EL PASO WATER UTILITIES

Formal Bid Solicitation Check List

BIO-SCRUBBER SYSTEM FOR THE HASKELL R. STREET WASTEWATER TREATMENT PLANT PRIMARY CLARIFIERS

Bid # 17-15

THIS CHECKLIST IS PROVIDED FOR YOUR CONVENIENCE

Before turning in your bid proposal did you do the following?

________ Responses should be delivered to the El Paso Water Utilities Purchasing Department by 11:00 A.M. MARCH 9, 2015. Did you visit our website at www.epwu.org for any addendums? (Failure to sign addenda and include with bid proposal may deem the bidder’s submission non-responsive.)

________ Did you sign the Bid Proposal?

________ Did you provide two (2) signed bid proposals, one (1) original signed in blue ink and one (1) copy?

________ Did you complete the Excel Worksheet and submit it on a CD along with the sealed bid proposal? Excel worksheet is found with the bid announcement located at www.epwu.org (Failure to include the Excel Worksheet and submit it on a CD may deem the bidder’s submission non-responsive) PLEASE LEGIBLY LABEL CD WITH COMPANY NAME.

________ Are all unit and extended costs filled out?

________ Does the bid total equal the sum of extended costs as compared to the Excel Worksheet?

________ Did you provide Bid Bonds (only if required)?

________ The last day for questions is: MARCH 2, 2015 UNTIL 5:00 P.M.

________ Are all blank spaces filled in?

________ Is your bid in a sealed envelope marked with the bid number and name?
SPECIFICATIONS FOR THE

Bioscrubber System for the
Haskell R. Street Wastewater Treatment Plant
Primary Clarifiers

BID NUMBER 17-15

CITY OF EL PASO, TEXAS

March, 2015

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Ruth Katherine Brennand, Vice Chair
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Christopher A. Antcliff, Member
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R. Alan Shubert, P.E., Vice President
Fernando Rico Jr., P.E., Chief Operations Officer
Gilbert Trejo, P.E., Chief Technical Officer

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<td>Stephen Burdett</td>
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</table>

March, 2015

Bioscrubber System for the Haskell R. Street Wastewater Treatment Plant Primary Clarifiers
The undersigned bidder offers to furnish all the materials, supplies, equipment and/or services shown below in accordance with specifications, terms and conditions set forth herein. Note: The "INSTRUCTION TO BIDDERS" are attached on the last two pages of this bid proposal document and are applicable, unless otherwise stated within the bid proposal document.

SUBJECT: BIO-SCRUBBER SYSTEM FOR THE HASKELL R. STREET WASTEWATER TREATMENT PLANT PRIMARY CLARIFIERS

BID NUMBER: 17-15
TO BE OPENED: 11:00 A.M. LOCAL TIME March 9, 2015

FIRM: ____________________________________________________________
MAILING ADDRESS: __________________________________________________
STREET ADDRESS: __________________________________________________
CITY/STATE/ZIP: __________________________________________________
PHONE NUMBER: __________________________________________________
E-MAIL: __________________________________________________________

SIGNATURE: ______________________________________________________
PRINTED NAME: __________________________________________________
TITLE: __________________________________________________________
FAX: ____________________________________________________________
DATE: __________________________________________________________

Bid Proposal shall bear an original signature, in ink, of a responsible officer or agent for the company. Failure to sign will be the basis for declaring the bid proposal non-responsive.

Submit two (2) signed bid proposals, one (1) original and one (1) copy.

Any requests for clarifications and/or changes to this bid proposal shall be made in writing via email to CPellicano@epwu.org or sent via fax to Chris Pellicano at (915) 594-5689. Requests need to be submitted one week prior to bid opening. Requests submitted after this time frame, may not elicit a response.

ONLY Item(s) #14 BID SECURITY and #15 PAYMENT AND PERFORMANCE BOND as noted on the attached “INSTRUCTIONS TO BIDDERS” do not apply to this bid.

BIDDER’S ARE TO COMPLETE THE EXCEL FORMAT SPREADSHEET FOUND WITH THIS BID ANNOUNCEMENT LOCATED AT www.epwu.org BIDDER MUST PROVIDE A SAVED READ ONLY CD or FLASH FORMATTED COPY OF THIS EXCEL SPREADSHEET TO BE SIGNED AND SUBMITTED WITH THIS BID. FAILURE TO COMPLETE THIS MAY DEEM THE BIDDER’S SUBMISSION NON RESPONSIVE.
ITEM | QTY | UNIT  | DESCRIPTION          | UNIT PRICE | TOTAL COST |
--- | --- | --- | --------------------- | ---------- | ---------- |
1.) 1 | LS  | Bio-scrubber System | $___________  | $____________ |

TOTAL BID $________________________

This bid will be awarded to the bidder with the lowest, responsive, responsible “Total Bid”.

THE BIOSCRUBBER SYSTEM (ITEM 1) CONTAINED WITHIN THIS BID PROPOSAL IS TO BE PROVIDED IN ACCORDANCE TO THE FOLLOWING AND OR ATTACHED SPECIFICATIONS:

- Section 00100A: Specific Conditions
- Section 01171: Electric Motors to 250 HP
- Section 01179: Control Panels
- Section 01300: Submittals
- Section 11258: Bio-scrubber System
- Section 15891: Fiberglass Duct Work and Accessories
DELIVERY REQUIREMENTS:

**Shop Drawings:** The Bioscrubber System Manufacture shall submit complete shop drawings **15 calendar days after the notice to proceed.**

Engineer will review Manufacture's submittals within 14 calendar days at which time Engineer will issue its approval or denial accompanied by substantive comments regarding information needed to gain approval. In the event that Engineer requires resubmittal, Manufacture shall resubmit the appropriately modified Shop Drawings and Product Data to Engineer within 7 calendar days.

Manufacture shall be solely responsible for preparing and submitting documents in a timely manner so as to avoid delayed delivery of Goods. Manufacture shall prepare and transmit each submittal sufficiently in advance of material ordering and manufacturing, so that delivery of Goods will not be delayed by processing times, including disapproval and re-submittal (if required), coordination with other submittals, testing, fabrication, delivery, and similar sequenced activities. No extension of time will be authorized because of Manufacture's failure to transmit submittals in a timely manner.

**Equipment Delivery:** Upon approval of the shop drawings the Bioscrubber System Manufacturer shall deliver the system complete to the job site within **96 calendar days.**
PRICE ESCALATION:

A Price Escalation may be considered under the following conditions:

a. Prices must be firm for at least the first 12 month period from award of the Master Contract.

b. A request for a price increase must be accompanied by a Certified Letter from the contractor's supplier or other forms of evidence as deemed necessary by the El Paso Water Utilities which includes the price increase to the contract. The price increase shall be effective within 14 calendar days from El Paso Water Utilities acceptance.

c. The El Paso Water Utilities reserves the right to cancel the contract resulting from this Bid Proposal and rebidding our requirements if the price escalation requested is above the current open market price. Cancellation of the contract will not affect any outstanding orders.

d. All price increases accepted shall be effective for a 12 month period from the revised date of the Master Contract.

PRICE DE-ESCALATION:

If the Contractor receives a price decrease from the supplier, the Contractor is responsible to notify the El Paso Water Utilities within two working days of the price decrease and pass the price decrease on to the Utility. The price decrease will be effective upon receipt of the price reduction from the Contractor.

Personnel entering the premises of the El Paso Water Utilities (to include drivers of delivery vehicles) are required to wear an identification badge containing the following information:

-Name -Company Name -Employee's Picture

Entry to the premises of the El Paso Water Utilities facility may be denied to individuals without identification as addressed above.

Unless a discount is provided as an inducement for prompt payment, El Paso Water Utilities - Public Service Board is not obligated to make payment on invoice(s) for this contract until 30 days after receipt of the invoice or 30 days after acceptance of the BIOSCRUBBER SYSTEM FOR THE HASKELL R. STREET WASTEWATER TREATMENT PLANT PRIMARY CLARIFIERS, whichever is later. Any discount will be used in the evaluation of the bid submittal to determine the lowest responsive bid.

Discount: _________________________

Payment may be delayed in accordance with exceptions under the Texas Prompt Payment Act (Chapter 2251 of the Texas Government Code). Interest on all overdue payments shall be imposed in accordance with the provisions of the Texas Prompt Payment Act.

F.O.B. – 4100 Delta Drive, El Paso, Texas 79905

State and City Sales Tax Exempt
Bidder must answer the following questions:

1. Does the bidder that is making and submitting the bid qualify as a "Resident Bidder" or a "NonResident Bidder" under Texas Law?

   Answer: ______________________________

2. If the bidder is a "NonResident Bidder" does the state, in which the nonresident bidder's principal place of business is located, have a law requiring a nonresident bidder of that state to bid a certain amount or percentage under the bid of a resident bidder of that state in order for the nonresident bidder of that state to be awarded the contract on his bid in such state?

   Answer: ______________________________

3. If the answer to Question Number 2 is "Yes", by what amount or percentage must a Texas resident bidder bid under the bid of a resident bidder of that state in order to be awarded a contract on such bid in said state?

   Answer: ______________________________

A "NonResident Bidder" will not be awarded this Bid unless the nonresident's bid is lower than the lowest bid submitted by a responsible Texas Resident Bidder by the same amount that a Texas Resident Bidder would be required to underbid the nonresident bidder to obtain a comparable contract in the state where the nonresident's principal place of business is located. The definitions for the terms “Bidder”, Texas Resident Bidder” and "NonResident Bidder" are included in the “Instructions to Bidders” on the last two pages of this bid proposal.
1. **TYPE AND TERM OF CONTRACT:**

This is a **Good(s) and/or Service(s) Contract**, under which the El Paso Water Utilities shall order all of its requirements for the good(s) and/or service(s) described within this bid proposal from the lowest, responsible, responsive bidder, hereinafter referred to as Contractor, for the duration of the contract. 

**Note:** Good(s) and/or Service(s) will be ordered on “as-required” basis.

The **Contract** to provide **BIOSCRUBBER SYSTEM FOR THE HASKELL R. STREET WASTEWATER TREATMENT PLANT PRIMARY CLARIFIERS** shall be from **AWARD OF BID** by the Public Service Board for a term of one year. Upon mutual agreement, the contract may be extended under the same terms and conditions on a year to year basis for an additional two years periods. This bid is to award a contract to the most responsive, responsible bidder for an initial one year period. If upon mutual consent between both parties the contract may be extended for an additional year for a maximum of up to two years total. In the event the El Paso Water Utilities has not obtained another goods and/or services contractor by the expiration date of the existing contract term, the Contractor shall nonetheless continue ON A SAME PRICE, TERMS AND CONDITIONS BASIS WITH NO PRICE INCREASE ON MUTUALLY AGREED UPON EXTENSION BY BOTH PARTIES for a period not to exceed six (6) months on a month-to-month basis after the end of its term, unless the El Paso Water Utilities shall have notified the Contractor that the El Paso Water Utilities obtained another contractor.

Bidders are advised that only bids with a firm, fixed price, F.O.B., El Paso Texas for the above listed time period will be considered. **Bids not complying with this provision may be disqualified.**

2. **INVOICES AND PAYMENTS:**

   a. The Contractor shall submit invoices, in single copy, for each contract. Invoices covering more than one contract will not be accepted.

   b. If transportation costs are allowed in the bid a separate line item will be included in the proposal.

   c. Invoices shall reflect the Contract Number and/or the Purchase Order Number.

   d. Do not include Federal tax, State tax, or City Tax. El Paso Water Utilities shall furnish tax exemption certificate upon request.

   e. Discounts will be taken from the date of receipt of services or date of invoice, whichever is later.

   f. The El Paso Water Utilities’ obligation is payable only and solely from funds available for the purpose of this contract for good(s) and/or service(s). Lack of funds shall render this contract null and void to the extent funds are not available and any delivered but unpaid for good(s) and/or service(s) will be returned to the Contractor by the El Paso Water Utilities.

   g. Mail invoices to:

      El Paso Water Utilities Accounting Department  
P.O. Box 511  
El Paso, Texas  79961-0511

   h. Contractor shall advise the Purchasing Department of any changes in its remittance addresses.

   i. All proper invoices received by the EPWU will be paid within 30 days of the EPWU’s receipt date of the invoice.

   j. If partial shipments or deliveries are authorized by the EPWU, the Contractor shall be paid for the partial shipment or delivery as stated above.

   k. The EPWU may withhold or off set the entire payment or part of any payment otherwise due to a Contractor, if good(s) or service(s) is/are defective or non-conforming.
3. **INDEMNIFICATION:**

Contractor or its insurer will INDEMNIFY, DEFEND AND HOLD the El Paso Water Utilities, its officers, agents and employees, HARMLESS FOR AND AGAINST ANY AND ALL CLAIMS, CAUSES OF ACTION, LIABILITY, DAMAGES OR EXPENSE, (INCLUDING BUT NOT LIMITED TO ATTORNEY FEES AND COSTS) FOR ANY DAMAGE TO OR LOSS OF ANY PROPERTY, OR ANY ILLNESS, INJURY, PHYSICAL OR MENTAL IMPAIRMENT, LOSS OF SERVICES, OR DEATH TO ANY PERSON ARISING OUT OF OR RELATED TO THIS AGREEMENT. Without modifying the conditions of preserving, asserting or enforcing any legal liability against the El Paso Water Utilities as required by law, the El Paso Water Utilities will promptly forward to Contractor every demand, notice, summons or other process received by the El Paso Water Utilities in any claim or legal proceedings contemplated herein. Contractor will 1) investigate or cause the investigation of accidents or occurrences involving such injuries or damages; 2) negotiate or cause the to be negotiated the claim as the Contractor may deem expedient; and 3) defend or cause to be defended on behalf of the El Paso Water Utilities all suits for damages even if groundless, false or fraudulent, brought because of such injuries or damages. Contractor will pay all judgments finally establishing liability of the El Paso Water Utilities in actions defended by Contractor pursuant to this section along with all attorneys’ fees and costs incurred by the El Paso Water Utilities including interest accruing to the date of payment by Contractor, and premiums on any appeal bonds. The El Paso Water Utilities, at its election will have the right to participate in any such negotiations or legal proceedings to the extent of this interest. The El Paso Water Utilities will not be responsible for any loss or damage to the Contractor’s property from any cause.

4. **GRATUITIES:**

The El Paso Water Utilities may, by written notice to the Contractor, cancel this contract without liability to Contractor if it is determined by the El Paso Water Utilities that gratuities, in the form of entertainment, gifts, or otherwise, were offered or given by the Contractor, or any agent or representative of the Contractor, to any officer or employee of the El Paso Water Utilities with a view toward securing a contract or securing favorable treatment with respect to the awarding or amending, or the making or any determinations with respect to the performing of such a contract. In the event this contract is canceled by the El Paso Water Utilities pursuant to this provision, the El Paso Water Utilities shall be entitled, in addition to any other rights and remedies, to recover or withhold the amount of the cost incurred by the Contractor in providing such gratuities.
5. TERMINATION:

I. TERMINATION FOR CONVENIENCE
The El Paso Water Utilities may terminate this contract, in whole or in part, at any time by written notice to the Contractor. The Contractor will be paid its costs, including the contract close out costs, and profit on work performed up to the time of termination. The Contractor will promptly submit its termination claim to the El Paso Water Utilities to be paid the Contractor. If the Contractor has any property in its possession belonging to the El Paso Water Utilities, the Contractor will account for the same, and dispose of it in the manner the El Paso Water Utilities directs.

II. TERMINATION FOR DEFAULT
If the Contractor fails to comply with any provision of the contract, the El Paso Water Utilities may terminate this contract for default. Termination shall be effected by serving a notice of intent to terminate the contract, with a copy to Surety, if applicable, setting forth the manner in which the Contractor is in default. The contractor will be given an opportunity to correct the problem within a reasonable amount of time as specified by The El Paso Water Utilities before termination notice is rendered. The El Paso Water Utilities shall have the right to immediately terminate the Contract for default if Contractor violates any local, state, or federal laws, rules or regulations that relate to the performance of this Contract.

If the El Paso Water Utilities terminates this Contract because the Contractor failed to perform the services as required by the Contract, the El Paso Water Utilities shall have the right to obtain like services from another vendor in substitution for those due from the Contractor. The cost of substitute services shall be determined by informal or formal procurement procedures as required by the Local Government Code. The El Paso Water Utilities may recover the difference between the cost of the substitute services and the Contract price from the Contractor as damages. The El Paso Water Utilities may deduct the damages from Contractor’s account for services rendered prior to the termination or services rendered by Contractor pursuant to a different contract or pursue any other lawful means of recovery. The El Paso Water Utilities may recover the difference between the cost of the substitute services and the Contract price from the Contractor as damages. The El Paso Water Utilities may deduct the damages from Contractor’s account for services rendered prior to the termination or services rendered by Contractor pursuant to a different contract or pursue any other lawful means of recovery. The failure of the El Paso Water Utilities to obtain substitute services and charge the Contractor under this clause is not a bar to any other remedy available for default.

6. FORCE MAJEURE:
If, by reason of Force Majeure, either party hereto will be rendered unable wholly or in part to carry out its obligations under this Contract then such party will give notice and full particulars of such Force Majeure in writing to the other party within a reasonable time after occurrence of the event or cause relied upon, and the obligation of the party giving such notice, so far as it is affected by such Force Majeure, will be suspended for only thirty (30) days during the continuance of the inability then claimed, except as hereinafter provided, but for no longer period, and such party will try to remove or overcome such inability with all reasonable dispatch.

The term Force Majeure as employed herein, will mean acts of God, strikes, lockouts, or other industrial disturbances, acts of public enemies, orders of any kind of government of the United States or the State of Texas or any civil or military authority, insurrections, riots, epidemics, landslides, lightning, earthquake, fires, hurricanes, storms, floods, washouts, droughts, arrests, restraint of government and people, civil disturbances, explosions, breakage or accidents to machinery, pipelines, or canals. It is understood and agreed that the settlement of strikes and lockouts will be entirely within the discretion of the party having the difficulty, and that the above requirement that any Force Majeure will be remedied with all reasonable dispatch will not require the settlement of strikes and lockouts by acceding to the demands of the opposing party or parties when such settlement is unfavorable in the judgment of the party having the difficulty. If a party is unable to comply with the provisions of this contract by reason of Force Majeure for a period beyond thirty days after the event or cause relied upon, then upon written notice after the thirty (30) days, the affected party shall be excused from further performance under this contract.
7. **AVAILABILITY OF FUNDS:**

The awarding of this contract is dependent upon the availability of funds. In the event that funds do not become available, the contract may be terminated or the scope may be amended. A 30-day written notice will be given to the vendor and there shall be no penalty nor removal charges incurred by the El Paso Water Utilities.

8. **VENUE:**

Both parties agree that venue for any litigation arising from this contract shall lie in El Paso, El Paso County, Texas.

9. **CONTRACT ADMINISTRATION:**

Administration of this Contract, on behalf of the El Paso Water Utilities, is the responsibility of Chris Pellicano, Purchasing and Contract Administration, who is your point of contact for general information or specific matters concerning this contract. Chris Pellicano can be reached by telephone at (915) 594-5639, or by FAX at (915) 594-5689. Correspondence should be addressed to: The El Paso Water Utilities, Purchasing and Contract Administration, Attn: Chris Pellicano, P.O. Box 511, El Paso, Texas 79961-0001. Please refer to Bid Number or Contract Number in all correspondence.

10. **LIABILITY INSURANCE:**

For the duration of this contract and any extension hereof, Vendor/Manufacture shall carry in a solvent company authorized to do business in Texas public liability insurance a) covering contractor and its employees in the amount of $500,000 and b) for the protection of the general public and the El Paso Water Utilities in the amount of $1,000,000 per occurrence for bodily injury or wrongful death and $1,000,000 per occurrence for property damage.

With respect to the above required insurance, the El Paso Water Utilities and its officers and employees shall be named as additional insureds as their interests may appear. The El Paso Water Utilities shall be provided with 30 days advance notice, in writing, of any cancellation or material change. The El Paso Water Utilities shall be provided with certificates of insurance evidencing the above required insurance prior to the commencement of this contract and thereafter with certificates evidencing renewal or replacement of said policies of insurance at least 15 days prior to the expiration or cancellation of any such policies.

**Notices and Certificates required by this contract clause shall be provided to:**

El Paso Water Utilities  
Purchasing and Contract Administration Department  
Attn: Michelle LePage, Purchasing Agent  
P. O. Box 511  
El Paso, Texas 79961-0001  

Failure to submit insurance certification may result in contract cancellation.
11. **CONE OF SILENCE:**

The “Cone of Silence” is imposed upon each RFP, RFQ or Bid after advertising. The Cone of Silence prohibits communications with EPWU employees to attempt to influence the purchasing decision. As such, the Cone of Silence prohibits any communication regarding RFP’s, RFQ’s or Bids between, among others:

- Potential vendors, service providers, bidders, or consultants and EPWU employees.
- Potential vendors, service providers, bidders, or consultants, any member of the Board, the President/CEO, or their respective staff and members of the respective selection committee.

The provisions do not apply to, among other communications:

- Oral communications with Purchasing Agent or Administrative Analyst or Procurement Analyst, provided the communications is limited strictly to matters of process or procedure already contained the solicitation document;
- The provisions of the Cone of Silence do not apply to oral communications at pre-proposal or pre-bid conferences, oral presentations before selection committees, contract negotiations during duly notice public meeting, public presentations made to the President/CEO and Board members during a duly noticed public meeting; or
- Communications in writing at any time unless specifically prohibited by the applicable, RFP, RFQ or bid document.

