Town of Montague
Clean Water Facility (CWF)
34 Greenfield Road, Montague, MA 01351

Invitation for Bids
Aeration System Diffuser Upgrade Project

Bid Deadline: ~~**November 14, 2024 at 10:00 AM**~~ November 21, 2024 at 10:100AM

Awarding Authority:

Town of Montague
1 Avenue A
Turners Falls, MA 01376

Bid Contact: Chelsey Little
Email: cwf.supt@montague-ma.gov

LEGAL ADVERTISEMENT PER MGL Ch. 30B, §5

INVITATION FOR BIDS: The Town of Montague will accept bids for Aeration System Fine Bubble Diffusers – Materials Only per MGL Ch. 30B, sec. 5. Sealed bids marked "Aeration System Diffuser Upgrade Project Bid" in the lower left hand corner of the envelope will be received by the Town at Montague Town Hall, One Avenue A, Turners Falls, MA 01376, until ~~November 14, 2024 at 10:00 A~~M. Download project specifications and bid instructions from https://www.montague-ma.gov/BIDS. The Town of Montague is the awarding authority and reserves the right to accept or reject any or all bids in total or in part as they may deem in the Town's best interest.

November 21, 2024 at 10:100AM

INVITATION FOR BIDS
AERATION SYSTEM DIFFUSER UPGRADE PROJECT
IFB-FY24-07

The Town of Montague will accept sealed bids for the supply and delivery of the Aeration System Fine Bubble Diffusers (fine buffer diffusers, drop leg connections, pipe supports, manual air valves, and any associated appurtenances) at the Montague Clean Water Facility, located at 34 Greenfield Road in Montague MA 01351.

Sealed bids, which must be clearly marked **"AERATION SYSTEM DIFFUSER UPGRADE PROJECT BID"** in the lower left hand corner of the envelope, will be received by the **Town of Montague, One Avenue A, Turners Falls MA 01376**, until ~~November 14, 2024 at 10:00 A~~M, at which time they will be publicly opened and read aloud in the Montague Town Hall Annex Multi-Purpose Room on the basement floor level (rear parking lot entrance). **One original and one copy of the bid is required.**November 21, 2024 at 10:100AM

Specifications for bids are available for download at https://www.montague-ma.gov/BIDS. Registration is required. Once registered, any addenda or notifications will automatically be sent to the email address of registrants on record. Questions about securing bid specifications can be answered by contacting the CWF Superintendent at cwf.supt@montague-ma.gov or at 413-773-8865. The bid is issued pursuant to and subject to MGL Ch. 30B, §5.

The Town of Montague reserves the right to accept or reject any or all bids in total or in part as they may deem in the public's best interest.

By: Walter Ramsey, Chief Procurement Officer
October 24, 2024

A. MEETING SPECIFICATION REQUIREMENTS

Your bid must indicate whether the Bidder complies with the Technical Specifications, and if "or equal" materials, design, and submittals are proposed, those must be adequately explained in an accompanying document which provides specification references per deviation.

Delivery of all equipment as well associated appurtenances and materials shall be delivered within 12 weeks upon receipt of purchase order after formal submittal is approved.

B. GENERAL INSTRUCTIONS TO BIDDERS

A. All bids must contain a signed BID FORM (in the form appearing herein). Minor defects on a bid submittal may be waived by the Chief Procurement Officer as long as the error or variation is not prejudicial or preferential to the other bidders and that it may be corrected without affect upon substantive elements of the bid such as, but not limited to, price, quality, payment terms or delivery schedule. Resolution will be determined by the Chief Procurement Officer.
B. Bids which are incomplete, not properly endorsed or signed, or otherwise contrary to instructions may be rejected as non-responsive by the Chief Procurement Officer. Conditional bids will not be accepted. Any bid arriving after the time and date of bid opening will not be accepted.
C. As the Town is exempt from the payment of Federal Excise Taxes and Massachusetts Sales Tax, prices quoted herein are not to include these taxes.
D. By submitting its bids, a bidder agrees to be held to the terms and the prices on the bid form for 30 days from bid opening.
E. The Town reserves the right to reject any and all bids, in total or in part.
F. Any restrictions, qualifications, or deviations from specifications must appear either on the bid form or on an attachment thereto.
G. Once bids are opened, the Chief Procurement Officer will forward bid information to the CWF for the Superintendent's review and evaluation of technical information submitted.
H. Payment of invoices will be made within 30 days of the date specified in the payment schedule and after receipt of a complete and satisfactory written invoice.
I. The Town will answer any general questions about bid procedure, etc., but no question regarding the substance of the bid will be answered that in any way could give an unfair advantage to a bidder. All such questions and answers will be published as a written addendum and made available to all bidders. All inquiries concerning this bid should be.
J. All compensation under the "project" award shall be subject to the appropriation and availability of funds.

