner a certain Bid, attached hereto and hereby made a part hereof to enter into an Agreement in writing, for:

**NORTH WASTEWATER TREATMENT PLANT SUSTAINABILITY PROJECT
CITY-PARISH PROJECT NO. 13-TP-MS-0045**

NOW THEREFORE,

- (a) If said Bid shall be rejected, or in the alternative,
- (b) If said Bid shall be accepted and the Principal shall execute and deliver a Contract in the Form of Contract attached hereto (properly completed in accordance with said Bid) and shall furnish bonds for his faithful performance of said Contract and for furnishing materials in connection therewith and shall in all other respects perfect the Agreement created by the acceptance of said Bid,

then this obligation shall be void; otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such Bid; and said Surety does hereby waive notice of any extension.

IN WITNESS WHEREOF, Said Principal and Surety have hereunto set their hands and seals, this __ day of _____, 20__.

PRINCIPAL (BIDDER)

SURETY

(Address)

(Address)

By: _____

By: _____

(Typed Name and Title)

(Typed Name and Title)

UNIT PRICE FORM

To: CITY OF BATON ROUGE
 PARISH OF EAST BATON ROUGE
 DEPARTMENT OF PUBLIC WORKS

BID FOR: NORTH WASTEWATER TREATMENT PLANT SUSTAINABILITY
 PROJECT

Project Number: 13-TP-MS-0045

<i>Description:</i> Sustainability Improvements				
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION <i>(Quantity X Unit Price)</i>
9999901	1	LUMP	\$ _____ . _____	\$ _____ . _____
<i>Description:</i> Tank/Compartment/Piping Draining and Cleaning				
REF. NO.	QUANTITY	UNIT OF MEASURE	UNIT PRICE	UNIT PRICE EXTENSION <i>(Quantity X Unit Price)</i>
9999902	1	LUMP	\$ _____ . _____	\$ _____ . _____