In addition to any other penalties provided by law, violation of the Cone of Silence by any proposer or bidder shall render that proposer’s or bidder’s RFP, RFQ or bid award voidable. Any person having personal knowledge of a violation of these provisions shall report such violations to the EPWU General Counsel and the Purchasing Agent.

The “Cone of Silence” applies to any and all potential subcontractors as well.

Bids will be received until **March 9, 2015, 11:00 AM Local Time**, and will then be opened and read aloud in the first floor Conference Room of the El Paso Water Utilities Bldg. 1154 Hawkins Blvd. El Paso, Texas.

Bids may be mailed to the attention of the Purchasing and Contracts Administration Department, P.O. Box 511, El Paso, Texas 79961 or delivered to the El Paso Water Utilities Bldg. 1154 Hawkins Blvd. El Paso, Texas 79925.

**Note:** Faxed bids will not be accepted.

This bid will be awarded by the Public Service Board at their regularly scheduled meeting.
EL PASO WATER UTILITIES
PUBLIC SERVICE BOARD

Bioscrubber System
for the Haskell R. Street Wastewater Treatment Primary Clarifiers

Bid Number 17-15

CITY OF EL PASO, TEXAS

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SECTION 00100A
SPECIFIC CONDITIONS

1. PRE-BID CONFERENCE
NOT USED

2. DEFINITIONS

Goods: The goods and services described herein.

Project: Goods will be incorporated into the construction of the Haskell R. Street WWTP Primary Clarifier Odor Control System currently under design which will be located at the Haskell R. Street WWTP located at 4100 Delta Drive, El Paso, Texas 79905.

EPWU: El Paso Water Utilities.

Manufacturer: The term "Manufacturer" as used in this specification will refer to the manufacturer of the bioscrubber system or the manufacturer's authorized representative.

Engineer: The engineer-of-record for the bioscrubbers system for the Haskell R. Street WWTP Primary Clarifier Odor Control System is CDM Smith, 4110 Rio Bravo, Suite 201, El Paso, Texas 79902. Engineer may sometimes be referred to as Consultant, Architect/Engineer, or Architect. Engineer is the professional retained by Owner under a separate agreement to design and/or administer the Project. Nothing in Purchase Order shall create a contractual relationship between Engineer and Manufacturer. Nothing in Purchase Order shall create a contractual relationship between Engineer's employees, officers or Manufacturer. Neither Engineer's authority to act under the Purchase Order nor any decision made by Engineer in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of Engineer to Manufacturer. Engineer will not be responsible for Manufacture’s means, methods, techniques, sequences or procedures, or the safety precautions and programs incident thereto, and Engineer will not be responsible for Manufacture’s failure to perform or furnish Goods in accordance with the Purchase Order. Engineer will not be responsible for the acts or omissions of Owner, Contractor, Manufacturer, any subcontractor, any supplier, or of any other person or organization performing or furnishing any of the Goods. Although Engineer is not authorized to issue or award Change Orders, Engineer may offer advice, suggestions, and opinions. Manufacture’s shall not rely on such advice, suggestions, and opinions unless directed in writing to do so by Owner, and shall, in no event, make any claim against Engineer for any such advise, suggestion s, and opinions. In the event that Engineer’s or Engineer's employees make comments or issue warnings about safety issues, such comments and warnings shall be considered to have been offered by a Good Samaritan and shall not impose on Engineer, it’s employees and any obligation or responsibility. Engineer, as EPWU’s representative, has authority to approve, disapprove or reject Shop Drawings, Product Data, and Goods.

Contractor: The party selected by Owner to construct the Project. Contractor will receive, off-load, store, and install Goods.

Substantial Completion: Engineer will issue a written certificate of substantial completion when Goods have been successfully installed, started-up, and tested.
3. SCHEDULE

All time limits including milestones for submittals, times for delivery of Goods, and times for furnishing services are of the essence. Unless specifically stated otherwise herein, time will be measured in calendar days (not work days). The Bioscrubber System Manufacturer shall have the system delivered to the Job Site at the Haskell Street WWTP at 4100 Delta Drive, El Paso, Texas 79905.

A. Milestones

   Shop Drawings: The Bioscrubber System Manufacturer shall submit complete shop drawings **30 calendar days after the purchase order is received.** (Manufacture is encouraged to expedite the process by delivering submittals to Engineer in fewer days.) (Engineer will review Manufacture's submittals within 14 calendar days at which time Engineer will issue its approval or denial accompanied by substantive comments regarding information needed to gain approval. In the event that Engineer requires resubmittal, Manufacture shall resubmit the appropriately modified Shop Drawings and Product Data to Engineer within 7 calendar days.

   Manufacture shall be solely responsible for preparing and submitting documents in a timely manner so as to avoid delayed delivery of Goods. Manufacture shall prepare and transmit each submittal sufficiently in advance of material ordering and manufacturing, so that delivery of Goods will not be delayed by processing times, including disapproval and re-submittal (if required), coordination with other submittals, testing, fabrication, delivery, and similar sequenced activities. No extension of time will be authorized because of Manufacture's failure to transmit submittals in a timely manner.

   i. Equipment Delivery: Upon approval of the shop drawings the Bioscrubber System Manufacturer shall deliver the system complete to the job site within **96 calendar days.**

4. LIQUIDATED DAMAGES

It is recognized that EPWU will suffer financial loss if Goods are not delivered and accepted by EPWU on or before the times stated above. EPWU and the Bioscrubber System Manufacturer agree that time is of the essence of this agreement. They also recognize that delays to the delays and expense and difficulties in proving in a legal proceeding the actual loss suffered by the Owner if the Work is not completed on time. Accordingly instead of requiring such proof the Owner and the Bioscrubber System Manufacturer agree that as liquidated damages for delay (but not as a penalty) the Bioscrubber System Manufacturer shall pay the owner **$500 per day** for each calendar day that expires after the time specified for Shop Drawings and Equipment Delivery.

5. SHIPPING AND RECEIVING

Manufacture shall notify Engineer at least two weeks before shipping Goods. Provide anticipated shipping date, anticipated date of arrival at jobsite, and shipping company name and contact information. When bill of lading and tracking number are available, provide to Engineer. **Point of delivery shall be the Haskell R. Street WWTP located at 4100 Delta Drive, El Paso, Texas 79905.**
6. OTHER RELATED CONTRACTS

The overall construction of the project will be constructed by a Contractor yet to be selected by the Owner. The Contractor will be responsible for installing the equipment supplied by the Bioscrubber System Manufacturer. The Contractor will be connecting the bioscrubber’s piping, ductwork and electrical and instrumentation to the remainder of the work they will be installing. The Bioscrubber System Manufacturer shall be fully responsible for coordinating their requirements for installation, startup, testing and commissioning of the bioscrubber system with the Engineer and the Contractor.

7. MANUFACTURE’S REPRESENTATIONS

In order to induce EPWU to enter into this Agreement, Manufacture makes the following representations:

   A. Manufacture has examined and carefully studied the Bid Procurement Documents and all related data identified in the Bid Procurement Documents.
   B. Manufacture is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and the furnishing of Goods.
   C. Manufacture has carefully studied, considered and correlated the information known to EPWU and disclosed in these documents; any other information commonly known to manufactures of similar Goods doing business in the locality of the Point of Delivery; information and observations obtained from bidders’ visits, if any, to the Point of Delivery; and any other information, observations that could affect the cost, progress and performance for providing Goods as required by these Bid Procurement Documents.
   D. Manufacture has given EPWU written notice of all conflicts, errors, ambiguities, or discrepancies that Manufacture has discovered in the Bid Procurement Documents, and the written resolution, if any, thereof by EPWU or Engineer is acceptable to Manufacture.
   E. The Bid Procurement Documents are generally sufficient to indicate and convey understanding of all terms and conditions for furnishing Goods required.

8. SUCCESSORS AND ASSIGNS

EPWU and Manufacture each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

9. SEVERABILITY

Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon EPWU and Manufacture. The Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10. MANUFACTURE’S CERTIFICATIONS

Manufacture certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract.
"Corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution.

"Fraudulent practice" means an intentional misrepresentation of facts made:

A. To influence the bidding process or the execution of the Contract to the detriment of EPWU,
B. To establish Bid or Contract prices at artificial noncompetitive levels, or
C. To deprive EPWU of the benefits of free and open competition.

"Collusive practice" means a scheme or arrangement between two or more Manufacture, with or without the knowledge of EPWU, a purpose of which is to establish Bid prices at artificial, non-competitive levels.

"Coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

11. SUBMITTALS

Manufacture shall submit Shop Drawings and Product Data to Engineer for review and approval. The data shown on the Shop Drawings and Product Data shall be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Manufacture proposes to provide.

Manufacture may commence ordering and fabrication prior to Engineer's approval of Shop Drawings and Product Data, but materials purchased and fabrication performed that do not conform to subsequently approved Shop Drawings and Product Data shall be at Manufacture's sole risk. EPWU and Engineer will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity with Shop Drawings, Product Data, Drawings and Specifications.

12. PAYMENT PROCEDURES

A. Payment Schedule: Bioscrubber System Manufacturer shall submit Applications for Payment for each of the following based on the following schedule:

i. 15% of the TOTAL COST indicated in the BID PROPOSAL upon OWNER’s approval of the Bioscrubber System Manufacturer Engineering Submittals.
ii. 60% of the TOTAL COST indicated in the BID PROPOSAL will be paid for the Bioscrubber System upon OWNER’s receipt of the delivery of the Bioscrubber System to the project site.
iii. 10% of the TOTAL COST indicated in the BID PROPOSAL upon completion and acceptance of the Operations and Maintenance Manuals for the Systems.
iv. 10% of the TOTAL COST indicated in the BID PROPOSAL upon completion of Start-Up, Testing, and Commissioning of the Bioscrubber System.
v. 5% of the TOTAL COST indicated in the BID PROPOSAL upon final completion of the Bioscrubber System Project.

B. Each invoice must reference:
   i. The Owner's Authorized Representative;
   ii. The Owner’s assigned Work Order Number;
iii. The Owner’s assigned Purchase Order Number.

C. Each invoice must include the following:
   i. A description of the work performed;
   ii. A summary of the total amount authorized for work,
   iii. The total amount previously invoiced, the amount of the current invoice, and the balance of the authorized amount remaining.

D. Owner may adjust the final payment on the basis of any final accounting made by Owner.

E. Owner may withhold from any payment, including the final payment, the following:
   i. Any amount incorrectly invoiced;
   ii. Any amount in dispute either because Owner has found the invoice excessive, or the work performed unacceptable; or
   iii. An amount sufficient to completely protect Owner from any loss, damage or expense arising out of assertions by other parties of any claim or lien against Owner because of Bioscrubber System Manufacturer performance or failure to perform under this Agreement.

13. INDEMNIFICATION

A. In the performance of this Work Bioscrubber System Manufacturer must take all necessary precautions (including, but not limited to compliance with the regulations and standards of the Occupational Health and Safety Administration, the Environmental Protection Agency and the Department of Transportation) to prevent the occurrence of any injury (including death) of any persons, or of any damage of any property arising out of acts or omissions of Manufacture, its agents, employees, or Subcontractors, except to the extent that any such injury or damage is due to Owner’s negligence.

B. To the fullest extent permitted by law the Bioscrubber System Manufacturer shall indemnify the OWNER, Engineer and its agents from and against any claims, damages, harm, liability, lawsuits, proceedings or losses, and any related expenses including retained attorneys’ fees or allocated in-house legal charges or costs resulting from or in any way connected with Bioscrubber System Manufacturer’s performance or failure to perform (or that of anyone acting under the Bioscrubber System Manufacturer’s control or on its behalf) under this Agreement (“claim”), excluding claims and losses resulting solely from OWNER’s own negligence or willful misconduct

11. MANUFACTURE’S WARRANTIES AND GUARANTEES

Manufacture warrants and guarantees to EPWU that the title to Goods conveyed shall be proper, its transfer rightful, and free from any security interest, lien, or other encumbrance.

Manufacture warrants and guarantees to EPWU that Goods will conform with the Contract Documents and with the by any Shop Drawings and Product Data approved by Engineer. Engineer shall be entitled to rely on Manufacture’s warranty and guarantee.
Manufacture's warranty and guarantee hereunder excludes defects or damage caused by normal wear and tear under normal usage, abuse, improper modification, improper maintenance, or improper operation by persons other than Manufacture.

Manufacture's obligation to furnish Goods in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Goods that are non-conforming, or a release of Contractor's obligation to furnish Goods in accordance with the Contract Documents: observations by EPWU or Engineer; recommendation by Engineer or payment by EPWU of any progress or final payment; use by EPWU; acceptance by EPWU; inspection, test or approval by EPWU, Engineer, or others; or correction of non-conforming Goods by EPWU.

EPWU shall promptly notify Manufacture of any breach of Manufacture's warranties or guarantees.

Manufacture makes no implied warranties under this Contract.

12. LIMITATIONS

EPWU and Manufacture waive against each other, and against the other's officers, directors, members, partners, employees, agents, consultants, and subcontractors, any and all claims for or entitlement to incidental, indirect, or consequential damages arising out of, resulting from, or related to the Contract. Upon assignment the terms of this paragraph shall be binding upon the assignee with respect to Manufacture and assignor. The terms of this mutual waiver do not apply to or limit any claim by either EPWU or Manufacture against the other based on any of the following:

A. Contribution or indemnification,

B. Costs, losses, or damages attributable to personal or bodily injury, sickness, disease, or death, or to injury to or destruction of the tangible property of others,

C. Intentional or reckless wrongful conduct, or

D. Rights conferred by any bond provided by Manufacture under this Contract.

13. BIOSCRUBBER SYSTEM MANUFACTURER'S REPRESENTATIONS

A. The Bioscrubber System Manufacturer's representations:

B. Bioscrubber System Manufacturer has familiarized itself with the nature and extent of the Contract Documents, Contract Times, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Goods and Special Services.

C. Bioscrubber System Manufacturer has given OWNER written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by OWNER is acceptable to the Bioscrubber System Manufacturer.

D. Bioscrubber System Manufacturer does not require additional information from OWNER to enable the Bioscrubber System Manufacturer to furnish the bioscrubber system and other
services at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.

14. OTHER RELATED CONTRACTS

A. The overall construction of the project will be constructed by a Contractor yet to be selected by the Owner. The Contractor will be responsible for installing the equipment supplied by the Bioscrubber System Manufacturer. The Contractor will be connecting the bioscrubber’s piping, ductwork and electrical and instrumentation to the remainder of the work they will be installing. The Bioscrubber System Manufacturer shall be fully responsible for coordinating their requirements for installation, startup, testing and commissioning of the bioscrubber system with the Engineer and the Contractor.
SECTION 01300
SUBMITTALS

PART 1: GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

A. This Section specifies the general methods and requirements of submissions applicable to the following work-related submittals: Shop Drawings, Product Data, Samples, Mock Ups, Construction Photographs, and Construction or Submittal Schedules. Detailed submittal requirements will be specified in the technical specifications sections.

B. All submittals shall be clearly identified by reference to Specification Section, Paragraph, Drawing No. or Detail as applicable. Submittals shall be clear and legible and of sufficient size for sufficient presentation of data.

C. Each Specification Section, Paragraph, Drawing No. or Detail, as applicable, shall be submitted individually.

1.02 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

A. Shop Drawings

1. Shop drawings, as defined in the General Conditions and as specified in individual work Sections include, but are not necessarily limited to, custom-prepared data, such as fabrication and erection/installation (working) drawings, scheduled information, setting diagrams, actual shopwork manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports, including performance curves and certifications, as applicable to the Work.

2. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

3. The Contractor shall check all subcontractor’s shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof. Submittals that have not been properly reviewed by the Contractor prior to submission to the Engineer will be returned without review.

4. All details on shop drawings submitted for approval shall show clearly the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for approval.
B. Product Data

1. Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing and printed product warranties, as applicable to the Work.

C. Samples

1. Samples specified in individual Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the Work.

D. Factory and Mill Tests

1. The Contractor, at his own expense, shall furnish the engineer in triplicate, certified copies of all required factory and mill test reports to verify material quality and composition. Any materials shipped by the Contractor from a factory or mill prior to having satisfactorily passed such testing and inspection by the Engineer shall not be incorporated in the work, unless the Engineer shall have notified the Contractor in writing that such testing and inspection will not be required. The cost of performing all mill and factory tests shall be paid by the Contractor unless otherwise required by these Contract Documents.

1.03 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:

1. Field measurements
2. Field construction criteria
3. Catalog numbers and similar data
4. Conformance with the Specifications
5. Coordination with other trades and other work.

B. Each shop drawing, sample and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have fulfilled all obligations regarding verifying and determining field measurements, field construction
criteria, materials, dimensions, catalog numbers and similar data, and I have checked and
coordinated each item with other applicable, approved shop drawings and all contract
requirements." Shop drawings and product data sheets 11-in × 17-in and smaller shall be bound
together in an orderly fashion and bear the above Certification Statement on the cover sheet. The
cover sheet shall fully describe the packaged data and include a listing of all items within the package.
Provide to the Resident Project Representative a copy of each submittal transmittal sheet for shop
drawings, product data and samples at the time of submittal of said drawings, product data and
samples to the Engineer.

C. The Contractor shall utilize an 8-character submittal identification numbering system in the following
manner:

1. The first five digits shall be the applicable Specification Section Number.

2. The next two digits shall be the numbers 01-99 to sequentially number each initial separate item
or drawing submitted under each specific Section number.

3. The last character shall be a letter, A-Z, indicating the submission, or resubmission of the same
Drawing (i.e. A=1st submission, B=2nd submission, C=3rd submission, etc.). A typical
submittal number would be as follows:

   03300-08-B

   03300  = Specification Section for Concrete
   08     = The eighth initial submittal under this specification section
   B      = The second submission (first resubmission) of that particular shop drawing

D. Notify the Engineer in writing, at the time of submittal, of any deviations in the submittals from the
requirements of the Contract Documents.

E. The review and approval of shop drawings, samples or product data by the Engineer shall not relieve
the Contractor from his/her responsibility with regard to the fulfillment of the terms of the Contract.
All risks of error and omission are assumed by the Contractor and the Engineer will have no
responsibility therefor.

F. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall
any materials be fabricated or installed prior to the approval or qualified approval of such item.
Fabrication performed, materials purchased or on-site construction accomplished which does not
conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be
liable for any expense or delay due to corrections or remedies required to accomplish conformity.

G. Project work, materials, fabrication, and installation shall conform with approved shop drawings,
applicable samples, and product data.

1.04 SUBMISSION REQUIREMENTS

A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause
no delay in the Work or in the work of any other contractor. The manufacture shall submit
complete shop drawings 15 calendar days after the notice to proceed.
B. Each submittal, appropriately coded, will be returned within 14 calendar days following receipt of submittal by the Engineer.

C. Number of submittals required:

1. Shop Drawings as defined in Paragraph 1.02 A: six (6) copies shall be provided. (If Contractor requires more than one copy of Shop Drawings returned, Contractor shall submit more than the number of copies listed above.)

2. Product Data as defined in Paragraph 1.02 B: six (6) copies.

3. Samples: Submit the number stated in the respective Specification Sections.

D. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.

2. The Project title and number.

3. Contractor identification.

4. The names of:
   a. Contractor
   b. Supplier
   c. Manufacturer

5. Identification of the product, with the specification section number, page and paragraph(s).

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the Work or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.


10. Identification of revision by highlighting on resubmittals.

11. An 8-in × 3-in blank space for Contractor and Engineer stamps.

1.05 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

A. The review of shop drawings, data, and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed as:

1. permitting any departure from the Contract requirements;
2. relieving the Contractor of responsibility for any errors, including details, dimensions, and materials; and/or

3. approving departures from details furnished by the Engineer, except as otherwise provided herein.

B. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

C. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. Submittals will be returned to the Contractor under one of the following codes:

Code 1 — "APPROVED" is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.

Code 2 — "APPROVED AS NOTED". This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.

Code 3 — "APPROVED AS NOTED/CONFIRM". This combination of codes is assigned when a confirmation of the notations and comments IS required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This confirmation shall specifically address each omission and nonconforming item that was noted. Confirmation is to be received by the Engineer within 15 calendar days of the date of the Engineer's transmittal requiring the confirmation.

Code 4 — "APPROVED AS NOTED/RESUBMIT". This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the package. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the Engineer within 15 calendar days of the date of the Engineer's transmittal requiring the resubmittal.

Code 5 — "NOT APPROVED" is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.

Code 6 — "COMMENTS ATTACHED" is assigned where there are comments attached to the returned submittal which provide additional data to aid the Contractor.
Code 7 — "RECEIPT ACKNOWLEDGED" - This code is assigned to acknowledge receipt of a submittal that is not subject to the Engineer’s review and approval; and, is being filed for informational purposes only. This code is generally used in acknowledging receipt of means and methods of construction work plan, field conformance test reports, and Health and Safety plans.

Codes 1 through 5 designate the status of the reviewed submittal with Code 6 showing there has been an attachment of additional data.

E. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing on the letter of transmittal and on resubmitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.

F. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Not Approved" until resubmitted. The Engineer may at his/her option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

G. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least seven working days prior to release for manufacture.

H. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

1.06 REPETITIVE REVIEW

A. Submittals for each item will be reviewed no more than twice at the Owner's expense. All subsequent reviews will be performed at times convenient to the Engineer and at the Contractor's expense, based on the Engineer’s then prevailing rates. The Contractor shall reimburse the Owner within 30 calendar days for all such fees invoiced to the Owner by the Engineer.

B. The need for more than one resubmission or any other delay in obtaining Engineer's review of submittals, will not entitle the Contractor to an extension of Contract Time.

1.07 DISTRIBUTION

A. Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Engineer.
1.08 MOCK UPS

A. Mock Up units as specified in individual Sections, include but are not necessarily limited to, complete units of the standard of acceptance for that type of work to be used on the Project. Remove at the completion of the Work or when directed.

1.09 CONSTRUCTION PHOTOGRAPHS

A. The Contractor shall take a minimum of ten digital photographs per week of the work during its progress or the number required to accurately document the work activities completed during the week and ten color photographs of the completed facilities. The weekly photographs will document the installation of items that will not be visible when the work is complete (e.g. valves and fittings). The digital photographs will be provided to the Owner at the monthly construction meeting on a CD or other digital media. The Owner will select ten photos per month for the Contractor to print in 8 x 10 format and notate as described in paragraph D. The prints will be provided to the Owner at the following monthly construction meeting. The photographs shall be of such views and taken at such times as the Owner directs.

B. All photographic work shall be done by a qualified photographer acceptable to the Engineer. Three prints of each photograph shall be furnished promptly to the Engineer, and each print shall have a glossy finish and be mounted in plastic sleeving on a substantial backing. The overall dimensions of each mounted print shall be 8 x 10-in with 1¼-in flexible binding margin on the long top side to permit storage in standard 3-ring binders.

C. The film negatives shall be retained in the files of the photographer until the completion of the project and shall then be turned over to the Owner.

D. Each photograph shall have attached to the backing a paper label, approximately 2¼-in wide by 1¾-in high containing thereon in neat lettering:
   1. Contractor's name
   2. Short Description of View
   3. Photo No. and Date Taken
   4. Photographer's Firm Name

E. At the completion of all work at the site, the Contractor shall provide ten 8 x 10” color aerial photographs of the completed facilities. After selection by Owner and Engineer, the Contractor shall provide three 20” x 24” aerial photographs, two for the Owner and one for the Engineer.

1.10 PROFESSIONAL ENGINEER (P.E.) CERTIFICATION FORM

A. If specifically required in other Sections of these Specifications, the Contractor shall submit a P.E. Certification for each item required, in the form attached to this Section, completely filled in and stamped.
1.11 GENERAL PROCEDURES FOR SUBMITTALS

A. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections, of the Specifications, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

PART 2: PRODUCTS (NOT USED)

PART 3: EXECUTION (NOT USED)

END OF SECTION
PART 1 GENERAL

1.01 SCOPE OF WORK

A. Random wound, NEMA frame motors up to 250 Hp furnished under other Sections shall comply with the requirements listed in this Section.

B. Motors connected to Variable Frequency Drive Controllers shall be designed for inverter duty.

1.02 RELATED WORK (NOT INCLUDED)

1.03 SUBMITTALS

A. Submit motor nameplate data and test characteristics per NEMA Standard MG1-12.54 "Report of Test Form for Routine Tests on Induction Motors", including:
   1. Efficiency at 1/2, 3/4 and full load
   2. Power factor at 1/2, 3/4 and full load
   3. Motor outline, dimensions and weight
   4. Descriptive bulletins, including full description of insulation system
   5. Bearing design data
   6. Special features (i.e., space heaters, temperature detectors, etc.)

1.04 REFERENCE STANDARDS

A. American Bearing Manufacturers Association (ABMA)
   1. ANSI/ABMA 7 - Shaft and Housing Fits for Metric Radial Ball and Roller Bearings (Except Tapered Roller Bearings) Conforming to Basic Boundary Plans
   2. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings
   3. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings

B. American National Standards Institute (ANSI)
   1. ANSI/NCSL Z540-1 – Calibration Laboratories and Measuring and Test Equipment, General Requirements

C. American Society for Testing Materials (ASTM)
   1. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) apparatus
D. Institute of Electrical and Electronics Engineers (IEEE)

1. IEEE 1 - Recommended Practice - General Principles for Temperature Limits in the Rating of Electric Equipment and for the Evaluation of Electrical Insulation
2. IEEE 43 - Recommended Practice for Testing Insulation Resistance of Rotating Machinery
3. IEEE 85 - Test Procedures for Airborne Sound Measurements on Rotating Electric Machinery
4. IEEE 112 - Standard Test Procedure for Polyphase Induction Motors and Generators
5. IEEE 792 - Recommended Practice for the Evaluation of the Impulse Voltage Capability of Insulation Systems for AC Electric Machinery Employing Form-Wound Stator Coils
6. IEEE 841 - Standard for Petroleum and Chemical Industry - Severe Duty Squirrel Cage Induction Motors - Up to and Including 500 HP

E. International Organization for Standardization (ISO)

1. ISO 10012-1 - Quality assurance requirements for measuring equipment
2. ISO 1940-1 - Mechanical Vibration, Balance Quality Requirements of Rigid Rotors
3. ISO 1940-2 - Determination of Permissible Residual Unbalance
5. ISO 9001 - Quality Management Systems - Requirements

F. National Electrical Manufacturers Association (NEMA)

1. NEMA MG1 - Motors and Generators
2. NEMA MG2 - Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors and Generators
3. NEMA MG3 - Sound Level Prediction for Installed Rotating Electrical Machines
4. NEMA MG10 - Energy Management Guide for selection and use of Polyphase Motors

G. National Fire Protection Association (NFPA)

1. NFPA 70 - National Electric Code

H. Underwriters Laboratories (UL)

1. UL 674 - Motors and Generators, Electric, for Use in Hazardous Locations, Class I - Groups C and D, Class II - Groups E, F and G.
I. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. Motors shall be listed under UL recognized component file as applicable.

B. The motor manufacturer shall maintain a documented ISO 9001 quality assurance program implementing suitable procedures and controls to monitor all aspects of production and testing.

C. Motor manufacturer shall maintain authorized service centers capable of providing training, parts, and emergency maintenance and repairs.

D. Electric motors driving identical machines shall be identical.

1.06 SYSTEM DESCRIPTION

A. To assure unity of responsibility, the motors shall be furnished and coordinated by the manufacturer of the driven equipment. The Contractor shall assume responsibility for the satisfactory installation and operation of the entire system as specified.

B. When electrically driven equipment differs from that indicated, adjust the motor size, wiring and conduit systems, disconnect devices, and circuit protection to accommodate the equipment actually installed, without additional cost.

1.07 DELIVERY, STORAGE AND HANDLING

A. Motors shall be shipped fully assembled with the driven equipment. Provide storage and handling per motor manufacturer’s installation instructions.

B. When furnished, energize motor space heaters to prevent moisture condensation throughout the storage and construction period. Perform periodic motor insulation resistance tests per manufacturer's storage recommendation.

C. Maintain the bearings during storage and construction, and periodically rotate the motor shaft according to manufacturer's instructions.

1.08 PROJECT/SITE REQUIREMENTS

A. Power supply: 208, 240, or 480 VAC, three phase, 60 hertz as indicated for 1/2 Hp and above; 120, 208, or 240 VAC single phase, 60 hertz for less than 1/2 Hp.

B. Environmental Requirements: unless otherwise stated, suitable for continuous duty operation without derating under the following service conditions:

1. Environment: Wastewater treatment plant indoor or outdoor applications involving severe duty conditions such as high humidity or chemical laden, corrosive or salty atmospheres.

2. Area classification: as indicated in the Bioscrubber System Section 11258.
3. Minimum outdoor ambient temperature: -10 degrees C.

4. Maximum ambient temperature: 50 degrees C.

5. Altitude: up to 4000 feet above MSL.

C. Coordination:

1. Coordinate motor installation and equipment layout with conduit and wiring, piping, other machinery equipment, and adjacent surfaces. Maintain required access clearances for cooling air, conduit box, lubrication and coupling.

2. Coordinate size and location of concrete pads for motors and equipment soleplates.

3. Coordinate voltage and current ratings of motors and accessories such as space heaters with power supply characteristics, and overcurrent and overload protective devices per the NEC.

4. Coordinate winding and bearing protective devices with ratings and characteristics of monitoring equipment circuits to which they connect. Coordinate control sequences and temperature setpoints.

1.09 MAINTENANCE – NOT USED

1.10 WARRANTY

A. Warranties: in accordance with Bioscrubber System Section 11258.

1.11 DEFINITIONS

A. Definition of terms used in this specification shall be in accordance with NEC Article 100, ANSI/IEEE Standard 100, and UL Standards Glossary.

B. Definitions of Enclosure Types for Motors

1. ODP - Open Drip-Proof

2. TEFC - Totally-Enclosed, Fan-Cooled

3. TEAO - Totally-Enclosed, Air Over

4. TEXP - Totally-Enclosed, Explosion-Proof

5. IP-22 - Open Drip-Proof

6. IP-44 - Totally-Enclosed

7. IP-54 - Splash Proof

8. IP-55 - Washdown
PART 2 PRODUCTS

2.01 GENERAL

A. Torque output: minimum performance characteristics for locked rotor and breakdown torque with rated voltage and frequency applied as defined by NEMA MG1, to accelerate and operate the load throughout its operating speed range, including conditions imposed by reduced voltage starting methods.

B. Motors shall deliver the specified performance at rated load under the combinations of voltage and frequency variations and voltage unbalance specified in NEMA MG1.

C. Horsepower rating: sized for operation within the full load nameplate rating without applying the service factor, throughout the full range of mechanical or hydraulic operating condition.

D. Service Factor: 1.15 service factor on sine wave power and 1.0 service factor on VFD power in a 40 degree C ambient.

E. Specific motor application data such as Hp, rpm, enclosure type, etc., is specified under the detailed driven mechanical equipment specification.

F. Enclosures: conform to one of the following NEMA standard enclosure designs as specified under the detailed driven mechanical equipment specification. If no enclosure type is specified, provide TEFC enclosures:
   1. Open Drip Proof (ODP)
   2. Totally Enclosed Fan Cooled (TEFC)
   3. Totally Enclosed Explosion Proof (TEXP)

G. Nameplates: engraved or embossed on stainless steel fastened to the motor frame with stainless steel screws or drive pins with information per NEMA MG1.

2.02 SINGLE-PHASE MOTORS

A. Application: motors smaller than 1/2 Hp shall be 115/230 or 208 Volts single phase, continuous heavy duty, reversible, capacitor start. Small fan motors may be split-phase or shaded pole type if such are standard for the equipment. Wound rotor or commutator type single-phase motors are not acceptable unless their specific characteristics are necessary for the application.

B. Overload protection: provide internal automatic thermal overloads unless otherwise noted.

C. Insulation: Class F or better, with Class B temperature rise, 1.15 service factor. Locked rotor current shall not be greater than specified in NEMA Standard MG1, Design "N".

D. Enclosure: provide fully gasketed, totally-enclosed air over or fan cooled in conformance with NEMA Standard MG1. Small fan motors may be open type if suitably protected from moisture, dripping water and lint accumulation.
E. Washdown duty: Where motor is installed in wet or corrosive areas routinely exposed to washdowns, high humidity or caustic chemicals, provide stainless steel, paint free washdown motors with Inpro bearing isolators, stainless steel T-type condensation drains, nitrile conduit box gasket, and corrosion resistant fans.

F. Bearings: sealed ball bearings permanently lubricated for 10 years normal use, furnished with shaft slinger.

G. Class 1, Division 1 and 2 locations: Single phase motors installed in Class 1, Division 1 and 2 locations shall be explosion proof, marked with a T3B temperature code label, and UL listed for use in Class 1, Division 1, Groups C & D, and Class II, Groups E, F, & G hazardous location. The temperature code marking shall appear on the nameplate.

2.03 THREE-PHASE INDUCTION MOTORS

A. Applications

1. Energy efficiency: meet or exceed requirements of NEMA MG1 Part 12 for NEMA Premium Efficient motors, for 1 Hp and larger. Where State Energy Codes or Utility Company Energy Rebate Programs dictate higher efficiencies than those listed, comply with the more stringent standard.

2. Severe duty: Motors installed in process areas and wet or corrosive locations shall be of a type designated by the manufacturer as "Corro Duty", "Mill and Chemical", "Severe Duty", or similar quality designation.

3. Class 1, Division 2 locations: Motors in Class 1, Division 2 locations shall be marked with a temperature code label suitable for use in the hazardous area classification where installed. Motors shall also comply with IEEE 841 severe duty requirements, with the following additional requirements:
   a. The Class, Group and Temperature Code shall be one of the following:
   b. Class I Group D - T2B (260°C)
   c. Class I Group D, Class II Groups F and G - T3B (165°C)
   d. Class I Groups C and D, Class II Groups F and G - T3C (160°C)
   e. Thermostats: Where winding thermostats are used to obtain surface temperature limitation, the thermostats shall be connected in series with the starter holding coil (stop button). Winding temperature detectors and switches shall be UL listed for use in Class 1, Division 1 locations.
   f. The exposed surface of motor condensation heaters shall not exceed 80 percent of the nameplate temperature code value.
   g. Ventilation fan shall be constructed of corrosion-resistant, non-sparking material such as bronze.

4. Class 1, Division 1 locations: Motors installed in Class 1, Division 1 locations shall be explosion proof, temperature code T3C (160°C), listed for use in Class 1, Division 1, Group C & D locations in accordance with UL 674. The operating temperature or temperature range marking shall appear on the nameplate, indicating the maximum temperature for all conditions including overload, locked rotor and single-phasing.
B. Construction

1. Stator core: built up, fully processed, high grade, low loss silicon steel laminations keyed or dovetailed to the stator frame and securely held in place at each end.

2. Stator winding: assembled using random wound copper coils. A split component epoxy insulation system shall be used in order to provide high resistance to moisture and other contaminants.

3. Insulation: manufacturer's premium grade non-hygroscopic, chemical and humidity resistant insulation system consisting of Class F or H materials, operated at Class B temperature rise, with at least one impregnation cycle using solventless resin, and multiple additional dip and bake cycles using polyester varnish.

4. Motor leads: non-wicking type, minimum Class F temperature rating and permanently numbered for identification.

5. Rotor shaft: forged or rolled steel, accurately machined, smoothly finished, with sufficient strength to withstand all stresses resulting from normal operation at any speed up to and including a 25 percent overspeed condition. Coordinate shaft end details with driven equipment coupling.

6. Rotor core: solid, built-up stack of fully processed and coated, high-grade, low-loss silicon steel laminations, with die cast aluminum or fabricated copper bars or their respective alloys. Rotors on frames 213T and above shall be keyed to shaft and rotating assembly dynamically balanced.

7. Cooling fan: corrosion-resistant, bi-directional, keyed, clamped and shouldered on the shaft.

8. Rotor assembly: coated with a corrosion resistant epoxy insulating varnish or other protective coating, thermally stable, statically and dynamically balanced. Balance weights shall be securely attached to the rotor resistance ring by welding or similar permanent method.

C. Bearings

1. Horizontal Bearings
   a. Bearings: anti-friction open or single-shield, vacuum-degassed steel ball or roller bearings, electric motor quality. Metric size bearings are not acceptable.
   b. Maximum bearing temperature rise: 50 degrees C for two pole motors, 45 degrees C for all other motors, measured at rated load by RTD or thermocouple at bearing outer race.
   c. Lubrication: factory lubricated with a premium moisture resistant polyurea thickened grease containing rust inhibitors and suitable for operation over temperatures from -30 to 150 degrees C. with standard lube and relief fittings for re-greasing external lubrication while machine is in operation. Motors shall be NEMA size 140 frame motors and smaller than may be permanently lubricated.
d. Minimum Rated fatigue life: L10 life of 100,000 hours per ABMA 9 or ABMA 11 for direct coupled applications and 26,000 hours for belted applications based on NEMA belting application limits per NEMA MG1. Severe duty motors shall have increased bearing life of 150,000 hours for direct coupled applications and 50,000 hours for NEMA belted applications per IEEE 841.

e. Shaft seals: prevent grease leakage and the entrance of foreign materials, such as water and dirt, into the bearing area while running, coasting, or at rest. Severe duty motors shall have improved sealing per IEEE 841.

2. Vertical Bearings
   a. Bearings: manufacturer's standard design, constructed with thrust bearings on top to allow inspection and/or replacement without requiring complete disassembly of motor, of type and size to satisfy thrust loading requirements, rated for an in-service B-10 life of 8800 hours per ABMA, designed to support the weight of the rotor plus, if required, the weight of the rotating driven equipment parts and the hydraulic thrust created by the driven equipment, with a 40 degrees C maximum temperature rise. Metric bearings are not acceptable.
   b. Coordinate all thrust conditions, including shutoff, and shaft requirements with the manufacturer of the driven equipment.
   c. Normal thrust applications: use grease lubricated deep-groove ball type thrust bearings only on normal thrust design motors, capable of handling thrust loads in either direction.
   d. High thrust applications: use single or multiple angular contact ball bearings. Anti-friction thrust bearings shall be designed for an L10 life of 100,000 hours including rotor weight. For applications with higher thrust loads which cannot meet the L10 life, spring loaded spherical roller thrust bearings may be used.
   e. Guide bearings: deep-groove ball type located at the bottom of the motor, capable of withstanding all stresses incident to the normal operation of the unit and to the specified overspeed condition, with sufficient means for preventing the leakage of lubricant or entrance of foreign matter along the shaft. When furnished as guide bearings for high thrust units, they shall be oil lubricated. Hollow shaft motors shall have a steady bushing to support the head shaft at the lower end of the motor.
   f. Grease lubricated bearings: furnished with provisions for in-service positive lubrication and a drain to guard against over lubrication.
   g. Oil lubricated bearings: contained in an oil reservoir with sight level gauge, fill and drain openings with plugs, designed to prevent leakage and excessive aeration of the oil.
   h. Anti-backspin device: when specified or requested by the pump manufacturer, provide a shaft mounted, mechanical non-reverse ratchet rated at 100 percent of motor full load torque for immediate protection against reversing due to phase reversals or from backspin at shutdown.

D. Enclosures

1. Motor frames: cast iron or welded heavy plate steel construction, stiff enough to withstand the rotating forces and torques generated and shall be designed to limit or avoid any undesirable harmonic resonances. Provide a threaded, forged steel, shouldered eyebolt blind tapped into the motor frame for lifting.
2. Condensate drain openings: locate drain holes at the low points in the end brackets to allow removal of accumulated moisture from enclosures. Provide corrosion resistant, breather drain plugs for severe duty motors.

3. Enclosure type: as specified in the mechanical equipment section, designed in accordance with NEMA MG1. Totally enclosed designs shall be suitable for outdoor use.

4. Hardware: hex head, SAE Grade 5 or better, plated for corrosion protection.

5. Main terminal box: fabricated steel or cast iron, sized per the NEC for number and size of conduit connections as indicated on the drawings, arranged to accommodate conduit entry from any quadrant, with a grounding terminal and gaskets between the box and motor frame and between the box and its cover.

6. Bearing housings: provide machined surfaces for attaching a magnet mounted accelerometer in order to monitor the motor vibration in the vertical, horizontal, and axial directions at each bearing housing.

7. Space heaters: provide silicone rubber strip type enclosure heaters for outdoor motors, or where otherwise specified. Heaters shall be rated 120 Volt, single phase, designed to prevent condensation inside the enclosure when the motor is idle, with leads brought out to the motor terminal box. The heater wattage and voltage shall be embossed on the motor nameplate.

8. Frame grounding: provide motor frame grounding pad or threaded stud where supplemental grounding to frame is indicated on the drawings.

E. Accessories: provide where specified under the detailed mechanical specifications for individual equipment:

1. Winding temperature switch: three, snap action, bi-metallic, temperature actuated switches embedded in the connection end-turns of the motor winding with normally closed contacts and leads terminating in the main conduit box.

2.04 SURFACE PREPARATION AND SHOP COATINGS

A. Cast and Fabricated Components

1. Motor cast iron and fabricated metal components shall be cleaned; free of grease, oil, dirt, or other contaminants; then oxide primed and painted with manufacturer’s standard finish coating.

2. Severe duty motors: surpass the 250 hour salt spray test per ASTM B117.

B. Internal Surfaces

1. Internal surfaces: shaft, rotor, end bells and parts shall be covered with a corrosion-resistant coating of epoxy paint or equal material of 2 mils minimum dry film thickness for
increased life against adverse environmental conditions. The stator bore and end turns shall be coated with clear epoxy varnish in addition to the insulating varnish treatment.

2. Shaft extension: protected with a rust preventive strippable coating capable of being peeled off or unwrapped.

3. Machined joints and threaded parts: coated with rust-inhibiting compound.

2.05 FACTORY TESTING

A. Each motor shall be given an unwitnessed routine short commercial test per NEMA MG1 and IEEE 112.

PART 3 EXECUTION

A. Pre-Commissioning Inspection

1. Inspect for physical damage. Verify all shipping materials and braces are removed.

2. Compare equipment nameplate information with site conditions and report any discrepancies.

B. Field Commissioning

1. Perform insulation resistance tests in accordance with manufacturer's instructions. If the test fails consult the manufacturer and dry out the machine.