REFERENCES:

Bidders should possess a minimum of five (5) years' experience providing similar products and systems. All bidders are asked to provide Owner with three (3) municipal or sewer district references, including current email and telephone numbers of the entities the bidder has completed similar jobs for in the past five (5) years. The Town reserves the right to check any and all potential references.

Checklist of Required Signed Submittals:

- List of any corresponding Or Equal Submissions to Technical Specifications
- Bid Form.
- Legal Certification.
- Bid Signature Page with Corporate Resolution or List of Partners if applicable.
- References (three) and Statement of Qualifications affirming 5+ years successful experience with similar projects.
- Sign Wherever You See ☑
- ONE UNBOUND ORIGINAL AND ONE COPY OF THE BID SHALL BE INCLUDED

PREPARATION OF BIDS

A. Bid Prices: The bidder shall submit their bid upon forms furnished by the Town and included in this IFB.
B. The bidder shall specify a lump sum for the supply and delivery of the Aeration System Fine Bubble Diffusers in the format appearing in the Bid Form. All words and figures shall be in ink. In case of a discrepancy between the prices written in words and those in figures, the written word shall govern. The prices shall, without exception, include all royalties, permits (except building permit as noted) and costs involved in the work and the equipment, and as otherwise specified in the Bid Form.
C. Signatures: All proposals shall be signed correctly with ink in the proper places provided, as follows: If the proposal is made by an individual, his name and post office address shall be given. If the proposal is made by a firm, partnership or corporation, it shall be signed by a person having such legal authority from the firm, partnership, or corporation and the person so signing the proposal shall give his own name and title (if any) in addition to the name and address of the President, Treasurer, and Manager shall be given. If the proposal is made by a firm or partnership, the names and addresses of the individual members shall be given. If the proposal is made by a Corporation, the name of the State under which the laws of the Corporation are chartered and the names, titles, and business addresses of the President, Treasurer, and Manager shall be given.
D. All bids must include a duly executed Non-Collusion Certificate, Tax Certificate and Corporate Vote (if applicable) in the forms appearing in Exhibit A hereto.

AWARD OF CONTRACT

A. M.G.L Ch.30B requires that public contracts (and when applicable, purchase orders) be awarded to the responsible and responsive bidder offering the lowest price.
B. Bidders are required to disclose all Federal, State, or local agency citations for the last three years in the Cover Letter accompanying the bid.
C. If in the judgment of the Town any property is needlessly damaged by an act or omission of the Contractor or his employees, servants, or agents, the amount of such damages shall be determined by the Town's designee and such amount shall be deducted from any money due the contractor or may be recovered from said contractor in actions at law.
D. It should be further noted that all delivery safety precautions and/or regulations required by the U.S. Department of Labor, Occupational Safety and Health Administration shall be a condition of this project and shall be strictly enforced.

APPLICABLE LAWS

All applicable laws and regulations of the Commonwealth of Massachusetts will apply to any resulting agreement, contract or Purchase Order, and are deemed incorporated into this IFB and the contract by reference.

TAXES

The Town of Montague is exempt from Federal and State Taxes. The Town's Certificate exemption number is 04-6001231.

BILLING

Invoices are to be mailed to:

Montague CWF
34 Greenfield Road
Montague, MA 01351

EFFECTIVE PERIOD OF BIDS

Bids submitted in response to this IFB must be effective for a minimum of 30 days from date of bid opening.