2. Inspect for unusual mechanical or electrical noise or signs of overheating during initial test run.

3. Measure running current and evaluate relative to load conditions and nameplate full load amperes.

END OF SECTION
SECTION 01179
CONTROL PANELS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish a functional control panel to manually or automatically operate the control system as specified in the detailed mechanical equipment requirements of this Section.

B. Provide control system engineering to produce custom elementary drawings showing interwiring and interlocking with remote devices.

C. All control devices, unless specified otherwise, shall be mounted in the control panel.

1.02 RELATED WORK

A. A 480 Volt, 3 Phase, 60 Hz, 3-wire power supply will be provided to the control panel.

1.03 SUBMITTALS

A. Submit to the Engineer six (6) copies of shop drawings and product data for the following:

1. Panel Layout Drawings: Drawings shall be furnished for all panels, consoles, and equipment enclosures specified. Panel assembly and elevation drawings shall be drawn to scale and detail all equipment in or on the panel. Panel drawings shall be 11”x17” in size. At a minimum, the panel drawings shall include the following:
   a. Interior and exterior panel elevation drawings to scale.
   b. Nameplate schedule.
   c. Conduit access locations.
   d. Panel construction details.
   e. Cabinet assembly and layout drawings to scale. The assembly drawing shall include a bill of material on the drawing with each panel component clearly defined. The bill of material shall be cross-referenced to the assembly drawing so that a non-technical person can readily identify any component of the assembly by manufacturer and model number.
   f. Construction details, NEMA ratings, intrinsically safe barrier information, gas sealing recommendations, purging system details, etc. for panels located in hazardous locations or interfacing to equipment located in hazardous areas.
   g. For every control panel, heating and cooling calculations for each panel supplied indicating conformance with cooling requirements of the supplied equipment and environmental conditions. Calculations shall include the recommended type of equipment required for both heating and cooling.
   h. Submit evidence that all control panels shall be constructed in conformance with UL 508 and bear the UL seal confirming the construction. Specify if UL compliance and seal application shall be accomplished at the fabrication location or by field inspection by UL inspectors. All costs associated with obtaining the UL seal and any inspections shall be borne by the Contractor.
2. Panel wiring diagrams depicting wiring within and on the panel as well as connections to external devices. Panel wiring diagrams shall include power and signal connections, power sources, all panel ancillary equipment, protective devices, wiring and wire numbers, and terminal blocks and numbering. Field device wiring shall include the device ISA-tag and a unique numeric identifier. The diagrams shall identify all device terminal points that the system connects to, including terminal points where I/O wiring lands on equipment not supplied by the vendor. Two-wire and four-wire equipment shall be clearly identified and power sources noted. Panel drawings shall be 11" x 17" in size.

3. Instruction and replacement parts books.

4. Certified shop test reports.

5. As-built final drawings.

6. Field tests and inspection reports.

1.04 REFERENCE STANDARDS

A. Institute of Electrical and Electronics Engineers (IEEE)

B. National Electrical Manufacturers Association (NEMA)

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. A factory authorized service and parts organization shall be able to respond to any service call for the project within 8 hours. Provide the name and address of the factory authorized service and parts organization nearest to the project location at the time of the bid.

B. Equipment components and devices shall be UL labeled to the extent possible where ever UL standards exist for such equipment.

C. The control panel manufacturer shall demonstrate at least three years of continuous field operating experience in control panel design and fabrication. Submit customer/user list with telephone numbers, addresses and names of customer/user representatives.

1.06 SYSTEM DESCRIPTION

A. Refer to the detailed mechanical equipment specifications for description of system operation.

1.07 DELIVERY, STORAGE AND HANDLING

A. Package the control panel for maximum protection during delivery and storage.

B. Store the control panel indoors in a clean, dry, heated storage facility until ready for installation. Do not install the control panel in its final location until the facilities are permanently weather
tight. Protect the control panel at all times from exposure to moisture, chemicals, hydrogen sulfide and chlorine gas.

1.08 PROJECT/SITE REQUIREMENTS

A. The control panel shall consist of a main circuit breaker, a combination motor circuit protector (MCP), magnetic starter and solid state overload relay for each motor, a 120 volt control power transformer with two fuses on the primary and one fuse on the secondary. All control components shall be mounted in one common enclosure. Control switches shall be provided to operate each motor either manually or automatically.

1.09 SPARE PARTS

A. Provide the following spare parts for each control panel in the quantities specified:
   1. One dozen replacement fuses, all types and sizes
   2. Two dozen replacement lamps for pilot lights
   3. One dozen of each color replacement lens caps for pilot lights
   4. One starter coil for each size furnished
   5. One, solid state overload for each size furnished.
   6. One, 3-pole set of starter contacts of each NEMA size used
   7. One can of aerosol touch-up paint
   8. Panel Mounted power supplies - one of each type installed.

B. Spare parts shall be boxed or packaged for long term storage. Identify each item with manufacturer's name, description and part number on the exterior of the package.

1.10 WARRANTY

A. Warranties: in accordance with Bioscrubber System Section 11258.

PART 2 PRODUCTS

2.01 RATING

A. The control panel shall accept a single point of connection as its power source. The control panel shall operate on a power supply of 480 Volts, 3 Phase, 60 Hz. Provide transformers and power supplies to obtain different voltages as required by the control panel components.

B. The overall withstand and interrupting rating of the equipment and devices shall not be less than 65,000 amperes R.M.S. symmetrical at 480 Volts. All circuit breakers and combination motor starters shall be fully rated for the above fault current interrupting capacity. Series connected short circuit ratings will not be acceptable.
C. The complete control panel assembly shall be UL certified or carry a UL listing for "Industrial Control Panels".

D. The control panel shall meet all applicable requirements of the National Electrical Code.

E. The control panel enclosure shall be rated NEMA 4X type 316 stainless steel.

2.02 COMPONENTS

A. The main circuit breaker shall be a thermal-magnetic molded case breaker, Type FCL by Square D Company, or equal. Provide a flange mounted main power disconnect operating handle with mechanical interlock having a bypass that will allow the panel door to open only when the switch is in the OFF position.

B. A mechanical disconnect mechanism, with bypass, shall be installed on each motor circuit protector, capable of being locked in the "OFF" position to provide a means of disconnecting power to the motor.

C. An open frame, full voltage non-reversing, magnetic motor starter, shall be furnished for each motor. Motor starters shall be provided with motor circuit protectors and equipped to provide under-voltage release and overload protection on all three phases. Overload reset push-buttons shall be located on the exterior of the control panel door.

D. Auxiliary contacts shall be provided for remote run indication and indication of each status and alarm condition. Additional controls shall be provided as specified herein and as required by the detailed mechanical equipment requirements.

E. All operating control devices and instruments shall be securely mounted on the exterior door. All controls shall be clearly labeled to indicate function and shall be NEMA 4X rated.

1. Indicator lamps shall be heavy duty, industrial type, high-visibility LED, full voltage type. Units shall have screw on plastic lenses and shall have factory engraved legend plates as required. Lens color shall be green for OFF, red for ON and amber for FAIL or ALARM. For all control applications indicator lamps shall incorporate a push-to-test feature.

2. Mode selector switches (HAND-OFF-AUTO, LOCAL-OFF-REMOTE, PUMP SELECTOR, LEAD-LAG, etc) shall be heavy-duty, industrial type with contacts rated for 120 VAC at 10 Amps continuous. Units shall have standard size, black field, legend plates with white markings, as indicated. Operators shall be black knob type. Units shall have the number of positions and contact arrangements, as required. Units shall be single-hole mounting, accommodating panel thicknesses from 1/16-in minimum to 1/4-in maximum. Selector switches shall be by Allen-Bradley or equal.

3. Push-buttons, shall be heavy-duty, industrial type with momentary or maintained contacts as required, rated for 120 VAC at 10 Amps continuous. Units shall have standard size, black field, legend plates with white markings, as indicated. Button color shall be red for EMERGENCY STOP or START and green for STOP. Contact arrangement shall be as required. Push-buttons shall be by Allen-Bradley or equal.
F. A six digit, non-resetable elapsed time meter shall be connected to each motor starter. Meter shall be Bulletin 705, HK Series by Eagle Signal or equal.

G. A failure alarm with light shall be provided. Alarm beacon shall be by Federal Signal or equal.

H. The control panel shall be provided with a lightning and surge protection unit on the line side of the main power disconnect. Unit shall be 600 Volt, 3 Phase, General Electric "Tranquell" Series or equal.

I. All interfaces between control panel and remote devices shall be isolated via an interposing relay. Interposing relays shall have contacts rated for 250 VAC and 10 Amps continuous. Relays shall be by Potter and Brumfield or equal.

J. Intrinsically safe relays shall be solid state type with 5 Amp output contacts, suitable for use on a 120 Volt, 60 Hz power supply and shall be Factory Mutual approved for pilot devices in Class I, Division I, Group D hazardous atmospheres. Intrinsically safe relays shall be Gems Solid State Safe-Pak by Gems Sensors, Division of Transmerica Delaval, Inc or equal.

K. Control relays and timers shall be 300 Volt, industrial rated, plug-in socket type, housed in a transparent polycarbonate dust cover, designed in accordance with UL Standard 508 for motor controller duty. Continuous contact rating shall be 10 Amps resistive, 1/4 Hp, at 120 VAC, with an operating temperature of minus 10 to plus 55 degrees C. Relays shall be Potter & Brumfield, KRP Series or equal, with calibrated timing knob.

L. The MCP shall house motor starters for drive motors.

M. The MCP shall house motor starters for drive motors.

N. Motor starters: three Pole, 600 Volt, electrically operated, of the types shown on the Drawings, minimum size shall be NEMA Size 1. IEC rated starters shall have continuous current ratings equal to or greater than the continuous current ratings listed in NEMA ICS 2. Starters shall have 120 Volt encapsulated operating coils, an individual control power transformer with primary and secondary fuses, and silver cadmium oxide renewable line contacts.

1. Auxiliary contacts: accommodate up to four auxiliary contacts. Contacts shall be rated ten amperes continuous.
   a. Provide four external auxiliary contacts of any arrangement normally open or normally closed.

2. Each starter shall be equipped with two indicating lights for Run/Stop, Hand-Off-Auto (HOA) selector switch with an auxiliary contact which closes when in "Auto", two pushbuttons, a normally open Overload (OL) trip contact, unless otherwise required or shown on the drawings.

3. Provide a solid-state overload relay for protection of each motor. The overload relay shall provide high accuracy through the use of state-of-the-art microelectronic packaging technology.
   a. The overload relay shall be modular in design, be an integral part of a family of relays to provide a choice of levels of protection and be listed under UL Standard 508.
b. The overload relay shall have the following features:
   1) Self-powered
   2) Class 10 or 20 fixed tripping characteristics
   3) Manual or automatic reset
   4) Phase loss protection. The relay shall trip in 2 seconds or less under phase loss condition when applied to a fully loaded motor
   5) Visible trip indication
   6) One normally open and one normally closed isolated auxiliary contact
   7) Test button that operates the normally closed contact
   8) Test trip function that trips both the normally and normally closed contacts
   9) A current adjustment range of 3.2:1 or greater
   10) Ambient temperature compensated
   11) Ground fault protection. Relay shall trip at 50% of full load ampere setting
   12) Jam/Stall protection. Relay shall trip at 400% of full load ampere setting, after inrush

O. Specific control devices, control descriptions and other data are specified under the detailed specification for the mechanical equipment with which the control panel is supplied.

2.03 ENCLOSURE

A. The control panel specified herein shall be rated NEMA 4X.

   1. NEMA 4X enclosures shall be 316 stainless steel.

B. Steel enclosures shall be 12 gauge and constructed with continuously welded seams. The panel door(s) shall have continuous hinge and neoprene gasket. Door clamps shall be provided.

C. The enclosure shall incorporate a removable back panel on which control components shall be mounted. Back panel shall be secured to the enclosure with collar studs. The enclosure door shall be interlocked with the main power disconnect by a door mounted operating mechanism. Back panel shall be tapped to accept all mounting screws. Self-tapping screws shall not be used to mount any components.

D. Print storage pockets shall be provided on the inside of each panel. The storage pockets shall be steel, welded on to the door, and finished to match the interior panel color. The storage pocket shall be sufficient to hold all of the prints required to service the equipment, and to accommodate 8.5 inch by 11 inch documents without folding.

E. Overload tables shall be laminated and adhered to the inside of the door.

F. All panel doors shall have a lock installed in the door handle, or a hasp and staple for padlocking. Locks for all panels provided under this Contract shall be keyed alike.

G. The devices designated for rear-of-panel mounting shall be arranged within the panel in a manner to allow for ease of maintenance and adjustment. Heat generating devices such as power supplies shall be located at or near the top of the panel.
2.04 CORROSION CONTROL

A. Panels shall be protected from internal corrosion by the use of corrosion-inhibiting vapor capsules as manufactured by Northern Technologies International Corporation, Model Zerust VC; Hoffman Model AHCI; or equal.

2.05 NAMEPLATES MARKINGS AND IDENTIFICATION

A. Provide 2-in by 5-in, nominal, engraved lamicoid master nameplate on the control panel fastened with stainless steel screws or rivets. Nameplate shall be black with white core, 3/8-in high lettering and shall indicate equipment designation as shown on the Drawing.

B. Provide legend plates or 1-in by 3-in engraved nameplates with 1/4-in lettering for identification of door mounted control devices, pilot lights and meters.

C. Provide permanent warning signs as follows:

1. "Danger - High Voltage - Keep Out" on all doors.

2. "Warning - Hazard of Electric Shock - Disconnect Power Before Opening or Working On This Unit" on main power disconnect.

2.06 ENVIRONMENTAL CONTROL

A. All panels shall be provided with sun shields, heat sinks, or air conditioning units as required to prevent temperature buildup inside of panel. The internal temperature of all panels shall be regulated to a range of 45 Deg F to 104 Deg F under all conditions. Under no circumstances shall the panel cooling or heating equipment compromise the NEMA rating of the panel.

B. For panels with internal heat that cannot be adequately dissipated with natural convection and heat sinks, an air conditioner shall be provided.

C. Provide custom fabricated sun shields in accordance with the following requirements:

1. Sun shields shall be fabricated from minimum 12 gauge Type 316 stainless steel. Units shall be designed, fabricated, installed, and supported to fully cover and shade the top, sides and back of the enclosure, and to partially shade the front panel of the enclosure, from direct exposure to sunlight from sunrise to sunset.

2. Depending on overall size, sun shields may be fabricated in single or multiple segments for attachment to the enclosure support framing or to separate free standing framing around the enclosure.

3. Sun shields shall not be attached directly to the enclosure by drilling holes through, or welding studs to, the enclosure surfaces, and shall be designed and mounted to provide a minimum 3-inch air gap all around the enclosure for air circulation and heat dissipation.

4. The top section of all sun shields shall be sloped at a minimum angle of 5 degrees from horizontal. For wall mounted enclosures, the top section shall slope downward away from
the wall and towards the front of the enclosure. For free standing, floor mounted and frame mounted enclosures the top section shall slope downward towards the back side of the enclosure.

5. The front edge of the top section of all sun shields shall incorporate a narrow and more steeply sloped drip shield segment which sheds water away from the front of the enclosure and prevents it from dripping or running directly onto the front panel of the enclosure.

6. All seam welds used in sun shield fabrication shall be continuous and shall be ground smooth.

7. All exposed corners, edges and projections shall be smooth rounded or chamfered to prevent injury.

D. Provide an integral heater, fan, and adjustable thermostat to reduce condensation and maintain the minimum internal panel temperature. Mount the unit near the bottom of the enclosure with discharge away from heat-sensitive equipment.

1. Heater shall be Chromalox, Type OT, 1.5-in wide, 120 Volts, single phase, 150 watts, with rust resisting iron sheath, Catalog No. OT-715, Product Code No. 129314.

2. A control thermostat mounted inside the control Panel shall be Chromalox, Type WR, single stage, Catalog No. WR-80, Product Code No.263177.

3. The strip heater terminals shall be guarded by a protective terminal cover.

4. High temperature connecting lead wire shall be used between the thermostat and the heater terminals. Wire shall be No. 12 AWG stranded, nickel-plated copper with Teflon glass insulation and shall be the product of Chromalox, Catalog No. 6-CFI-12, Product Code No. 263783.

2.07 WIRING

A. All interconnecting wiring shall be stranded, type MTW, and shall have 600 volt insulation and be rated for not less than 90 degrees Celsius. Wiring for systems operating at voltages in excess of 120 VAC shall be segregated from other panel wiring either in a separate section of a multi-section panel or behind a removable Plexiglas or similar dielectric barrier. Panel layout shall be developed such that technicians shall have complete access to 120 VAC and lower voltage wiring systems without direct exposure to higher voltages.

B. Power distribution wiring on the line side of fuses or breakers shall be 12 AWG minimum. Control wiring on the secondary side of fuses shall be 16 AWG minimum. Electronic analog circuits shall utilize 18 AWG shielded, twisted pair, cable insulated for not less than 600 volts.

C. Power and low voltage DC wiring systems shall be routed in separate wireways. Crossing of different system wires shall be at right angles. Different system wires routed parallel to each other shall be separated by at least 6-inches. Different wiring systems shall terminate on separate terminal blocks. Wiring troughs shall not be filled to more than 60 percent visible fill.
D. Terminations

1. All wiring shall terminate onto single tier terminal blocks, where each terminal is uniquely and sequentially numbered. Direct wiring between field equipment and panel components is not acceptable.

2. Multi-level terminal blocks or strips are not acceptable unless they are approved by the Engineer. If approved, they shall be mounted on angled din rail elevated from the back panel.

3. Terminal blocks shall be arranged in vertical rows and separated into groups (power, AC control, DC signal). Each group of terminal blocks shall have a minimum of 25 percent spares.

4. Terminal blocks shall be the compression type, fused, unfused, or switched.

5. Discrete inputs and outputs (DI and DO) shall have two terminals per point with adjacent terminal assignments. All active and spare PLC and controller points shall be wired to terminal blocks.

6. Analog inputs and outputs (AI and AO) shall have three terminals per shielded pair connection with adjacent terminal assignments for each point. The third terminal is for shielded ground connection for cable pairs. Ground the shielded signal cable at the PLC cabinet. All active and spare PLC and controller points shall be wired to terminal blocks.

7. Wire and tube markers shall be the sleeve type with heat impressed letters and numbers.

8. All interconnecting wires between panel mounted equipment and external equipment shall be terminated at numbered terminal blocks.

9. Only one side of a terminal block row shall be used for internal wiring. The field wiring side of the terminal shall not be within 6-inches of the side panel or adjacent terminal or within 8-inches of the bottom of free standing panels, or within 3-inches of stanchion mounted panels, or 3-inches of adjacent wireway.

10. Circuit power from the control panel out to field devices (switches, dry contacts etc.) that are used as discrete inputs to the PLC input cards shall be isolated with an isolating switch terminal block with flip cover that is supplied with a dummy fuse. Isolation switch block shall be an Allen Bradley Model 1492-H7 or equal. One isolating switch terminal block per loop numbered piece of equipment and one per spare I/O point is acceptable.

11. All PLC discrete outputs to the field shall be isolated with an isolating fuse switch terminal block with a flip cover and a neon blown fuse indicator. The single circuit fusible terminal block shall be an Allen Bradley 1492-H4 or equal.

E. All wiring to hand switches and other devices, which are live circuits independent of the panel's main power disconnect, shall be clearly identified as such.
F. All wiring shall be clearly tagged at both ends and color coded. All tag numbers and color coding shall correspond to the panel wiring diagrams and loop drawings prepared by the control panel vendor. All power wiring, control wiring, grounding, and DC wiring shall utilize different color insulation for each wiring system used. The color coding scheme shall be:

1. 120 VAC Hot wiring downstream of panel circuit breaker – Red
2. Three phase power – Brown, Orange, Yellow, and Green ground.
3. 120 VAC neutral - White
4. Ground - Green
5. DC power or control wiring – Blue
6. DC analog signal wiring – Black (+), White (-)
7. Foreign voltage – Yellow

G. Each field instrument deriving input power from the control panel(s) shall have a separate power distribution circuit with a circuit breaker or fuse and blown fuse indication. All instruments requiring 120VAC power shall be powered from the source in the panel where the instrument signals lands.

H. Wiring trough for supporting internal wiring shall be plastic type with snap-on covers. The side walls shall be open top type to permit wire changing without disconnecting. Trough shall be supported to the subpanel by stainless steel screws. Trough shall not be bonded to the panel with glue or adhesives.

I. Each panel shall have a specification grade duplex convenience receptacle with ground fault interrupter, mounted internally within a stamped steel device box with appropriate cover.

J. Each panel shall be provided with an isolated copper grounding bus for all signal and shield ground connections. Shield grounding shall be in accordance with the instrumentation manufacturer's recommendations.

K. Each panel shall be provided with a separate copper power grounding bus (safety) in accordance with the requirements of the National Electrical Code.

L. Each panel shall have control, signal, and communication line surge suppression.

1. 120VAC power feed protection shall be EDCO HSP series, Phoenix Contact PT series, or Equal.
2. 4-20mA surge protection shall be EDCO, Phoenix Contact, or Equal.
3. Communication line protection shall be EDCO, Phoenix Contact, or Equal.
2.08 TERMINAL BLOCKS

A. Terminal blocks shall be one-piece molded plastic blocks with screw type terminals and barriers rated for 600 volts. Terminals shall be double sided and supplied with removable covers to prevent accidental contact with live circuits. Terminals shall have permanent, legible identification, clearly visible with the protective cover removed. Each terminal block shall have 20 percent spare terminals, but not less than two spare terminals.

B. Wires shall be terminated to the terminal blocks with crimp type, pre-insulated, ring-tongue lugs. Lugs shall be of the appropriate size for the terminal block screws and for the number and size of the wires terminated.

C. Provide an AC ground bar bonded to the panel enclosure with 20 percent spare terminals.

D. Provide an intrinsically safe ground terminal bar isolated from the control panel enclosure. Provide 20 percent spare terminals but not less than two spare terminals.

2.09 24 VDC POWER SUPPLIES

A. If required, provide a 24 VDC power supply in the control panel to power field instruments, panel devices, etc., as required. Equip the power supply with a power on/off circuit breaker.

B. The 24 VDC power supply shall meet the following requirements:

1. Input power: 115 VAC, plus or minus 10 percent, 60 Hz.

2. Output voltage: 24 VDC.

3. Output voltage adjustment: 5 percent.

4. Line regulation: 0.05 percent for 10 volt line change.

5. Load regulation: 0.15 percent no load to full load.

6. Ripple: 3 mV RMS.

7. Operating temperature: 32 to 140 degrees Fahrenheit.

C. Size the 24 VDC power supply to accommodate the design load plus a minimum 25 percent spare capacity.

D. If power supply on/off status signal is shown, provide a relay contact (internal to the power supply or external if the power supply is not so equipped) to indicate on/off status of the power supply.

E. Provide output overvoltage and overcurrent protective devices with the power supply to protect instruments from damage due to power supply failure and to protect the power supply from damage due to external failure.
F. Mount the 24 VDC power supply such that dissipated heat does not adversely affect other panel components.

G. Manufacturer(s):
   1. Phoenix Contact.
   2. Weidmuller
   3. Equal.

2.10 SHOP TEST
   A. Perform manufacturer's standard production testing and inspection in accordance with NEMA and ANSI standards.

PART 3 EXECUTION

3.01 INSTALLATION
   A. Repaint any damage to factory applied paint finish using touch-up paint furnished by the control panel manufacturer. The entire panel or section shall be repainted per the field painting per manufacturer’s requirements at no additional cost to the Owner.
   
   B. Any work not installed according to the Drawings and this Section shall be subject to change as directed by the Engineer. No extra compensation will be allowed for making these changes.

3.02 FIELD TESTING
   A. Check mechanical interlocks for proper operation. Make any adjustments required.
   B. Install overload heaters per actual motor nameplate currents.
   C. Adjust motor circuit protectors for actual motor nameplate currents.
   D. In the event of an equipment fault, notify the Engineer immediately. After the cause of the fault has been identified and corrected, a joint inspection of the equipment shall be conducted by the Contractor, the Engineer and the control panel manufacturer's factory service technician. Repair or replace the equipment as directed by the Engineer prior to placing the equipment back into service.

END OF SECTION
SECTION 11258
BIOSCRUBBER SYSTEM

PART 1  GENERAL

1.01  SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required for the installation and testing of the complete, bioscrubber system as specified herein. System shall include three (3) inlet fans, three (3) bioscrubber vessels and media, wiring and electrical components, local control panel(s), automatic irrigation systems, supplemental nutrient supply equipment, and three (3) 55 gallon nutrient tanks. Additionally, the Manufacturer shall be responsible for the inlet boxes for the fans and associated dampers, ductwork, appurtenances between the fans and bioscrubber vessel (which includes dampers, flexible flange connectors, and other fittings), and the pipe support brackets for the non-potable water/nutrient/recirculation pipeline(s) and the ductwork along the bioscrubber vessel. If the Manufacturer utilizes a recirculation system, the Manufacturer shall provide all components for the recirculation system, including the recirculation pump, as necessary and the Contractor, under a separate contract, shall provide all of the necessary power, control, and piping improvements in order to provide a fully functional system. The bioscrubber manufacturer shall coordinate the ductwork installation with the Contractor and the ductwork manufacturer to provide test port locations on the ductwork system for H₂S/odor sample collection/measurements for the inlet and outlet of each scrubber and for testing and balancing of the system.

B. This Section gives a general description of system requirements, but does not cover all details, which will vary in accordance with the manufacturer and requirements of the application. It does, however, it does cover the furnishing, delivery, installation supervision, start-up, warranty, and field testing of all materials, equipment and appurtenances for a complete bioscrubber system as specified, whether specifically mentioned in this Section or not.

C. The Bioscrubber System Manufacturer shall have complete system responsibility for the bioscrubber system. The Manufacturer shall furnish and be responsible for proper functioning of all internal piping and appurtenances. The Contractor, under a separate contract, shall provide and install water, drain and interconnect piping, water and drain piping insulation, ductwork and power and control wiring to the bioscrubber system, which includes the power and control wiring between the bioscrubber electrical control panel and the water panels. The Manufacturer shall supply the Contractor with all necessary wiring diagrams. The system manufacturer shall furnish and be responsible for all integral electrical components (transformers, control panels and circuits, interlocks, instrumentation, etc.) required for proper functioning of the system.

D. The term "Manufacturer" as used in this specification will refer to the manufacturer of the bioscrubber system or the manufacturer's authorized representative.

E. The dimension, layout and orientation of the bioscrubbers, fans and duct work shall be in accordance with the Figures in Appendix A. Deviation of the layout is not permitted due to space limitation.
1.02 RELATED WORK

A. Section 00100A – Specific Conditions

B. Motors are specified in Section 01171.

C. Control Panels are specified in Section 01179.

D. Fiberglass Reinforced Plastic Ductwork and Accessories are specified in Section 15891.

1.03 SUBMITTALS

A. Submit to the Engineer six (6) hard copies and one (1) PDF of all materials and equipment required to establish compliance with this Section. Partial submittals will not be accepted. Submittals shall include the following at a minimum:

1. Descriptive literature, bulletins, and/or catalogs of the equipment.

2. Design structural calculations for the vessel construction and for the hold down lug stamped and sealed by a professional engineer registered in Texas.

3. Certified shop and erection drawings showing all important details of construction and dimensions.

4. Dimensions shall include anchor bolt layout and locations, and diameters of air duct, water supply and drainage piping at the limit of work.

5. Wiring diagram and electrical requirements, including logic diagrams and wiring schematics.

6. Materials of construction, including resin and material used. A statement from the manufacturer that the materials and resin used are suitable for this installation.

7. Details of filter media supports.

8. Descriptive information of media including but not limited to pressure drop through media, liquid hold-up data and media physical characteristics.

9. Complete, detailed instructions on the installation of the bioscrubber.

10. A statement from the manufacturer that the fabrication is in accordance with this Section.

11. The total weight of the equipment including the weight distribution at the points of supports.

12. A complete bill of materials for all equipment.

13. A list of the manufacturer's recommended spare parts.

14. A list of special tools.
15. Description of nozzles showing details of construction and attachment to vessel.

16. Bioscrubber media characteristics.

17. Testing procedures and test equipment.

18. Acclimatization procedure and any required temporary piping during the acclimation period.

19. Complete data on the head loss for the air flow through the vessels at design air flow rate.

20. Provide signed and sealed (State of Texas PE) calculations that the bioscrubber system can withstand the wind load design criteria described in paragraph 1.09.F. Current design does not include wiring restraints. If wiring restraints shall be required based on the calculations, modifications to the bioscrubber system design, including pad size to allow appropriate access space, shall be performed at no additional cost to the Engineer/Owner.

21. Submit fan data sheets with a description of the proposed fan, fan size, type, arrangement, materials of construction, weight, motor horsepower, motor type, power supply, frame size, sheave sizes, belts size, number and length. Each submittal shall include pertinent equipment dimensional data, and a performance curve showing the fan operating point and range. Minimum curve size shall be 8-inch by 6-inch. Faxed copies of curves are not acceptable. A list of accessories to be furnished shall be included. Copies of operating and maintenance manuals shall be submitted. Refer to Section 01171 for motor requirements.


23. Complete Control Panel layout, including size, wiring, schematics internal and external equipment and device arrangement, nameplates and parts catalog cuts as specified in Section 01179.

24. If a permanent recirculation system is provided, submittals for the recirculation pump shall include as a minimum the following:
   a. Manufacturer's certified rating data.
   b. Certified shop drawings showing all important details of construction, dimensions and anchor bolt locations.
   c. Descriptive literature, bulletins and/or catalogs of the equipment.
   d. A list of the manufacturer's recommended spare parts. Include gaskets, packing, etc., on the list.
   e. Data regarding pump and motor characteristics and performance
      (1) Prior to fabrication and testing, provide guaranteed performance curves based on shop tests of mechanically duplicate pumping units, showing they meet specified requirements for head, capacity, horsepower and efficiency.
      (2) For units of same size and type, provide curves for a single unit only.
      (3) Submit curves for guaranteed performance and certified tests as specified on 8-1/2 in. by 11-in sheets, one curve per sheet.
      (4) Provide motor information as specified in Section 01171.
B. Submit shop inspection and test certificates.

1. The Engineer retains the right to extract a one (1) inch diameter sample from the vessel for analysis of the resin. The test sample shall be provided from the vessel cut-out during fabrication. The exact location of the test sample shall be submitted by the Manufacturer for the Engineer's review and approval. The hole shall be repaired by the Manufacturer, if the sample was not taken from the vessel cut-out, and the analysis shall be paid for by the Manufacturer. The Engineer may reject the bioscrubber vessel if they do not meet the standard of the representative samples.

2. Certificates from the manufacturer shall be submitted stating that the installation of the equipment is satisfactory, the unit has been satisfactorily tested, is ready for operation and the operating personnel have been suitably instructed in the operation and care of the units.

C. Operation and Maintenance Data

1. Operations and maintenance instructions shall be furnished to the Engineer as specified herein. These instructions shall consist of clean, legible, reproducible manufacturers' manuals prepared by the manufacturer exclusively for the equipment furnished for this installation. Operations and maintenance instructions shall be written in a clear, concise and easily understandable manner to serve in training personnel at this facility. The instruction manual shall include schematic and detailed drawings and diagrams as necessary to accompany the written instructions. A complete set of equipment shop drawings. All component parts shall be clearly identified by name and part numbers cross-referenced. A complete listing of nameplate data for each piece of equipment shall be attached to these instructions. In addition, the instructions shall include troubleshooting data and full preventive maintenance schedules.

1.04 SERVICES OF A MANUFACTURER'S REPRESENTATIVE

A. A factory representative who has a complete knowledge of the proper operation and maintenance shall be provided as specified herein. Qualifications of the representative shall be submitted for approval. Workday requirements listed are exclusive of travel time and do not relieve the Contractor and/or Manufacturer of obligation to provide sufficient service to place equipment in satisfactory operation. The factory representative shall provide a minimum of two (2) training sessions (typically early morning and late evening) to accommodate plant staff. Owner and Engineer shall be notified in writing a minimum of fourteen (14) calendar days prior to the scheduled training.

<table>
<thead>
<tr>
<th>Services Provided by Factory Representative</th>
<th>Minimum (a) No. of Trips</th>
<th>Minimum Time On Site Per Trip (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Supervise installation</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2. Inspect and approve installation</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>3. Supervise initial adjustment</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>4. Conduct performance testing</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>5. Instruct Owner and Engineer in proper start-up and O&amp;M</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>
(a) The manufacturer's factory representative shall be present at frequent enough intervals to ensure proper installation, testing, and initial operation of the equipment.

(b) The manufacturer's factory representative shall provide to the Engineer a written certification that the system has been installed in accordance with the manufacturer's recommendations.

(c) May be done on the same trip upon completion of prior item if acceptable to the Engineer.

(d) Instruction may be given upon completion of Item 4, provided that the test is successful and the O&M manuals have been submitted to and accepted by the Engineer.

1.05 SCHEDULE

A. The Bioscrubber System Manufacturer shall have the system delivered to the Job Site at the Haskell Street WWTP at 4100 Delta Drive, El Paso, Texas 79905.

B. Milestones

1. Shop Drawings: The Bioscrubber system manufacturer shall submit complete shop drawings 15 calendar days after the notice to proceed.

2. Equipment Delivery: Upon approval of the shop drawings the Bioscrubber System Manufacturer shall deliver the system complete to the job site within 96 calendar days.

3. Liquidated Damages: Owner and the Bioscrubber System Manufacturer agree that time is of the essence of this agreement. They also recognize that delays to the delays and expense and difficulties in proving in a legal proceeding the actual loss suffered by the Owner if the Work is not completed on time. Accordingly instead of requiring such proof the Owner and the Bioscrubber System Manufacturer agree that as liquidated damages for delay (but not as a penalty) the Bioscrubber System Manufacturer shall pay the owner $500 per day for each calendar day that expires after the time specified for Shop Drawings and Equipment Delivery.

1.06 OTHER RELATED CONTRACTS

A. The overall construction of the project will be constructed by a Contractor yet to be selected by the Owner. The Contractor will be responsible for installing the equipment supplied by the Bioscrubber System Manufacturer. The Contractor will be connecting the bioscrubber’s piping, ductwork and electrical and instrumentation to the remainder of the work they will be installing. The Bioscrubber System Manufacturer shall be fully responsible for coordinating their requirements for installation, startup, testing and commissioning of the bioscrubber system with the Engineer and the Contractor.

1.07 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)


2. EN 13725 – Air Quality: Determination of Odour Concentration by Dynamic Olfactometry.

4. ASTM D883 - Definition of terms relating to plastics.


10. ASTM D2583 - Test for Indentation Hardness of Rigid Plastics by Means of a Barcol Impessor.


B. American National Standard Institute (ANSI)

C. Instrument Society of America (ISA)

D. Anti-Friction Bearing Manufacturers Association (AFBMA)

E. SPI Proposed Product Standard - Corrosion Resistant Structures - Reinforced Plastics/Composites Division Section, September 1970

F. National Electrical Manufacturers Association (NEMA)

G. Underwriters Laboratories (UL)

H. National Fire Protection Association (NFPA)

I. National Electrical Code (NEC)

J. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.08 QUALITY ASSURANCE

A. To assure compatibility of all system components and complete system responsibility, ensure that the bioscrubber system and all accessories and controls specified herein are furnished by a
B. single Manufacturer. The Manufacturer shall be fully experienced, reputable and qualified in the manufacture of the equipment to be furnished. The equipment shall be manufactured and installed in accordance with the best practices and methods, and shall operate satisfactorily. The bioscrubber system shall be EcoFilter Reactor by BioAir Solutions, LLC or Engineer approved equal by BIOREM Technologies Inc. or by Evoqua Water Technologies LLC.

1.09 SYSTEM DESCRIPTION

A. The bioscrubber system shall continuously, automatically treat, effectively remove hydrogen sulfide, and eliminate odors in the foul air exhausted from the primary clarifiers at the wastewater treatment plant. Hydrogen sulfide and other odorants shall be removed by microbial action within synthetic media furnished in the bioscrubbers.

B. For purposes of testing bioscrubber odor control system performance, inlet concentrations of odorous pollutants will be as summarized in Table 1.

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Inlet Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen sulfide - average</td>
<td>100 ppmv</td>
</tr>
<tr>
<td>concentration</td>
<td></td>
</tr>
<tr>
<td>Hydrogen sulfide - peak</td>
<td>250 ppmv</td>
</tr>
<tr>
<td>concentration</td>
<td></td>
</tr>
</tbody>
</table>

C. The pollutant removal performance of the bioscrubber system shall be as indicated in Table 2.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>A. Required Performance After Bioscrubber</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Average hydrogen sulfide removal efficiency shall be equal to or greater than 99.0 % over a test period that includes both average and peak conditions OR average outlet ( \text{H}_2\text{S} ) concentration shall be less than 0.5 ppmv, whichever is less stringent.</td>
</tr>
<tr>
<td>2.</td>
<td>Average outlet odor concentration shall not exceed 2,000 dilutions-to-threshold (D/T) over a test period that includes both peak and average hydrogen sulfide loading conditions OR odor concentration removal shall be 85%, whichever is less stringent. Odor concentration shall be measured and analyzed in accordance with EN 13725-2003.</td>
</tr>
</tbody>
</table>

D. Performance testing procedures and terms of the performance guarantee are described in Subsection 3.04 of this Specification.
E. The bioscrubber system will consist of three (3) trains, and each train will consist of durable inorganic media, inlet fan, stack, water distribution system, nutrient addition system, and controls.

F. The bioscrubber system shall be able to withstand 90 mph winds and shall be in accordance with the wind loading requirements and structural design criteria requirements described in the 2009 International Building Code.

G. The Manufacturer shall provide three (3) 55 gallon nutrient tanks suitable for outdoor condition outdoor conditions filled with nutrient.

1.10 WARRANTY

A. The Manufacturer shall warrant that the System shall be supplied in accordance with these specifications and shall perform as described herein. The Manufacturer shall warrant that the System will be free from defects in materials and workmanship for a period of one (1) year after startup and final acceptance of the equipment at the Owner’s facility. At the Manufacturer’s discretion, the Manufacturer shall repair or provide replacement for any defective components under this warranty provided that any such defect was not the result of misuse of the component by the Owner or the Owner’s Agent and that the equipment was operated as designed.

B. The Manufacturer shall warrant the suitability of the biological reactor media for a period of ten (10) years from the date of final start-up and final acceptance, provided that the System is operated in accordance with the Manufacturer’s Operating and Maintenance Manual provided hereunder. In the event of a failure of the media within the ten (10) year warranty period, the Manufacturer shall replace the media at no expense to the Owner or Contractor and the ten (10) year warranty reinstated for the replacement media.

1.11 ENVIRONMENTAL CONDITIONS

A. Ambient Environment. The ambient temperatures are expected to range between 15 degrees F and 110 degrees F with a relative humidity that will vary from 10 to 100%. The site elevation is approximately 3700 feet above mean sea level.

1.12 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in coordination with installation of the pad, wiring, and piping by others. If equipment is delivered before the pad is ready, the Manufacturer shall be responsible for both off-loading and placement of the equipment on the pad.

B. Exercise care during loading, transporting, unloading, and handling to prevent damage of any nature to interior and exterior surfaces of pipe and fittings.

C. Do not drop pipe and fittings.

D. Store materials on the project site in enclosures or under protective coverings in accordance with manufacturer’s recommendations and as required by the Engineer.

E. Assure that materials are kept clean.
F. All equipment and materials shall be properly protected and maintained such that no damage will occur from the time of shipment until the completion of the installation.

G. The Engineer and Contractor shall inspect all equipment upon delivery. Contractor shall notify manufacturer within 24 hours if damage occurred as a result of shipping.

H. Vessel shall be shipped in either the vertical or horizontal position. Multiple shipments are acceptable. If shipped in the horizontal position, Manufacturer is responsible for any damage to the shape of the unit and must orient the vessel vertically upon offloading the vessel.

I. Flange faces shall be protected from damage by covering with suitable plywood or hardboard, securely fastened.

J. Pipe and tubing, fittings and miscellaneous small parts shall be crated or boxed.

K. The equipment shall be inspected by Owner and Contractor before unloading at the installation site.

1.13 OPERATION AND MAINTENANCE MANUAL

A. Three (3) bound Operating and Maintenance Manuals shall be furnished along with a CD inserted in a pocket inside the front cover of each manual. The instructions shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, recommended spare parts list, descriptions, etc, that are required to instruct operation and maintenance personnel unfamiliar with such equipment. The maintenance instructions shall include trouble shooting data and full preventive maintenance schedules.

B. The fully executed Manufacturer’s Certificate of Installation, Testing, and Instruction, located at the end of this Specification, shall be included in the Operating and Maintenance Manuals.

1.14 SUBSTITUTION

A. Any substitutions or deviations in equipment or arrangement, from that specified herein, shall be the responsibility of the Manufacturer. Any deviation must be accompanied by detailed structural, mechanical, and electrical drawings and additional supporting data for review by the Owner or the Owner’s Engineer, and must be stamped and certified by a registered Professional Engineer (PE) in the state where the jobsite is located.

B. All costs associated with the review of substitutions or deviations, and costs to the Engineer, Contractor or Owner associated with project drawing changes as a result of approval of such, shall be borne by the Manufacturer. There shall be no additional costs to the Owner due to substitutions or deviations.

1.15 TOOLS AND SPARE PARTS

A. At a minimum, manufacturer shall provide an adequate supply of consumables and calibration materials necessary to operate and maintain the equipment specified herein for one year period after Owner’s acceptance.
B. Manufacturer shall provide the following spare parts:

1. One (1) 1 ½”, 20 mesh strainer for the water panel.
2. One (1) set of fan bearings.
3. One (1) set of V-belts for fan.
4. If a permanent recirculation system is provided, one (1) spare recirculation pump.
5. Refer to Sections 01171 and 01179 for additional requirements.