BID FORM

To the Awarding Authority:

The Undersigned proposes to furnish and deliver all materials required for TOWN OF MONTAGUE – Aeration System Diffuser Upgrade Project in TURNERS FALLS, Massachusetts, in accordance with the bid specifications and Invitation for Bids.

This bid includes addenda numbered _____ _____

The proposed cost schedule is as follows:

LUMP SUM of the Aeration System Diffuser Upgrade Package*:

(dollars): $_____ (LUMP SUM)

(written): _____ (LUMP SUM)

*Aeration System Fine Bubble Diffusers package includes fine buffer diffusers, drop leg connections, pipe supports, manual air valves, and any associated appurtenances.

The above price schedule includes all costs associated with the Aeration System Fine Bubble Diffusers and related equipment and all other materials, services, insurance, shipping costs necessary to accomplish the work as specified in this Invitation for Bids, all costs for preparing the bid and warranty.

I/We hereby agree to provide materials and services for which we have provided pricing in accordance with the specifications in this bid.

Pursuant to M.G.L. Ch. 62C, Sec. 49A, I certify under the penalties of perjury that, to the best knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

The undersigned certifies under penalties of perjury that this bid has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

Any “Or Equal” submissions are included only with complete material specifications documenting deviations and is subject to approval by the Town.

Authorized Signature ☑ _____ Printed Name_____

Company Name * Date _____

Postal Address:

Email Address:

Phone Number:

The Office of the Attorney General, Washington, DC, requires the following information on all bid proposals amounting to $1,000.00 or more:

_____ Federal Tax ID Number (this number is regularly used by companies when filing their "EMPLOYER'S FEDERAL TAX RETURN, U.S." Treasury Department Form 941 .

*IF A CORPORATION, INCLUDE WITH YOUR BID A CORPORATE RESOLUTION LISTING ALL DULY AUTHORIZED SIGNERS ON BEHALF OF THE CORPORATION AND CHECK HERE ☐

*IF A PARTNERSHIP, INCLUDE A LIST OF NAMES/ADDRESSES OF ALL PARTNERS AND CHECK HERE ☐

*IF A PROPRIETORSHIP, COMPLETELY FILL OUT INFORMATION ABOVE ONLY AND CHECK HERE ☐

REFERENCES

Please list THREE sales references for supply of similar equipment/systems. Please make sure contact information is CURRENT. Inability to check references may affect the eligibility of your bid. You may use your own form if it includes at least all of this information.

1_____ _____
Equipment Description/Size Date Delivered

_____ _____
Name of Contact Person Location of Equipment

_____ _____
Phone Number Name of OWNER

2_____ _____
Equipment Description/Size Date Delivered

_____ _____
Name of Contact Person Location of Equipment

_____ _____
Phone Number Name of OWNER

3_____ _____
Equipment Description/Size Date Delivered

_____ _____
Name of Contact Person Location of Equipment

_____ _____
Phone Number Name of OWNER

Exhibit A – Legal Certifications

CERTIFICATIONS REQUIRED BY LAW

You must COMPLETE and SIGN the following certifications. You must also print, at the bottom of this page, the name of the contractor for whom these certifications are submitted.

TAX COMPLIANCE

Pursuant to Chapter 62C of the Massachusetts General Laws, Section 49A(b), I, the undersigned, authorized signatory for the below named contractor, do hereby certify under the pains and penalties of perjury that said contractor has complied with all laws of the Commonwealth of Massachusetts relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

NON-COLLUSION

The undersigned certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person'' shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

COMPLETE AND SIGN BELOW:

_____ _____

Authorized Person's Signature Date

_____

Print Name & Title of Signatory

_____

Name of Contractor

TOWN OF MONTAGUE CLEAN WATER FACILITY
Invitation for Bids – Aeration System Diffuser Upgrade Project

ADVERTISEMENT

Advertisement for Bid per M.G.L. Ch.30B, §5

A. Goods and Services Bulletin October 24, 2024
B. Town of Montague Webpage October 24, 2024
C. CommBUYS October 24, 2024
D. Greenfield Recorder October 24, 2024
includes the MA Newspaper Publisher's Assoc website: www.masspublicnotices.org

CRITICAL DATES

A. Online Bid Conference – N/A
B. Deadline for written questions October 31, 2024 by 10:00 AM
C. Addenda issued, if necessary November 7, 2024 by 10:00 AM
D. Deadline for Submission of Bids ~~November 14, 2024 at 10:00~~ AM November 21, 2024 at 10:100AM

ESTIMATED DATES

A. November 19, 2024 – Expected Date of Notice of Award (within 30 days of the due date for bids)
B. December 10, 2024 – Expected Date of Submittal for Review and Approval
C. Equipment Delivery – 12 weeks from Date of Purchase Order *

*PO issued after formal submittal is approved by the Town of Montague.