PART 2 PRODUCTS

2.01 GENERAL

A. General Description

1. The bioscrubber system shall consist of three (3) self-contained totally enclosed vessel constructed of fiberglass-reinforced resin. The vessels shall contain a durable inorganic media that serves as a support structure for a microbial population without being consumed as a source of nutrients or alkalinity. Non-potable water shall be distributed uniformly over the surface of the media to supply moisture and nutrients to the microbial population and remove process waste. If deemed necessary by the Manufacturer, Manufacturer shall supply a nutrient dosing system that is completely integrated into the irrigation and electrical system.

2. The bioscrubber system shall include inlet fans, stacks, control panel to control flow of water and nutrients, gauges to monitor pressure drop, manway, sampling port for drainage water, and freeze protection provisions. Freeze protection provisions shall include, yet not limited to, the installation of heater(s) and insulation for the water panel. The supply and installation of the heat tracing and aluminum jacketed insulation on all exposed water and drain piping shall be installed by the Contractor, under a separate contract.

3. All equipment shall be new and unused and suitable for the conditions of service to which they will be subjected. Workmanship shall be of the highest quality and shall be carried out by competent and experience workmen.

2.02 DESIGN REQUIREMENTS

A. All components of the System shall be compatible with the conditions and constituents to which they will be subjected during normal operation. Compounds with which the materials of construction must be compatible with include, but are not limited to:

1. Hydrogen Sulfide
2. Sulfuric Acid
3. Ammonia

4. Dimethyl Sulfide

5. Methyl Mercaptan and other Mercaptans

6. Other Reduced Sulfur Compounds (RSC’s)

B. The System shall be furnished to meet the following criteria:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Capacity</td>
<td>37,800</td>
<td>Cfm</td>
</tr>
<tr>
<td>Number of trains</td>
<td>3</td>
<td>train</td>
</tr>
<tr>
<td>Capacity per trains</td>
<td>12,600</td>
<td>Cfm</td>
</tr>
<tr>
<td>Bioscrubber diameter (max)</td>
<td>12</td>
<td>ft.</td>
</tr>
<tr>
<td>Bioscrubber overall height, including stack (max)</td>
<td>33</td>
<td>ft.</td>
</tr>
<tr>
<td>Maximum allowable pressure drop for the bioscrubber system. Includes inlet box, fan (suction and discharge sides), damper, and associated ductwork connections. Ductwork headloss upstream of the fan inlet box is not included. Refer to Paragraph 2.01.E.7 for fan sizing, which describes ductwork headloss upstream of the fan inlet box.</td>
<td>7.9</td>
<td>inch water column</td>
</tr>
<tr>
<td>Pressure drop across bioscrubber media (max)</td>
<td>6.6</td>
<td>inch water column</td>
</tr>
<tr>
<td>System water flow rate for system (instantaneous) (max)</td>
<td>186.0</td>
<td>gallons/minute</td>
</tr>
<tr>
<td>System water flow rate per train (instantaneous) (max)</td>
<td>62.0</td>
<td>gallons/minute</td>
</tr>
<tr>
<td>System water pressure (max)</td>
<td>70</td>
<td>psi</td>
</tr>
<tr>
<td>System water consumption (approx.) (average)</td>
<td>144,000</td>
<td>gallons/day</td>
</tr>
<tr>
<td>System Nutrient Consumption (approx.) (average)</td>
<td>0*</td>
<td>gallons/month</td>
</tr>
<tr>
<td>Empty bed residence time (EBRT) (min)</td>
<td>8.3</td>
<td>seconds</td>
</tr>
</tbody>
</table>

* Note: When the Total N is 3 – 20 mg/L and Total P is 1 – 5 mg/L, the system will not require any supplemental nutrients.

C. Fiberglass Reinforced Plastic Vessel

1. All parts of the vessel shall be so proportioned as to have liberal strength and stiffness and to be especially adapted for the work to be done. Ample room and facilities shall be provided for access.
2. The bioscrubber shall be a free-standing tower including media and media bed irrigation system. The reactor vessel shall be constructed of corrosion resistant FRP. The vessel shall be designed to support the required number of media layers and treatment stages. All materials of construction shall be corrosion resistant. The interior of the vessel shall be treated with vinyl ester corrosion barrier for maximum corrosion resistance. The exterior of the vessel shall incorporate a surface veil for superior durability.

3. Equipment built to these specifications shall meet the requirements of ASTM D3299 for filament wound tanks, ASTM D4097 for contact molded tanks, and National Bureau of Standards Voluntary Product Standard NBS PS15-69.

4. Vessels built to these specifications shall have the following information printed on nameplates of appropriate size for the equipment involved.
   a. Name of Manufacturer
   b. Capacity in Cubic Feet
   c. Chemical Environment
   d. Manufacturer Serial Number
   e. Year Built
   f. Name and Equipment Number
   g. Purchase Order Number
   h. Design Pressure and Temperature
   i. Resin

5. Resins
   a. The resin used shall be resistant to corrosion by wet hydrogen sulfide and other corrosive gases present in wastewater treatment plants. A single, fire retardant resin shall be used throughout. Flame spread ratio shall not exceed 25 when tested in a Steiner Test Tunnel in accordance with ASTM E84.
   b. Antimony or NYACOL activities shall not be used to achieve flame spread index.
   c. Acceptable products
      1) Vipel KO22-AC as manufactured by AOC Corrosion Resins.
      2) Derakane 510-A40 as manufactured by Ashland Chemical Company.
      3) CoRezyn 8400 as manufactured by Interplastic Corporation
      4) Or Engineer approved equal

6. The vessel shall be constructed of factory fabricated fiberglass reinforced fire retardant vinyl ester resin as follows:
   a. The shell shall consist of an interior layer, a corrosion barrier, a structural layer and an exterior layer.
   b. No thixotropic agents may be used in the corrosion barrier.
   c. Reinforcing material shall be commercial grade glass fiber containing a coupling agent to produce a suitable bond with the resin used.
   d. Interior layer shall be a minimum of 20 mils thick single layer Nexus surface veiling in a resin rich surface. Resin content shall be approximately 90 percent.
e. Corrosion barrier shall be a minimum of 100 mils thick of Type E glass strand mat, applied in two layers of equal thickeners. Resin content shall be approximately 70 percent.

f. Structural layer shall be alternating layers of Type E glass, reinforced by interweaving of chopped strand mat and woven roving continuous filament winding glass. Resin content shall be approximately 60 percent.

g. Exterior layer shall be a parafinatated gel coat with UV inhibitors. There shall be no pigmentation added to the exterior layer.

h. All surfaces shall be finished so as to obtain complete cure of the resin without air inhibition. The finished laminate shall be as free as commercially practicable from visual defects such as foreign inclusions, dry spots, air bubbles, pinholes and pimples. The vessel shall be post-cured per the resin manufacturer’s recommendations and shall conform to the resin manufacturer’s minimum standard for Barcol hardness.

i. The inner surface shall meet the visual acceptance criteria in Table 5 ASTM C 582 process side. Exterior shall meet the referenced criteria for the non-process side.

j. The structural layer or body of the laminate shall be of chemically resistant construction suitable for the service, providing the additional strength necessary to meet the tensile and flexural requirements. Where separate layers such as matt, cloth, or woven roving are used, all layers shall be lapped a minimum of 1-in. laps shall be staggered as much as possible. If woven roving or cloth is used, the layer of chopped strand glass shall be placed as alternate layers. The exterior surface shall be relatively smooth with no exposed fibers or sharp projections. Handwork is acceptable, but enough resin shall be present to prevent fiber show.

k. Any grinding, repair, or sanding of interior surfaces shall be confined to no more than one percent of the total area and shall be covered with a laminate duplicating the inner corrosion liner and paraffinated top coat. All exposed edges shall be healed with the same resin as used on the vessels and shall be fully pose-cured.

l. There shall be no longitudinal joints in the axial direction of the cylindrical shell. The entire shell thickness shall be built up prior to removal of the shell from the mandrel.

m. The minimum wall thickness shall be per structural calculations but no less than 3/8-in for all vessels. The vessel shall be external circumferential reinforcing ribs and bottom knuckle reinforcement as dictated by the design and the referenced ASTM standards.

D. Equipment & Tank Connections

1. Manways on bioscrubber vessel and equipment shall be a minimum of 24” I.D.

2. Lifting lugs (minimum of three) shall be provided for use in transporting and placing the vessel.

3. Hold downs (minimum of four) each consisting of a fiberglass reinforced polyester gusseted hold down lug laminated to the vessel sidewall and a Type 316L stainless steel anchor clip.
4. The anchor clip shall be used for anchor bolting to the concrete foundation and clamping to the hold down lug. The hold down systems shall be of sufficient strength to hold the vessel and any exhaust duct the vessel supports against all loads.
   a. Vessel manufacturer shall provide anchor requirements and locations to the Contractor where anchor bolts must be in place when the support pad is poured.
   b. Anchor bolts shall be provided by the Contractor.

5. All flanges shall be made by hand lay-up. Press molded flanges shall not be allowed.

6. The machine facing of the back of hand lay-up flanges is not permitted. All boltholes shall be spot faced for AE size washers if required.

7. Flange drilling on pipe connections shall be in accordance with ANSI P-16.5 for 150 PSI pressure class. Flange thickness shall be per ASTM D3299, Table 4, for 25 PSI pressure rating.

8. Flange drilling on duct connections shall be in accordance with PS15-69.

9. All nozzles, 4” and smaller, shall be reinforced with gussets.

10. Boltholes in flanged nozzles are to straddle the vertical centerline. Tolerance for bolt holes’ location and diameter of bolt circle shall be plus or minus 1/8”.

11. On all flanged joints use minimum 1/8” thick full-faced elastomeric gaskets having Shore A Durometer hardness of 40 to 60.

12. Threaded couplings shall not be allowed below the liquid level.

E. Fiberglass Reinforced Plastic Fan

1. The fan(s) shall be size 12,600 cfm single-width single-inlet as designed and manufactured by The New York Fan Company, Hartzell Fan Co., Verantis, or approved equal.

2. The fan shall be constructed such that all surfaces in contact with the corrosive gas stream are to be made of corrosion-resistant fiberglass reinforced plastic (FRP).

3. All nuts, bolts and fasteners in contact with the gas stream shall type 316 stainless steel.

4. Fans shall be AMCA Arrangement 1, 8, 9, 9F or 10. AMCA Arrangement 4, which places the motor shaft in the corrosive air stream is unacceptable.

5. Fan ratings shall be based on tests made in accordance with AMCA Standard 210 and licensed to bear the AMCA Certified Ratings Seal for Air Performance. Fans not licensed to bear the AMCA Seal for performance shall be tested, at Manufacturer’s expense, in an AMCA Registered Laboratory.
6. Fan brake horsepower shall be less than or equal to 45 BHP at 12.0 inches static pressure. This static pressure accounts for the pressure drop in the bioscrubber system including the scrubber, damper, inlet box, fan plus an additional 4-inches for exhaust system ductwork and for 12,600 CFM at site elevation of 3,700 feet above sea level. If the Manufacturer’s system has less headloss through their system, they may reduce the horsepower requirements as necessary for their system.

7. Fan motor shall be selected to be non overloading for the entire fan curve range and for the temperature and humidity range in paragraph 2.01.F.1.

8. Fans shall be assembled with OSHA compliant shaft and motor guards.

9. Fan inlet and outlet connections shall be flanged type.

10. Fan shall be constructed in accordance with ASTM D-4167 standard specification for fiber-reinforced plastic fans and blowers to ensure structural integrity.

11. All parts exposed to the gas stream shall be constructed of, or encapsulated in, an FRP laminate capable of resisting continuous airstream temperatures of up to 250°F. All resins shall be clear to allow detection of subsurface imperfections. Use of pigments, gel coats, inhibitors and additives which may disguise flaws in the laminate are prohibited.

12. Fan housing shall be constructed of a fire-retardant polyester or vinyl ester resin with an ASTM E84 Class I rating. Housing laminate construction shall conform to ASTM Standard C-582.

13. Wheel shall be of backwardly-inclined, non-overloading design for increased efficiency. Wheel shall be fabricated of a fire-retardant vinyl ester resin with an ASTM E84 Class I Rating.

14. Wheel hub shall be permanently bonded to the shaft and completely encapsulated in FRP to ensure corrosion-resistant integrity. Steel wheels coated with FRP, or wheels with taper-lock hubs are not acceptable.

15. Shaft shall be 316 stainless steel.

16. The fan motor shall be horizontal, TEFC, severe duty, squirrel cage induction type, 460 Volt, 3 Phase, 60 Hz with Class F insulation and a minimum 1.15 service factor, suitable for full voltage starting and continuous operation at 50 degrees C ambient temperature at the specified loads. Provide motor with heater as specified in Section 01171. The fan motor shall be suitable for operation in a Class 1 Division 2 environment.

17. Bearings shall have heavy-duty grease lubricated ball or roller bearings with a minimum ABMA L-10 life of 40,000 hours minimum for both fan and motor. Bearings shall have ample thrust provision to prevent end play during the normal life of the bearing.
F.  Fan Schedule

1. There will be three (3) fans.
2. Each fan will be 12,600 scfm and with a temperature range of 20 to 105 deg. F.
3. Suction pressure at connection to bioscrubber system will be minus 4 inches w.c.
4. Size, speed, and horsepower shall be determined by the bioscrubber system Manufacturer. The horsepower shall not exceed 50 hp.
5. Sound power level shall not exceed 90 DBA at 5 feet.

G.  Flanged Connections: Refer to Section 15891 (Fiberglass Reinforced Plastic Ductwork and Accessories).

H.  Flexible Connections: Refer to Section 15891 (Fiberglass Reinforced Plastic Ductwork and Accessories).

I.  FRP Transition Pieces: Refer to Section 15891 (Fiberglass Reinforced Plastic Ductwork and Accessories).

J.  Fiberglass Reinforced Plastic Damper: Refer to Section 15891 (Fiberglass Reinforced Plastic Ductwork and Accessories).

K.  Control Panels

1. General
   a. The control logic circuits for the bioscrubber system shall be mounted in a single Master Control Panel (MCP) enclosure provided by the manufacturer and located outdoors near the bioscrubber fans, and specified herein. The MCP enclosure shall be NEMA 4X 316 stainless steel, constructed by a UL certified control panel build facility and supported by the appropriate UL labeling.
   b. The bioscrubber MCP shall contain all controls, timers, relays, PLC (without exception), main circuit breaker, and motor starters for manual and automatic starting, stopping, and sequencing of the bioscrubber system. The MCP shall have all controls to provide the control sequences specified herein. The bioscrubber MCP shall include switches, pushbuttons, and indicator lamps and specified herein. The bioscrubber MCP shall be provided with a single 3-phase 480 volt source of power and shall include all power transformers, if required. Systems requiring more than one electrical connection shall not be allowed.
   c. Controls shall be tested by the panel builder and by the bioscrubber manufacturer prior to shipment to owner.
   d. All signal interface wiring between the MCP and the existing SCADA PLC shall be provided by the electrical contractor, under a separate contract.
2. Panel and Enclosure Construction
   a. The MCP shall meet the requirements of Section 01179.
   b. The MCP enclosure shall be NEMA 4X 316 stainless steel as specified in Section 01179.
   c. MCP’s shall include a main circuit breaker as specified in Section 01179.
   d. A six-digit, non-resettable elapsed run-time meter shall be installed on the front of the MCP for each fan and pump drive motor. Elapsed run-time meters shall be ENM, or equal.
   e. The MCP shall house motor starters for drive motors. Starters shall be as specified in Section 01179.
   f. The MCP shall be provided with a surge protection unit on the load side of 120VAC /1Ø/60 Hz control power transformer. Control power transformer shall have both primary and secondary overcurrent protection and shall be sized by the bioscrubber supplier.
   g. All necessary power conditioning and DC power supplies shall be furnished inside the MCP for proper operation of the equipment.
   h. The MCP shall include intrinsically safe barriers for termination of any signals to/from hazardous Class 1, Div 1 and Class 1, Div 2 areas. Provide 2” separation or barriers between the conductors of intrinsically safe circuits and non-intrinsically safe circuits meeting the requirements of NEC 504.30.A.2.
   i. The PLC signals associated with the equipment to be controlled shall be wired directly to the PLC. PLC discrete outputs shall drive a relay to provide a dry contact to interface with motor starters located in the MCP or in control panels furnished by others. Relay contacts shall be rated 10 amp at 120VAC. PLC input cards shall have optical isolation on individual channels.
   j. Provide an Operator Interface Terminal (OIT) which shall be a NEMA 4X rated, color touch screen for control and monitoring of the bioscrubber system and all auxiliary equipment. The OIT shall be menu-driven with automatic fault message windows appearing upon alarm conditions. Alternatively, the system supplier can provide display and interface functionality at the LCP using knobs, buttons, switches, indicator lamps, digital displays and other approved interface devices.
   k. Provide environmental controls as specified in Section 01179.
   l. Provide all other appurtenances required for a complete and fully operational control panel.
   m. Provide sun shield as specified in Section 01179.

3. The MCP shall include the following functions. All functions are typical for three bioscrubber trains:
   a. Control of fan motor starter
   b. Control of water flow to the unit with PLC and manual override, if required
   c. Control of nutrient flow.
d. Control of the dispersion fan starter (Note: The dispersion fan and its starter shall be supplied by the Contractor, under a separate contract, and connected into this control panel. The starter shall not be located in the MCP described herein.)
e. If a recirculation pump is provided, control of the recirculation pump starter
f. Dry contacts for plant SCADA system for common alarm, fan run status for the odor control inlet fan and fan run status for the dispersion fan, *(dispersion fan to be supplied by the Contractor, under a separate contract).* If a recirculation pump is provided, also provide a dry contact for pump run status.
g. Provide a totalizing meter to track the consumed irrigation water and nutrient water on the control panel. The totalizing meter shall be a resettable meter that displays the total water consumed.

4. Instrumentation Specifications are as follows:
   a. Water flow transmitter (located in water panel) to be paddlewheel type to provide instantaneous water flow reading on the local HMI. Flow transmitter is to be Georg Fischer 3-2536-P0 to match existing instrument installed at the grit building odor control unit.
   b. Differential Pressure Gauges shall be installed in order to show the differential pressure across each biotrickling filter vessel and shall be Dwyer Series 2000 to match existing instrument installed at the grit building odor control unit.
   c. Pressure Gauges shall be bourdon tube actuated dial face and provide accuracy of 1 percent of spare or better, Case shall be phenolic shock resistant or type 316 stainless steel. Gauges shall be Ashcroft Type 1005P to match existing instrument installed at the grit building odor control unit.
   d. Level switch shall be horizontal mount and rated for water, oils and chemicals. Material shall be polypropylene and rated for 176 degF and 116 psig. Mounting connection shall be via ½” NPT. Level switch shall be Dwyer F6 series to match existing instrument installed at the grit building odor control unit.
   e. Hydrogen Sulfide Detectors shall be continuous diffusion type that shall measure, indicate and transmit ppm concentration of hydrogen sulfide in air for each bioscrubber vessel supplied. There will be a total of six (6) detectors, one for each vessel inlet and one for each vessel outlet. Digital display indicating the gas level, alarm or fault messages, and diagnostic information shall be part of the unit transmitter. The speed of response to a step change in gas concentration shall be less than 10 seconds to 90 percent of final reading. Linearity shall be plus or minus 2 percent of full scale, repeatability shall be plus or minus 1 percent of full scale, range shall be capable of 0-500 ppm but shall be individually calibrated for expected range. Unit shall be capable of operating -10 to 50 degC and 0-95 percent relative humidity. One 4-20mA output proportional to calibrated range and two relay contacts for alarms shall be provided. Units shall be MSA Ultima X Series or equal.
      1) Sensor shall be mounted to prevent moisture accumulation. Include water trap and drains where required.
      2) Transmitter shall be NEMA 4X (IP65) approved for Class I, Div 1, Groups C and D. If transmitter is installed in a separate enclosure it shall meet the above requirements and provide heating and cooling equipment if required to meet operating temperatures of instrument.
3) A DC power supply shall be provided with each transmitter. The power supply shall be installed in an enclosure having the same certification as the enclosure for the transmitter. A/C power will be provided by Contractor.

4) Inlet Monitoring: 0-500 ppm

5) Outlet Monitoring: 0-50 ppm

f. All instruments shall be listed for use in Class I Division II environments, unless they are located outside of the Class I Division II area.

5. The display on the control panel shall include the following items for each bioscrubber train, at a minimum:
   a. Odor Control Fan failure
   b. Odor Control Fan run status
   c. Dispersion Fan failure (Note: The dispersion fan shall be supplied by the Contractor, under a separate contract, and connected into this control panel.)
   d. Dispersion Fan run status (Note: The dispersion fan shall be supplied by the Contractor, under a separate contract, and connected into this control panel.)
   e. High water level
   f. Irrigation low flow
   g. Irrigation high flow
   h. Irrigation water and nutrient water totalization
   i. If a recirculation pump is provided, pump run status and pump failure

L. Synthetic Media

1. The media shall be synthetic media as supplied by BioAir. Notwithstanding whether the media is structured or random, the material shall be synthetic, chemically resistant polyurethane, polyethylene, or polyvinyl chloride.

2. The media shall resist shrinking or swelling with varying moisture content.

3. Media layers shall be removable single media blocks or randomly dumped.

4. The treatment layers shall be designed not to short circuit or be subject to channeling under operating conditions.

5. The Manufacturer is responsible for providing the proper media content to ensure system meets specified performance.

6. Organic media shall not be allowed.

7. Non-synthetic inorganic media shall not be allowed.

8. The system shall be shipped with media pre-installed for ease of installation and quality control. Systems requiring media to be installed on-site shall not be allowed.

9. Manufacturer shall warranty the media for a minimum of 10 years. Warranty shall be a full replacement warranty and non pro-rated.
M.  Irrigation System

1. Each reactor shall be configured with sufficient fluid spray nozzles to provide sufficient irrigation.

2. Each spray nozzle shall be inspected and tested by the Manufacturer to ensure even dispersion of irrigation water, and certified to be operating properly prior to shipment.

3. Multiple spray nozzles or spray headers above each media layer shall not be acceptable.

4. When required, a nutrient addition system shall be provided to allow the Owner to supplement the nutrients in the non-potable irrigation water supply, or to use potable water for irrigation.

N.  Water Panel

1. The Water Panel shall be constructed of 316 stainless steel and shall be of a modified NEMA 4X design. NEMA 4, 12, and 3R ratings shall not be allowed. Materials of construction other than 316 stainless steel shall not be allowed.

2. The Water Panel shall contain all necessary piping, valves and instruments for proper operation of the system. Provide and install a schedule 80 inline, wye strainer for the non-potable water line. A single water panel shall be provided for the bioscrubber vessel.

3. Provide panel heater as specified in section 01179.

4. Provide the standard wash hose station in each of the water panels.

5. Provide one Water Panel for each bioscrubber train.

O.  Recirculation System

1. Permanent: If a permanent recirculation system is required for the bioscrubber operation, the Manufacturer shall provide a fully function permanent system, including a recirculation pump as specified herein.

2. Temporary: If a temporary recirculation system is necessary for start-up, the Manufacturer shall provide a fully functional temporary recirculation system.
   a. The temporary recirculation system for start-up of the bioscrubber shall remain in the property of the Manufacturer at all times.
   b. Contractor, under a separate contract, shall disconnect the temporary recirculation system once start up is complete and connect the system for normal operating mode per the manufacturer’s instruction.

P.  Recirculation Pump (if necessary based on the Manufacturer’s recommendation and proposed system)

1. The recirculation pump shall pump the low pH liquid from the vessel’s sump to the spray header(s).
2. The pump shall have a capacity of 50 gpm at 100 feet of head minimum. The pump capacity and head shall be based on the selected Manufacturer’s system and may be revised as necessary in order to provide a functional system. All deviations shall be submitted to the Engineer for review and approval.

3. Pump motor horsepower shall be a 3 HP (maximum).

4. The number of recirculation pump is one (1) pump per scrubber for a total of three (3) pumps.

5. Pump shall be seal less, magnetically driven, horizontal, single stage, base mounted, end suction centrifugal configuration manufactured in accordance with ANSI Horizontal End Suction Pumps for Chemical Process.

6. The pump casings have a top discharge. Suction and discharge connections shall be 150 lb standard ANSI flanges.

7. The pump casings shall be constructed of polypropylene and shall be designed to be suitable for pressures of at least 1.5 times the shut off head of the pump.

8. Magnets shall be rare earth, high performance.

9. The impellers shall be constructed of the same material as the casing and shall be fully open with contoured passages. The impellers shall be balanced for high efficiency.

10. The pump shafts shall be of Type 316 stainless steel and shall be manufactured such that deflection is minimal. Where the shaft is directly exposed to the liquid being pumped, the shaft shall be protected by polypropylene shaft sleeves.

11. The shaft shall be guided by low PV stationary bearings and rotary sleeve/thrust bearings that are resistant to corrosion from the process fluid.

12. The pump shall have an electrically non-conductive containment shell that is resistant to corrosion from the low pH process liquid.

13. The bearing frames and bearing housing adapters shall be of cast iron construction with chemically resistant two-part epoxy resin coating and shall have a registered fit with the pump casings.

14. The recirculation pump motor shall be horizontal, TEFC, severe duty, squirrel cage induction type, 460 Volt, 3 Phase, 60 Hz with Class F insulation and a minimum 1.15 service factor, suitable for full voltage starting and continuous operation at 50 degrees C ambient temperature at the specified loads. The pump motor shall be suitable for operation in a Class 1 Division 2 environment. Provide motor with thermal protection and heater as specified in Section 01171. Refer to Section 01171 for additional requirements.

15. Fiberglass base plates shall support the pumps and motors. The base plates shall have holes mounting to a concrete equipment pad. The pumps and motors shall be assembled on the base plates in the manufacturer's shop.
16. Brass or stainless steel nameplates giving the name of the manufacturer, model number, the rated capacity, head, speed and any other pertinent data shall be permanently attached to each pump.

17. Brass or stainless steel nameplates giving the name of the manufacturer, serial number, model number, horsepower, speed, voltage, amperes and other pertinent data shall be attached permanently to each motor.

18. The pump manufacturer shall supply all drive units and factory mount them on a common baseplate with the pumps. Acceptable vendors:
   a. Vanton Pump and Equipment Corp
   b. Goulds Pumps
   c. Or Engineer approved equal.

Q. Exhaust System
   1. The Contractor, under a separate contract, shall install a ductwork system to connect the bioscrubbers to the proposed dispersion fans. The proposed dispersion fan shall be provided downstream of the bioscrubber as a conditioning system. This proposed ductwork will connect direct to the vessel top flange.

   2. Provide mounting brackets on each scrubber for connection of a lateral support of vertical 36-inch diameter outlet duct. Lateral support shall be provided by others, and connected to the scrubber and to the duct by other. The mounting brackets shall be located on the shell of the scrubber approximately 22’ from the bottom of the scrubber.

PART 3 EXECUTION

3.01 INSTALLATION OF BIOSCRUBBER SYSTEM

A. The Manufacturer will be responsible for shipping the equipment delivery and off loading at the job site. The Contractor, under a separate contract, shall provide rigging services to place the equipment on the concrete pad. Anchor bolt shall be provided by the installing contractor in accordance with the Manufacturers shop drawing submittal. Any changes in bolt placement due to errors in the shop drawing shall be the responsibility of the manufacturer. The Manufacturer or Authorized Representative will be responsible for coordinating the delivery of the equipment with the Owner to ensure that the truck and rigging equipment can reach the location on the plant site and that the buried utilities are not damaged. The Manufacturer or Authorized Representative shall have a technical representative, who is experienced in installing the equipment, on-site at the time of installation.

B. The ductwork, power and control wiring, water supply, and drain line will be brought to the concrete pad by Others. The Contractor, under a separate contract, will be responsible for connecting the ductwork, plant water, power and control wiring.

C. Installation of the System shall be completed by the Owner or the Owner’s Contractor in accordance with the Manufacturer’s written instructions. At the discretion of the Manufacturer, a Manufacturer’s technical representative may be present during the installation.
D. All Owner-furnished personnel associated with the installation of the System shall be trained and qualified in the areas of plumbing, electrical work, concrete work and instrumentation as required to complete the installation.

3.02 UTILITIES

A. Electrical:

1. A single 480V / 3-phase / 60 Hz electrical connection shall be made by the Contractor, under a separate contract, to the control panel. Systems requiring separate 110V and 480V power supplies shall not be allowed.

B. Water:

1. One (1) 2½ inch effluent water supply and reducer, as necessary, shall be provided by the Contractor. The water supply has a pressure of 70 psig and is capable of an instantaneous flow of at least 186 gpm.

C. Connection of the water supply to the water panel shall be completed by the installing Contractor, under a separate contract.

D. Heat tracing and aluminum jacketed insulation shall be provided by the Contractor, under a separate contract.

3.03 START-UP

A. A representative of the Manufacturer who is experienced in the start-up of bioscrubbers systems shall provide the services during start-up

1. Check all fan and water flow functions.

2. Measure air flows after the odorous air collection system is balanced by Others and adjusted to 12,600 cfm per train.

3. Make all provisions required to minimize acclimation time of the bioscrubber.

4. Install all sampling taps in the bioscrubber required for acceptance testing.
5. An acclimation period of up to 28 days after initial startup shall be allowed. Once the acclimation period is completed, the Manufacturer shall commence Performance Testing as outlined in the following section.

B. Start-up of the System shall be the responsibility of the Manufacturer, who shall furnish factory-trained personnel to complete this activity. Start-up will commence following a visual inspection and check out of the System by the Manufacturer’s technical representative.

3.04 ACCEPTANCE TESTING

A. Acceptance testing shall not commence until to the Testing and Balancing Report for the entire ductwork system is submitted and approved by the Engineer.

B. The Owner shall schedule acceptance testing within 90 days of start-up. The total acclimation period shall not exceed 28 days.

C. The fan speed or inlet damper for each unit shall be adjusted to provide a flow of 12,600 cfm with the media microbial population fully developed.

D. Sample collection equipment and hydrogen sulfide monitoring instruments will be provided by the Manufacturer but must be approved by the Engineer.

E. Inlet and outlet hydrogen sulfide concentrations for each vessel will be monitored and logged continuously over a period of 24 hours. Inlet measurements shall be collected from the duct upstream of the bioscrubber inlet. Outlet conditions will be monitored at the discharge duct for the bioscrubber vessel.

F. One inlet sample and one outlet sample for each vessel (total of 3 vessels) will be taken under average conditions as shown on hydrogen sulfide monitors. Also, one inlet sample and one outlet sample for each vessel (total of 3 vessels) will be taken under peak conditions as shown on hydrogen sulfide monitors. Thus, there will be a total of 12 samples. The samples shall be sent to St. Croix Sensory, Inc. of Lake Elmo, MN by overnight delivery for odor analyses. Odor concentrations will be measured and analyzed in accordance with EN 13725.

G. To pass the acceptance test, the bioscrubber unit shall meet both hydrogen sulfide and odor reduction criteria set forth in Table 2, shown in Paragraph 1.09.C.

H. If the system fails the acceptance test, the Manufacturer shall conduct up two additional rounds of testing at no expense to the Owner. If the system does not pass after the additional testing, the Manufacturer shall make whatever provisions are required to meet the criteria as defined in Section 1.09 at no expense to the Owner. Failure to pass the acceptance test within 3 months of the initial acceptance test may result in forfeiture of the final payment, at the sole discretion of the Owner.

END OF SECTION
EQUIPMENT MANUFACTURER'S CERTIFICATE
OF INSTALLATION TESTING AND INSTRUCTION

Owner: ____________________________
Project: ____________________________
Contract No.: _______________________
CDM No.: __________________________

EQUIPMENT SPECIFICATION SECTION

EQUIPMENT DESCRIPTION

I, ____________________________________, Authorized representative of ____________________________
___________________________________________.

___________________________________________.

hereby CERTIFY that ____________________________________________

___________________________________________.

installed for the subject project [has] [have] been installed in a satisfactory manner, [has] [have] been satisfactorily tested, [is] [are] ready for operation, and that Owner assigned operating personnel have been suitably instructed in the operation, lubrication, and care of the unit[s] on Date: ______________

CERTIFIED BY: ________________________________________ DATE: ______________

(SIGNATURE OF MANUFACTURER’S REPRESENTATIVE)

OWNER’S ACKNOWLEDGMENT OF MANUFACTURER’S INSTRUCTION

[I] [We] the undersigned, authorized representatives of the ____________________________ and/or
Plant Operating Personnel have received classroom and hands on instruction on the operation, lubrication, and maintenance of the subject equipment and [am] [are] prepared to assume normal operational responsibility for the equipment:

__________________________________________ DATE: ______________
__________________________________________ DATE: ______________
__________________________________________ DATE: ______________
APPENDIX A: GENERAL PLAN & SECTION LAYOUTS
SECTION 15891
FIBERGLASS REINFORCED PLASTIC DUCTWORK AND ACCESSORIES

PART 1  GENERAL

1.01  SCOPE OF WORK

A. Furnish and fabricate all fiberglass reinforced plastic (FRP) ductwork including fittings, accessories, dampers, and any incidental work or components required and provide complete odor control ductwork systems between the discharge of odor control fan and the inlet of the scrubbing vessel, and as specified herein.

B. Ductwork shall be installed by others. Duct supports shall be provided by others.

C. In general, ductwork shall consist of any passageway made of FRP substantially air-tight, used for the conveying of air, gas, or materials. Included are fittings, transitions, bracing, fasteners, sealers, supports, and accessories such as access panels, access doors, turning vanes and manual air balancing dampers. All ductwork shall be of size and material as specified herein.

D. Any change in duct sizes, offsets, transitions, and fittings required to accommodate job conditions shall be submitted to Engineer for approval.

1.02  SUBMITTALS

A. Submit, in accordance with Section 01300, the following:

1. Ductwork shop drawings shall include typical details of discharge nozzles, transitions, elbows, fittings, accessory items such as access panels or access doors, turning vanes, dampers, joining methods, bracing and material gauges. Drawings of general layouts of individual systems shall be submitted, scale shall be 1/4-in. = 1-ft.-0-in. minimum. Locations and types of field joints shall be clearly indicated.

B. The following additional data shall be submitted:

1. Manufacturer’s qualification and experience data, specifications and installation instructions, factory and field quality control procedures catalog data, brochures, descriptive matter, illustrations, diagrams and color charts of ductwork to be selected.

2. Specific handling and storage requirements for ductwork, joint kits, and resin systems.

3. For units that will be shipped exposed, provide a description of the protective packaging that will be used during transit.

4. All submittals shall contain a statement that Section15891 and all other referenced Sections have been read and complied with. The certification statement shall be made by the Manufacturer.
5. Sample coupons of laminate not less than 1-ft. square. Provide sample laminate coupons for each method of manufacture and for both round and rectangular duct manufacturing methods.

6. Resin system data, including chemical environment service test data, case history data of similar installations (with contact addresses), resin pot life and time versus temperature data required for complete resin cure for laminate thicknesses actually proposed.

7. Submit design calculations signed and sealed by a professional engineer and fabrication procedures for record purposes only. Also submit a letter certifying that the laminates fabricated with the proposed resin system will give satisfactory performance under the specified service conditions and stating the service conditions for which certification is provided and indicating compliance with specified pressure and vacuum design criteria.

8. Submit construction details for flexible connectors, expansion joints, elbows, transitions, junctions and flanged fittings including dimensioned laminate cross sections and flange fabrication and assembly details.

9. Submit results of factory readings taken with "Barcol Hardness Impresor" and provide procedure to field check for complete cure of resin.

10. Certified service tables for the resins being used and the expected contaminants showing satisfactory services for the required design conditions. Corrosion resistance data shall be based on ASTM C581.

11. Detailed instructions for field joining of the ductwork to include quality control procedures.

12. Submit shop test reports for fiberglass reinforced plastic dampers.

In general, corrections or comments or lack thereof made relative to submittals during review shall not relieve the Manufacturer from compliance with the requirements of the specifications. Submittals are for review of general conformance with the design concepts of the project and general compliance with the contract documents. The Manufacturer is responsible for the final design conforming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction.

1.03 REFERENCE STANDARDS

A. ASTM International


B. National Fire Protection Association (NFPA)


C. Underwriters Laboratories (UL)
   1. UL 555 - UL Standard for Safety Fire Dampers.

D. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

E. American National Standards Institute (ANSI)

F. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.04 QUALITY ASSURANCE

A. All FRP duct and fittings shall be from a single manufacturer.

B. All materials shall be supplied by a manufacturer experienced in the fabrication of materials similar to those specified. Design and engineering shall be performed by personnel regularly employed by the manufacturer who are experienced in the design of FRP systems similar to those specified.

C. The manufacturer shall provide factory-trained personnel for training of installers and for supervision and inspection of the installation. The use of local sales representatives for this service is not acceptable.

D. Inspection by the Engineer's representative, or failure to inspect, shall not relieve the Manufacturer of responsibility to provide materials in accordance with the documents.

E. The Owner and Engineer reserve the right to sample and test any materials after delivery, and to reject all components represented by a sample that fails to comply with the specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Equipment, material, and spare parts are to be shipped complete, except where partial disassembly is required by transportation regulations or for protection of components. No ductwork or components shall be shipped prior to complete resin cure.

B. Inspection of the duct and components will be made by the Engineer or other representative of the Owner after delivery. Materials shall be subject to rejection at any time on account of failure to meet any of the specified requirements. Material rejected after delivery shall be marked for identification and shall be immediately removed from the job site.

C. All materials shall be inspected for size, quality, and quantity against approved shop drawings upon delivery.
D. Delivery schedule of all equipment shall be coordinated with the installing Contractor. Equipment ready for shipment prior to the agreed-on shipping date shall be stored by the Manufacturer without additional cost to the Owner.

E. All materials shall be suitably packed for shipment and long-term storage. Each package shall be labeled to indicate the project and the contents of each package. Where applicable, equipment numbers shall be marked on the container.

F. All equipment shipped that is exposed, such as on a flatbed truck, shall be protected during transit. The equipment shall be protected from moisture, road salt, dirt and stones or other materials thrown up from other vehicles. Electrical components shall be protected as above, but with special attention to moisture. The method of shipment protection shall be defined in the submittals.

G. All materials shall be stored in a covered dry location off of the ground. When required to protect the materials, they shall be stored in a temperature-controlled location.

1.06 COORDINATION

A. If any departures from the specifications are deemed necessary, details of such departures and the reasons therefore shall be submitted as soon as practical for review. No such departures shall be made without the prior written concurrence of the Engineer.

B. The Manufacturer shall not fabricate any equipment or materials until the Owner and Engineer have approved all submittals. If any equipment or materials are manufactured prior to approval of the submittals, it shall be at the Manufacturer’s risk.

1.07 STANDARDS OF CONSTRUCTION AND INSTALLATION

A. All ductwork construction specified herein is based on acceptable methods of construction and installation and are intended to define the quality of construction and installation to be furnished. Alternate details may be submitted for approval.

1.08 ENGINEERING SERVICES

A. When engineering services are specified to be provided by the Manufacturer, the Manufacturer shall retain a licensed professional engineer to perform the services. The engineer shall be licensed at the time the work is done and in the State in which the project is located. If the State issues discipline specific licenses, the engineer shall be licensed in the applicable discipline. In addition, the engineer shall be experienced in the type of work being provided.

B. All work is to be done according to the applicable regulations for professional engineers, to include signing, sealing and dating documents. When submittals are required by a professional engineer, in addition to state required signing and sealing, a copy of the current wallet card or wall certificate indicating the date of expiration shall be included with the submittal.
PART 2 PRODUCTS

2.01 MATERIAL

A. Design Conditions

1. Temperature: minus 10 to 125 degrees F
2. Pressure: 10-in H2O w.g. positive; 10-in H2O w.g. negative
3. Flow medium and velocity: air at 2500 fpm
4. Wall thickness (minimum):
   a. Up to 36-in. diameter - 0.187-in. struct. wall plus 0.10-in. liner
   b. 38 to 60-in. diameter - 0.250-in. struct. wall plus 0.10-in. liner

B. The following materials are expected to be in the air stream or surrounding area. The resins used shall be suitable for all of the following:

1. Hydrogen sulfide and other odorous compounds in 100 percent relative humidity air typically found at wastewater treatment plants. Some dilute sulfuric acid.

2.02 CLASSES OF CONSTRUCTION

A. Ductwork shall be designed and constructed for the following services and in accordance with ANSI RTP-1.

B. Design of ductwork shall include all loads applied to the ductwork, in addition to the load of the duct. These loads include but are not limited to wind, snow and internal dirt or liquid buildup.

2.03 FIBERGLASS REINFORCED PLASTIC (FRP) DUCTWORK

A. FRP ductwork shall be of contact molded or filament wound construction, or a combination of these methods, to meet design criteria.

B. FRP ductwork shall have a flame spread rating of 25 or less inside and outside in accordance with NFPA 91. Indoor ductwork shall have smoke developed rating of not more than 50. Sprinklers shall not be used for internal fire suppression.

C. Laminates shall consist of a 20 mil (finished thickness) minimum chemical resistant interior liner with an apertured synthetic surface veil embedded in a resin rich surface. The corrosion barrier shall be a minimum of 100 mils thick and include not less than two layers of 1-1/2 oz. mat with 25 percent glass and 75 percent resin content. The structural layer shall be of sufficient thickness to meet the minimum thickness requirements specified. The exterior surface layer shall be resin rich "C" - glass or apertured nexus veil not less than 20 mils thick. Outside finish shall be a pigmented, paraffinated gel coat with an ultra violet inhibitor. The inner surface shall be free of cracks and crazing with a smooth finish and with an average of not over two pits per square foot, providing the pits are less than 1/8-in. in diameter and not over 1/32-in. deep and are covered with sufficient resin to avoid exposure of inner surface fabric. Some waviness is permissible as long as the surface is smooth and free of pits.
D. Resins used in the laminate shall be premium corrosion resistant and fire retardant vinylester resins.

E. Fittings and Joints: All fittings such as elbows, laterals, tees and reducers shall be of the same resin as an equal or superior in strength to the adjacent duct section and shall have the same internal dimensions as the adjacent duct. Non-flanged duct joints shall be butt wrapped or bell and spigot joints. Bell and spigot joints shall be sealed with a standard butt joint overlay as per PS 15-69. The interior opening between the bell and spigot shall be sealed with a resin paste so that no glass fibers are exposed and all voids are filled. Field cut duct ends and exposed glass fibers shall be resin coated prior to joint assembly to maintain a continuous interior corrosion barrier. Coat all exterior surfaces of joints with a paraffinated resin-rich gel coat with UV inhibitors.