Town of Montague, Massachusetts
Montague Clean Water Facility (CWF)
Aeration System Diffuser Upgrade Project
Request For Proposal

The Town of Montague, Massachusetts is seeking equipment quotations for replacement of their existing coarse bubble diffused aeration system to a fine bubble diffused aeration system at the Montague Clean Water Facility (CWF). We are requesting bids that meets the requirements below.

Project Background

The Montague CWF has two aeration tanks that were originally designed as a conventional activated sludge process with stainless steel coarse bubble diffusers for oxygen transfer. Currently, three multi-stage centrifugal blowers are used to supply air to the aeration tanks. Dissolved oxygen sensors located in the activated sludge tanks are used to control the speed of the blowers which are equipped with variable frequency drives (VFDs). Each blower is also equipped with a modulating inlet butterfly valve to modulate the output of the blowers. The existing air flow rate is controlled by varying the speed of the blowers in response to a dissolved oxygen set point in the aeration tanks.

To increase energy efficiency and reduce operation costs, the Montague CWF wishes to replace the existing coarse bubble diffusers with an energy efficient fine bubble diffused aeration system. The Montague CWF has also recently separately procured two new integrally geared turbo blowers with new master control panel and associated VFDs to meet the new range of oxygen demand and associated air flow rates for the upgraded diffuser system.

The existing aeration tanks are 22-feet wide by 100-feet long by 14-feet deep at the outlet weir. The Aeration System Fine Bubble Diffusers upgrade will include the installation of fine buffer diffusers, drop leg connections, pipe supports, manual air valves, and associated appurtenances. Each tank will include five new diffuser grids. Each grid will be connected to the existing stainless steel drop legs by a stainless steel coupling.

Improvements and Scope of Work

The existing coarse bubble diffusers in the Montague CWFs' two aeration tanks will be replaced with an energy efficient fine bubble diffused aeration system, sized to meet the range of oxygen demand and associated air flow rates, as specified in Attachment A (Technical Specifications) and as shown in the figures included in Attachment B. The Town of Montague will be coordinating and performing the demolition of the existing coarse bubble diffuser system and the installation of the new fine bubble aeration system (including connections to the existing drop legs) in coordination with the selected equipment manufacturer.

In general, the bid price must include the following:

- All necessary labor, engineering time, materials, and support time for supply and coordination (but not installation) of Fine Bubble Diffusers (fine bubble diffusers, drop leg connections, pipe supports, manual air valves, and any associated appurtenances) for each tank.
- A detailed scope of supply in accordance with the attached equipment specifications (Attachment A).
- Allotments for Shop Drawing submittals and layout coordination for proposed fine bubble aeration system and appurtenances, including identification of all piping connections and elevations.
- Installation and Start-up Services: The equipment manufacturer shall provide the services of a field service representative for the purpose of review and certification of installation in accordance with the manufacturer's requirements, assisting the Town in the start-up, and operator training. Refer to Attachment A (Technical Specifications) for requirements.

- Supply of two hard copies and PDF of Operation and Maintenance Manuals.
- Warranties as specified in Attachment A.

RFP Site Visit

If desired, please RSVP with Superintendent/ Pretreatment Coordinator Chelsey Little via e-mail (cwf.supt@montague-ma.gov) for coordination of a site visit at the Clean Water Facility located at 34 Greenfield Road, Montague, MA 01351.

Submittal Content

Submittal shall consist of the following information including but not limited to:

- Cover letter identifying the bidder and proposed make/ model of the diffusers, valves etc.
- Detailed pricing proposal with proposed specifications and scope of supply
- List of References

The Town reserves the right to reject any and all quotations, to waive technical or legal deficiencies and to accept any quotation that it may deem to be in the best interests of the Town.

Schedule

If the Town makes an award under this request for proposal, the successful proposer will be notified within 30 days of the due date for the quotations.

ATTACHMENT A
Technical Specifications

TABLE OF CONTENTS

SECTION 01340

SUBMITTALS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Submit all shop drawings, operations and maintenance manuals, Manufacturers' certificates, project data, and samples required by the Specifications.

B. General Submittals Requirements: This project shall utilize:
   1. Submittals – Electronic via Email/FTP with Hard Copy for Record
      a. The Manufacturer shall submit to the Engineer/Owner an electronic submittal of shop drawings and O&M Manuals in portable document format (PDF) transmitted via email or file transfer protocol (FTP). The Owner shall return an electronic PDF of the submittal review comments to the Manufacturer. The electronic submittals shall serve as the electronic record of the project.
      b. In addition, completed shop drawings and completed operations and maintenance (O&M) manuals shall be provided in hard copy (paper) format, for the record, in accordance with the following requirements.

1.2 REQUIREMENTS SPECIFIED ELSEWHERE

A. Additional Requirements are specified elsewhere including, but not necessarily limited to Division 1 and 11.

1.3 SHOP DRAWINGS

A. Shop Drawings are required for each and every element of the work.

B. Shop Drawings are generally defined as all fabrication and erection drawings, diagrams, brochures, schedules, bills of material, manufacturers data, spare parts lists, and other data prepared by the Manufacturer which illustrate the fabrication, construction, and installation of the work, or a portion thereof.

C. Shop Drawings shall be submitted as a complete package by specification section, unless otherwise reviewed and approved by the Engineer. It is the intent that all information, materials and samples associated with each specification section be included as a single submittal for the Engineer's review. Any deviation from this requirement, shall be requested in writing with an anticipated shop drawing breakdown/schedule prior to any associated submittal. An exception to this requirement are shop drawings for reinforcing steel, miscellaneous metals and structural steel, which shall be submitted separately for each structure unless otherwise permitted by the Engineer.

D. The Manufacturer shall be responsible for the prompt and timely submittal of all shop and working drawings so that there shall be no delay to the work due to the absence of such drawings.

E. No material or equipment shall be purchased or fabricated especially for the Contract until the required shop and working drawings have been submitted as hereinabove provided and reviewed for conformance to the Contract requirements. All such materials and equipment and the work involved in their installation or incorporation into the Work shall then be as shown in and represented by said drawings.

F. Only drawings which have been checked and corrected by the fabricator should be submitted. Prior to submitting drawings to the Engineer, the Manufacturer shall check thoroughly all such drawings to confirm that the subject matter thereof conforms to the Specifications in all respects. All drawings which are correct shall be marked with the date, checker's name, and indication of the Manufacturer's approval, and then shall be submitted to the Engineer.

G. If a shop drawing shows any deviation from the Contract requirements, the Manufacturer shall make specific mention of the deviations in the transmittal. Shop Drawings that contain significant deviations that are not brought to the attention of the Engineer may be subject to rejection.

H. Shop Drawings that include drawings or other material that is illegible or too small may be returned without review.

1.4 OPERATION AND MAINTENANCE MANUALS

A. Operation and Maintenance (O&M) Manuals are required for certain elements of the project, as specified herein.

B. Each hard copy of an O&M Manual shall be provided in a stand-alone binder or shall be suitable for insertion into a 3-ring binder. Include the Manufacturer's representative's contact information on the front cover. O&M manuals must be appropriate for the project and customized for the project. If a Manufacturer's standard O&M manual is included in the submittal, all non-applicable content must be removed or crossed out.