F. Total width of overlay for butt-wrap joints shall be not less than 6-in. for diameters from 6-in. up to and including 30-in., 36-in. and larger shall be not less than 10-in.

G. Round Standard Elbows
   1. Standard elbow centerline radius shall be equal to 1-1/2 times the diameter.
   2. Standard elbows up to 24-in. diameter shall be smooth radius molded elbows. Standard elbows 30-in. diameter and greater may be mitered sections as specified below.
   3. Zero to 44 degree elbows shall contain one mitered joint and two sections. 45 to 80 degree elbows shall have a minimum of two mitered joints and three sections. Elbows greater than 80 degrees shall have a minimum of four mitered joints and five sections.

H. Rectangular Fittings
   1. Fittings shall be factory manufactured to meet the specified design criteria and in accordance with approved submittals. Factory install reinforcing ribs as required to meet the specified deflection requirements and to provide a system free from pulsing, warpage, sagging and undue vibration.
   2. Provide forming vanes in all mitered rectangular elbows. Rectangular elbow turning vanes shall be of FRP construction, solid or double wall construction with an airfoil shaped profile.

I. Reinforcing
   1. Round duct reinforcing shall be factory installed with spacing between reinforcing located to avoid all hangers and support saddles.
   2. Rectangular duct and fitting reinforcing shall be factory located and installed to avoid duct hangers, support saddles, bracing, branch take-offs and entries, and plenum connections. Routine field cutting and field relocation of factory-installed reinforcing is not acceptable.

J. Tolerances
1. Out-of-roundness of duct shall be limited to plus or minus 1/8-in. or plus or minus 1 percent of duct inside diameter, whichever is greater, for duct sizes 6-in. diameter and greater.

2. Rectangular duct tolerances shall be 3/16-in. for duct diameter up to 18-in. and plus or minus 1 percent for dimensions of over 18-in.

3. All unflanged duct shall be square on the ends in relation to the pipe axis and plus or minus 1/8-in. up to and including 24-in. diameter and plus or minus 3/16-in. for all diameters greater than 24-in.

4. Fittings
   a. The tolerance on angles of all fittings shall be plus or minus 1 degree, up to and including 24-in. diameter and plus or minus 1/2 degree for 30-in. diameter and above.

5. Flanges
   a. Flange faces shall be perpendicular to the axis of the duct within 1/2 degree.
   b. Flange faces shall be flat to within plus or minus 1/32-in., up to and including 18-in. diameter and flat within plus or minus 1/16-in. for 20-in. diameter and larger.
   c. Provide custom filler pieces as required to mate flanges squarely.

K. Calculations for wall thickness determination shall be based on the structural fiberglass reinforced wall only. Long term deflection shall not exceed 1 percent of duct diameter or duct width for rectangular ducts. Round and rectangular FRP ductwork shall be designed using a safety factor of 10 to 1 for pressure and 5 to 1 for vacuum service. Round duct shall be designed by manufacturer to resist specified loadings but in no case shall FRP duct be less than the following thicknesses:

<table>
<thead>
<tr>
<th>Diameter (-in.)</th>
<th>Filament Thickness (-in.)</th>
<th>Hand Layup Thickness (-in.)</th>
</tr>
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<tbody>
<tr>
<td>Less than 24</td>
<td>.225</td>
<td>.25</td>
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<tr>
<td>24 to 30</td>
<td>.275</td>
<td>.313</td>
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<tr>
<td>36 to 42**</td>
<td>.375</td>
<td>.438</td>
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<tr>
<td>48 to 60**</td>
<td>.525</td>
<td>.688</td>
</tr>
<tr>
<td>66 to 72**</td>
<td>.625</td>
<td>.813</td>
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* Where rectangular duct is used the longest dimension shall be considered equivalent to diameter.

** Rectangular duct may be reinforced with angles or tees as required to meet the required pressure/vacuum service.

L. All connections to expansion joints, butterfly dampers, fire dampers, tanks, or other equipment shall be flanged. Gaskets shall be chlorobutyl. Flanges shall be hand laid up to thickness specified in PS 15-69 except that minimum thickness shall be 3/4-in. Each flange face shall be ground flat, and a new 100 mil corrosion barrier shall be applied. The flange shall be anchored to a waxed table to ensure the flatness tolerance outlined above. The face shall be textured for use with full face chlorobutyl gaskets, 1/8-in. minimum thickness. Flange drilling shall be as per
PS 15-69. All bolt holes shall be back spot faced for a washer seat. All flange bolts shall be torqued to values as recommended by manufacturer.

M. Fasteners: Furnish all bolts, nuts, washers and other fasteners required. Material of metallic fasteners shall be Type 316 stainless steel.

2.04 FLEXIBLE CONNECTORS

A. Furnish flanged flexible connectors at each inlet and outlet of fan. Flexible connections shall be integral flange molded arch type units constructed of EPDM rubber 1/4-in. thick, reinforced with a strong synthetic asbestos-free fabric suitable for corrosive service. The flexible connections shall be designed to minimize the transmission of vibration from the fans to the ductwork at the suction and discharge connections. Expansion or contraction flexible connections shall be designed to allow 1-in movement. Working length or "live" length shall be as designed by the manufacturer to allow up to 1-in of movement. Ends shall be flanged, with flanges matching duct connection flanges. Corners on rectangular expansion joints shall be molded and free of patches or splices. The flexible connections shall be suitable for outdoor service and temperature ranges from minus 10 up to 125 degrees F, and pressure to 5 psig. Specially fabricated split Type 316 stainless steel retaining back-up bars shall be supplied to prevent damage to the EPDM rubber flanges when Type 316 stainless steel bolts are tightened.

B. Where the construction of the flexible connections or vibration isolator results in a cross sectional area of the connection which is less than 90 percent of the adjacent ductwork, the size of the connection shall be increased to provide a cross sectional area equal to or greater than 90 percent of the adjacent duct.

C. Ductwork spacing and alignment for flexible connections shall be aligned to the tolerances of the flexible connection manufacturer, or plus/minus 1/4-in., whichever is less. Bolts shall be torqued to the manufacturer's recommendations. Do not over tighten.

D. Manufacturer shall be Holz Rubber Company, Mercer Rubber Company, Proco Products Incorporated, or approved equal

2.05 TOOLS, SPARE PARTS AND MAINTENANCE MATERIALS

A. The duct system shall be furnished with the following:

1. One set of special tools required to maintain and repair the system.

2. All materials in kit form to make or repair joints. Additional kits shall be supplied sufficient to repair 10 percent of the joints. Materials shall be packaged for long-term storage.

3. Names and addresses of all manufacturers of fiberglass reinforcements, resins, hardeners and components used to repair and maintain the FRP duct system.

B. Spare parts shall be packed in sturdy containers with clear indelible identification markings and shall be stored in a dry, warm location, until transferred to the Owner at the conclusion of the project.
2.06 FIBERGLASS REINFORCED PLASTIC DAMPERS

A. Provide manually operated butterfly isolation dampers at the following locations:
   1. Between the outlet of each exhaust fan and the inlet to duct header.
   2. Between the outlets of the duct header and the inlet to each bioscrubber.

B. The dampers shall be certified in accordance with AMCA 500 for leakage and air performance. The dampers must be licensed to bear the AMCA seal. Dampers are to have been tested in an AMCA lab for performance (pressure drop) and leakage. Test results shall be submitted and confirmed by the engineer.

C. Damper frame (body), blade, and flanged shall be fabricated of fiberglass reinforced plastic with fire retardant vinyl ester resins to ASME-ANSI RTP-1. All interior metal shall be 316 stainless steel.

D. Damper frame shall be of one piece construction with a 100 mil corrosion barrier. A structural lay-up shall consist of alternate layers of chopped strand mat and woven roving to conform to ASME/ANSI RTP-1 and PS15-69. The glass to resin ratio shall be a minimum of 35% glass to 65% resin. Wall thickness, flange thickness, drilling pattern and width shall conform to PS15-69. Exterior surface of the damper shall contain UV inhibitors and a gel-coat, color to match bioscrubber.

E. Damper blade shall be constructed of the single laminate design of the same material as the damper frame and shall have a resin rich surfacing veil corrosion liner on both sides and on any external stiffeners. Blade stiffeners shall be FRP as required for stiffness.

F. Damper shaft shall be a solid 316 stainless steel rod. The shaft shall extend across the entire diameter of the damper. Any nuts, bolts, washers, or other hardware for fastening the damper blade to the shaft shall be encapsulated in FRP. Shaft bearings shall be PTFE or PVC sleeve type bearings and shall not require lubrication. Shaft seal shall be designed to permit easy adjustable or replacement of packing material.

G. Damper shall be provided with worm gear operators sized for the pressure rating and torque required to rotate the blade from opening to closed positions. The operator shall have an epoxy coated hand wheel handle. The operator shall be coupled to the damper shaft with a 316 stainless steel adapter.

H. Damper performance ratings
   1. Velocity through Damper: 4000 fpm.
<pre><code>  | Size   | Maximum Allowable |
  |--------|-------------------|
  |        |                   |
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<table>
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<tr>
<th>(in Diameter)</th>
<th>Leakage (cfm)</th>
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<td>72</td>
<td>200</td>
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<td>66</td>
<td>186</td>
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I. Manufacturer: Ershigs Incorporated; Swartwout, Phillips Industries. Belco Manufacturing; ECS Environmental; Daniel Company; or equal.

2.07 FRP TRANSITION PIECES

A. Provide duct transition piece between odor control fan outlet connection and associated ductwork connection. Provide duct transition piece between branch duct and scrubber inlet connection. Transition piece shall be constructed of contact molded FRP of the same resin as and equal or superior in strength to the adjacent equipment. End connections shall be flanged type. Dimensions of end connections shall be adjusted to suit equipment connection sizes.

B. Pressure Classification: Manufacturer shall design transition pieces so that they shall be free from buckling, pulsing, warpage and sagging at design pressures of +/-10-in w.c. Thickness of transition pieces shall be designed using a safety factor of 10 to 1 for pressure and 5 to 1 for vacuum service.

2.08 TEST PORTS

A. Provide two test ports on each branch duct between the duct header and the scrubber inlet connection. The test ports shall be placed at the same location along the duct and rotated 90-degrees apart. Provide at least 3-ft of straight duct without fittings upstream of the test ports.

B. The test ports shall be a minimum of ½-in diameter. The test ports shall consist of an FRP half coupling bonded to the bottom of the duct. The couplings shall have female nominal pipe threads (NPT). Provide a PVC or polypropylene threaded plug for each test port.

2.09 LOW POINT DRAIN

A. Provide a condensate drain connection at all low points in the ductwork. At a minimum provide one drain in the duct header.

B. The minimum drain connection size is 1-in diameter. The drain connection shall consist of an FRP half coupling bonded to the bottom of the duct. The coupling shall have female nominal pipe threads (NPT) for attaching drain piping.
PART 3 EXECUTION

3.01 QUALITY

A. All ductwork shall be free from pulsation, chatter, vibration or objectionable noise. After system is in operation, should these defects appear they shall be corrected by removing, replacing or reinforcing the work. Sound levels shall not exceed the minimum requirement as specified in ASHRAE - Systems Volume. No discreet tones will be allowed.

B. No ductwork or components shall be shipped prior to complete resin cure.

C. The maximum allowable leakage shall be one percent of air volume when tested at 100 percent of the operating static pressure.

D. The Engineer reserves the right to reject acceptance of delivery of any or all pieces of equipment found upon inspection to have any or all of the following defects in the laminate:

1. Blisters
2. Chips
3. Crazing
4. Exposed glass
5. Cracks
6. Burned areas
7. Dry spots
8. Foreign matter
9. Surface porosity
10. Sharp discontinuity
11. Trapped air
12. Any item which does not satisfy the tolerances as specified.

END OF SECTION
INSTRUCTIONS TO BIDDERS

1. Bidders MUST use the form and format included in this bid document and provides all required information. The Bid Proposal shall be mailed to the Purchasing and Contracts Administration Department, El Paso Water Utilities, P.O. Box 511, El Paso, Texas 79961 or delivered to the Purchasing and Contracts Administration Department, El Paso Water Utilities Building, first floor, 1154 Hawkins Boulevard, El Paso, Texas 79925 prior to the date and time specified in this bid document. Bids received after the date and time shall be returned unopened to the Bidder.

2. The unit price of each item must be given in the column headed ‘Unit Price’ and must be for the particular unit of measurement specified in the column headed ‘Unit’. In addition, the price per unit shall be multiplied by the total number of units and the total shown in the column for ‘Total Cost’. If there is a discrepancy between the unit price and the total cost, the unit price shall prevail.

3. When a bid is requested for a particular item by brand name or other form of identification and the words ‘or approved equal’ are used, Bidders may bid on items manufactured by other companies, provided the substituted article(s) is clearly described in terms of trade name, grade, capacity, etc. Sufficient information MUST BE INCLUDED WITH THE BID SUBMITTAL to permit the Utility to evaluate the item(s) for compliance with bid specifications. BIDDERS WHO FAIL TO INCLUDE THIS INFORMATION WITH THE BID SUBMITTAL MAY BE DISQUALIFIED.

4. Additional information not requested in the bid specifications, but felt to be pertinent by the Bidder, may be included as annotations or attachments to the Bid Proposal.

5. When a date is set for merchandise to be received or for work to be performed, the merchandise MUST BE DELIVERED OR THE WORK PERFORMED on or before the specified date; if not, the Purchase Order or Master Contract to the delinquent party may be canceled. If the Purchase Order or Master Contract is canceled, the El Paso Water Utilities shall have the right to buy the merchandise or have the unfinished work completed by another bidder. Any excess in cost for the same item(s) or service over the price specified in the Bid Proposal that was accepted by the Public Service Board will be deducted from any money deposited with this bid or subsequently due. The El Paso Water Utilities Public Service Board reserves the right to delete the company from the Bidders List for up to twelve months.

6. All bids MUST BE F.O.B. DESTINATION. All reductions or refunds on freight charges will be for the account of the El Paso Water Utilities.

7. The Bid Submittal shall remain subject to acceptance for sixty days after the bid opening.

8. Bidders are invited to be present at the opening of bids.

9. Unless otherwise specified in the Bid Proposal, award of the bid shall be made by individual item to the lowest responsible bidder meeting specifications for the goods and/or services described in the Bid Proposal. A Bidder may qualify his bid by indicating that is based on ‘All or None’ for either all or part of the items.

10. The Public Service Board is not bound by the issuance of this Bid Proposal to award a contract. Any resulting order will be awarded to the lowest and best qualified responsible bidder whose bid, conforming to the Bid Proposal, is most advantageous to the El Paso Water Utilities. If deemed to be in the best interest of the El Paso Water Utilities, the Public Service Board reserves the right to reject any or all bids, award a contract for the items, either in whole or part and/or waive any irregularities. However, the contract may not be awarded to a nonresident bidder unless the nonresident’s bid is lower than the lowest bid submitted by a responsible Texas resident bidder by the same amount that a Texas resident bidder would be required to underbid a nonresident bidder to obtain a comparable contract in the state in which the nonresident's principal place of business is located. If the funding of the contract involves federal funds, then the contract will be awarded to the lowest and best qualified responsible Texas resident or nonresident bidder whose bid, conforming to the Bid Proposal, is most advantageous to the El Paso Water Utilities.

DEFINITIONS:

BIDDER - means a person, partnership or corporation making a proposal for the performance of the work covered by the contract documents and may be a ‘Texas Resident Bidder’ or a ‘Nonresident Bidder’.

TEXAS RESIDENT BIDDER - means a bidder whose principal place of business is in this state and includes a contractor whose ultimate parent company or majority owner has its principal place of business in this state.

NONRESIDENT BIDDER - means a bidder whose principal place of business is not in this state but excludes a contractor whose ultimate parent company or majority owner has its principal place of business in this state.

11. A Bidder may withdraw his bid at any time prior to the date and time of bid opening, provided written authorization is presented to the Purchasing Agent by an officer of the firm that submitted the bid.

12. Any additional information about this bid and/or complaints, questions or comments about the bid of another vendor must be submitted to the Purchasing Agent within 24 hours after the bids are opened for the information or complaint to be considered.
13. The successful bidder will be required to obtain and maintain comprehensive general liability insurance in an amount not less than $500,000 per occurrence. The City of El Paso and the El Paso Water Utilities Public Service Board shall be included as additional insureds on all policies of comprehensive general liability insurance. Each policy shall contain a clause which requires the insured to give to the Public Service Board at least 30 days written notice of cancellation of said insurance or of a material change in same. Prior to the effective date of cancellation, the Bidder shall obtain replacement insurance which meets these specifications. A copy of the Bidder’s Certificate of Insurance or other satisfactory evidence of insurance coverage shall be submitted to the Purchasing Agent within 15 days after receipt of a written Notice of Award. UPON FAILURE OF THE SUCCESSFUL BIDDER TO FURNISH SATISFACTORY EVIDENCE OF INSURANCE COVERAGE WITHIN 15 DAYS AFTER RECEIPT OF A WRITTEN NOTICE OF THE BID AWARD, THE NOTICE OF AWARD SHALL BE NULL AND VOID. THE BID SECURITY (PROVIDED IN ACCORDANCE WITH INSTRUCTION 14) SHALL BE FORFEITED AND THE EL PASO WATER UTILITIES SHALL THEN HAVE THE RIGHT TO MAKE THE AWARD TO THE NEXT LOWEST RESPONSIBLE, RESPONSIVE BIDDER OR ASK FOR NEW BIDS.

14. Each bid MUST be accompanied by Bid Security made payable to the El Paso Water Utilities Public Service Board in an amount of five (5) percent of the Bidder's total bid and in the form of a certified or cashier’s check or a Bid Bond. The Bid bond (and performance and Payment bond when required) shall be in the form prescribed by applicable laws and regulations including, but not limited to, Chapter 2253 of the Texas Government Code and Section 7.19-1 of the Texas Insurance Code. The bond shall be executed by a Surety authorized and admitted to do business in the State of Texas and licensed by the State of Texas to issue surety bonds. This Bid Security is provided as a guarantee that the Bidder, if awarded a contract, will execute the contract (Purchase Order of Master Contract) to provide the material, supplies, equipment and/or services. FAILURE OF THE BIDDER TO INCLUDE BID SECURITY WITH THE BID SUBMITTAL SHALL CONSTITUTE A NONRESPONSIVE BID AND RESULT IN DISQUALIFICATION OF THE BID SUBMITTAL. The Bid Security of all bidders will be retained by the El Paso Water Utilities until award of the contract to the successful Bidder by the Public Service Board. After award of the contract, the Bid Security of the successful Bidder will be returned by the El Paso Water Utilities until receipt of the Performance Bond and/or Payment Bond (if required). Upon receipt of the Performance Bond and/or Payment Bond, the Bid Security will be returned. The Bid Security of the next two low bidders will be retained until execution of the successful Bidder’s contract and will then be returned. The Bid Security of all remaining Bidders will be returned after award of the Bid by the Board.

15. The successful Bidder will be required to obtain a Performance Bond and Payment bond (when required) for one hundred percent (100%) of the bid as security for the faithful performance and payment of all of the Bidder’s obligations. All bonds shall be in the form prescribed by all applicable laws and regulations including, but not limited to, Chapter 2253 of the Texas Government Code and Section 7.91-1 of the Texas Insurance Code. The bonds shall be executed by a Surety which is authorized and admitted to do business in the State of Texas and licensed by the State of Texas to issue surety bonds. All bonds signed by an agent must be accompanied by a certified copy of the agent’s authority to act. IF THE SUCCESSFUL BIDDER FAILS TO FURNISH THESE BONDS WITHIN FIFTEEN (15) DAYS AFTER RECEIPT OF WRITTEN NOTIFICATION OF THE BID AWARD, THEIR BID SECURITY SHALL BE FORFEITED. The El Paso Water Utilities shall then have the right to make the award of a contract to the next lowest responsible, responsive bidder or to ask for new bids.

16. To the fullest extent permitted by laws and regulations, Bidders shall indemnify and hold harmless the El Paso Water Utilities Public Service Board, its officers, agents and employees from and against all claims, damages, losses and expenses; direct, indirect or consequential (including, but not limited to, fees and charges of engineers, architects, attorneys and other professionals and court costs) arising out of or resulting from the performance of its obligations under this contract and the contract documents.

17. The Bid Proposal MUST be signed by an authorized agent of the bidding company. Failure to sign the Bid Proposal or signing it with a false statement shall void the submitted bid or any resulting contract (Purchase Order or Master Contract) and the bidder may, at the option of the Public Service Board, be removed from the bid list.

18. By signing the Bid Proposal, the Bidder affirms that he has not given or offered to give nor intends to give, at any time hereafter, any economic opportunity, future employment, gift, loan, gratuity, special discount, favor or services to an employee or official of the El Paso Water Utilities in connection with the submitted bid.

19. These INSTRUCTIONS TO BIDDERS, the Bid Proposal and all other contract documents shall constitute a binding and enforceable contract with the El Paso Water Utilities Public Service Board. Upon award of the bid by the Public Service Board, the Bidder hereby agrees that the signature of its duly authorized agent on the first page of the Bid Proposal shall bind the Bidder to all terms and obligations of the INSTRUCTIONS TO BIDDERS, Bid Proposal and other contract documents.

20. This bid specifically prohibits communications in writing addressed in the final bullet of the cone of silence.