C. O&M Manuals shall contain the following operational information:

1. Safety Precautions: List personnel hazards, equipment or product safety precautions for all operating conditions.
2. Operator Prestart: Include all procedures required to set up and prepare each system, equipment or component for use.
3. Startup Procedures: Provide a narrative description for all startup operating procedures, include all control sequences.
4. Shutdown Procedures: Provide a narrative description for all shutdown operating procedures, include all control sequences.
5. Post-Shutdown Procedures: Provide a narrative description for all post-shutdown operating procedures, include all control sequences.
6. Normal Operating Procedures: Provide a narrative description of normal operating procedures. Include control diagrams with data to explain operation and control of systems and specific equipment.
7. Emergency Operations: Include emergency procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include emergency shutdown instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance on emergency operations of all utility systems including valve locations and portions of systems controlled.
8. Operator Service Requirements: Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, alignment, spare parts installation and gage reading or recording.
9. Environmental Conditions: Include a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each

product or piece of equipment and describe conditions under which the equipment should not be allowed to run.

D. O&M Manuals shall contain the following maintenance information:
   1. Lubrication Data: Include a table showing recommended lubricants for specific temperature ranges and applications. Also, include charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, capacities and a lubrication schedule showing service interval frequency
   2. Preventative Maintenance Plan: Include the manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation as well as to ensure minimization of corrective maintenance and repair. Provide the manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide the manufacturer's specified frequency and procedures for each separate operation.
   3. Troubleshooting Guides: Include recommendations on procedures and instructions for correcting problems and making repairs. Provide step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.
   4. Wiring and Control Diagrams: Provide Wiring diagrams and control diagrams. All diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to the actual installation numbering.
   5. Maintenance and Repair Procedures: Include instructions and list the tools required to restore products and/or equipment to proper conditions or operating standards.
   6. Removal and Replacement Instructions: Include step-by-step procedures, list required tools/supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.
   7. Spare Parts and Supply Lists: Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration shall be required for facilities at remote locations. List spare parts and supplies that have a long lead times to obtain.
   8. Corrective Maintenance Work Hours: Include the manufacturer's projection of corrective maintenance work-hours including craft requirements by type of craft. Corrective maintenance that requires participation of the equipment manufacturer shall be identified and tabulated separately.

E. O&M Manuals shall contain the following additional information:

1. Parts Identification: Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirements to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items.
    a. When illustrations omit a part number and description, both the illustration and a separate listing shall show the index, reference, or key number which shall cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as a master parts catalog, in accordance with the manufacturer's standard commercial practice.
2. Warranty Information: List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents to keep warranties in force. Include warranty information for all primary components included in product systems.
3. Personnel Training Requirements: Provide information available from the manufacturers to use in training designated personnel to operate and maintain the equipment and systems properly.
4. Testing and Special Tools: Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.
5. If specified, written confirmation from the manufacturer that the equipment One Year Service Call in accordance with specification Section 01800, par. 1.1, A, 2.

1.5 MANUFACTURER'S CERTIFICATES

A. Prior to accepting the installation, the Manufacturer shall submit manufacturer's certificates for each item specified.

B. Such manufacturer's certificates shall state that the equipment has been installed under either the continuous or periodic supervision of the manufacturer's authorized representative, that it has been adjusted and initially operated in the presence of the manufacturer's authorized representative, and that it is operating in accordance with the specified requirements, to the manufacturer's satisfaction. All costs for meeting this requirement shall be included in the bid price.

1.6 SUBMISSION REQUIREMENTS

A. Accompany submittals with a transmittal cover sheet, containing:
    1. Date.
    2. Project title and number.
    3. Notification of deviations from Contract Documents.
    4. Other pertinent data.

B. A completed Submittal Certification Form shall be attached to each hardcopy and electronic PDF of each shop drawing and must include:

1. Project name
2. Specification Section and sequential number with alphabet suffix for resubmittal
3. Description
4. Identification of deviations from Contract Documents.
5. Manufacturer's stamp, initialed or signed, certifying review of the submittal, verification of field measurements and compliance with Contract Documents.
6. Where specified or when requested by the Engineer, manufacturer's certification that equipment, accessories and shop painting meet or exceed the Specification requirements.
7. Where specified, manufacturer's guarantee.

C. Additional Requirements for Electronic Submittals:
1. Each individual shop drawing or O&M submittal shall be contained in one PDF.
2. The first page of the PDF shall be the Submittal Certification Form as described above.
3. The electronic PDF shall be **exactly** as submitted in the hardcopy.
4. The electronic PDF shall include an electronic table of contents that is bookmarked for each section of the submittal.
5. The electronic PDF shall be configured such that is fully searchable.
6. PDF versions of 24x36 drawings shall be converted to 24 x 36 PDFs so as not to lose the clarity of the original drawing.
7. Electronic PDF submittals that are not submitted in accordance with the requirements stated above will not be reviewed by the Engineer.
8. Electronic submittals shall be transmitted via the protocol established in Part 1 above.

1.7 RESUBMISSION REQUIREMENTS

A. Revise initial submittals as required and resubmit as specified for initial submittal.

B. Indicate on submittals any changes which have been made other than those required by Engineer. All renumbering of shop drawings, relabeling of individual pieces or assemblies or relocating of pieces or assemblies to other Drawings within the submittal shall be clearly brought to the attention of the Engineer. If relabeling of individual pieces or assemblies has taken place, the labels from the previous submittal shall be indicated to assist in comparing the original and resubmitted shop drawing.

C. All resubmittals shall include a summary of the previous submittal review comments with the vendors' written response as to how the previous comments were addressed.

1.8 ENGINEER'S REVIEW

A. The review of shop and working drawings hereunder will be general only, and nothing contained in this specification shall relieve, diminish or alter in any respect the responsibilities of the Owner under the Contract Documents and in particular, the specific responsibility of the Owner for details of design and dimensions necessary for proper fitting and construction of the work as required by the Project and for achieving the result and performance specified thereunder.

PROCESS EQUIPMENT MANUFACTURER SUBMITTAL CERTIFICATION
(Divisions 11 and 14)

Owner:_____ Date: _____

Project:

Equipment Manufacturer: _____

Equipment: _____

As an authorized representative of the equipment manufacturer, the undersigned certifies that the equipment listed above conforms to the requirements of Section 11000, Part 1.3.K. The undersigned authorized representative of the manufacturer further certifies that the equipment manufacturer or supplier has: reviewed the Contract Documents, the intended installation by the Owner, and the intended functional and operational conditions; determined all conditions to be acceptable; and found no conditions which would cause the warranty to be void; or the equipment to function improperly, or not meet the performance requirements.

_____ _____
(Authorized Representative of the Manufacturer) (Date)

END OF SECTION

SECTION 01800

EQUIPMENT STARTUP, TESTING AND OPERATOR TRAINING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. General: The work of this Section includes the startup, certification and operator training of equipment and control systems sufficient for a fully functional project as determined by the Engineer.

1.2 REQUIREMENTS SPECIFIED ELSEWHERE

A. Additional Requirements are specified elsewhere including, but not necessarily limited to Division 1 and 11 specifications.

1. The following items are integral to this process, in general order of activity:
   a. Submittals, as specified in Section 01340.
   b. Operations and Maintenance Manuals, as specified in Section 01340.
   c. Equipment Startup, as specified herein.
   d. Operator Training, as specified herein.
   e. Equipment Demonstration Testing, as specified herein.
   f. One Year Service Calls, as specified herein.

1.3 GENERAL DEFINITIONS:

A. Equipment Startup shall be generally defined as the initial placing into service of the equipment by representatives of the Owner and the equipment Manufacturer. This shall include verification of all equipment protection and safety control features (e.g., motor high temperature, seal fail, hardwire interlocks, estops, etc.) and include configuration of the VFD (if applicable) prior to equipment startup.

B. Equipment Demonstration Testing shall generally be defined as the formal and scheduled demonstration of equipment/system operations in accordance with the requirements of the Contract Documents, including all required performance or acceptance testing. This formal demonstration shall be performed in the presence of the Engineer by representatives of the Owner and the equipment Manufacturer.

C. Operator Training shall generally be defined as the formal and scheduled instruction of plant personnel and other Owner designated representatives in the proper operations of provided equipment, and in the techniques, methods, schedules, etc. associated with maintenance. This formal training shall be performed in the presence of the Engineer and the equipment Manufacturer. Operator Training shall also include remote assistance to Clean Water Facility personnel by Manufacturer representatives during the initial operations of the equipment.

1.4 SUBMITTALS:

A. In accordance with the requirements of Section 01340.

B. Owner shall coordinate with Manufacturer to develop a proposed start-up, testing and training plan for each piece of equipment including detailed plans for temporary

bypass pumping or temporary facilities, when required.

1. The startup, testing and training plan shall include a written outline description of the means and methods to be employed during the equipment test of each piece of equipment as well as the anticipated sequence and duration of activities.
2. The startup, testing and training plan shall include the name(s) and resume(s) of the duly authorized Manufacturer's Representatives proposed for the project. The qualifications of duly authorized representatives of the Manufacturer are specified below.
3. The startup, testing and training plan shall include proof of calibration of decibel meter(s) and flow meter(s) to be used in Equipment Startup(s).
4. The startup, testing and training plan shall identify the location and type of temporary flow meters to be utilized, where required herein.
5. Equipment startup and testing shall not be scheduled for Fridays without prior agreement by the Owner and Engineer.
6. Manufacturer shall submit manufacturer Operations and Maintenance Manuals, along with updated control system drawings, at least 2 months prior to Equipment Startup.

C. Following successful Equipment Startup and prior to placing the equipment into service, submit:
   1. Completed Equipment Startup Certification forms
   2. Completed Operator Training forms

D. Prior to Equipment Demonstration Testing, submit:
   1. Manufacturer start-up report

E. Following Equipment Demonstration Testing, submit:
   1. Completed Equipment Demonstration Testing Certification form

F. Prior to the equipment is accepted, submit:
   1. Manufacturer demonstration report

1.5 SCHEDULES AND NOTIFICATIONS:

A. Owner shall provide Engineer and Manufacturer with at least a 14 calendar day notice prior to initiating startup activities to allow necessary coordination. If startups are conducted in groups of activities, the notification shall be provided for each grouping. The actual date and time for testing and/or training will be the first mutually acceptable date and time available to all parties subsequent to receipt of the request.

B. Owner shall be responsible for any and all coordination necessary with the daily operations of the facility to accommodate the testing schedule.

C. Operator Training shall follow successful Equipment Startup and must be completed prior to the equipment being put on-line for uninterrupted service. Owner may formally request that Operator Training be conducted concurrently with the Equipment Demonstration Testing; however, this determination will be made on a case-by-case basis by the Engineer and Owner. Under no circumstances will conditions of the testing interfere with the ability of Owner's representatives to observe necessary features, to hear and understand instructions, or to ask questions. If such conditions occur, then Operator Training will not be allowed to run concurrently with Equipment Demonstration Testing.

1.6 QUALITY ASSURANCE

A. Duly authorized Manufacturer's Representatives shall meet the following criteria:
   1. A direct employee of the Manufacturer;
   2. Fluent in the English language;
   3. Has a minimum of 5 years of experience in the proper installation, adjustment, operation, testing, and startup of the specified model, including, but not limited to, equipment calibration, and other mechanical or electrical components of the equipment.
   4. Sales personnel, marketing personnel or local representatives will not be accepted as a duly authorized representative of the Manufacturer unless the Manufacturer has certified them accordingly.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.1 EQUIPMENT STARTUP

A. Equipment startup shall be performed by the authorized representative(s) of the Manufacturer as identified in the Submittals.
B. The Equipment Startup shall be performed prior to Operator Training and prior to Equipment Demonstration Testing.
C. No form of energy shall be applied to any part of the system prior to receipt by the Engineer of a certified statement of approval of the installation from the Owner and Manufacturer. This certification shall contain a statement by an authorized representative of the equipment Manufacturer that the equipment is ready for testing, as outlined below.
D. As part of the Equipment Startup, the Owner and Manufacturer shall:
   1. Verify that the equipment is installed properly and in accordance with Manufacturer's requirements and instructions, and as such, it is appropriate to apply power to the units in question.
   2. Verify that all manual and all automatic equipment protection and safety control features of the equipment function properly, including all alarms, and all activation and deactivation sequences.
   3. Verify that equipment can receive remote control signals and send remote feedback signals.
   4. Verify that the equipment can operate without excessive noise, vibration, overheating, overloading, jamming, etc. during specified conditions.
   5. Verify and document equipment capacity and amperage draws (on all power feeds) with equipment running under specified conditions.
E. Each piece of equipment shall be tested sufficiently to ensure that all features required to be demonstrated and/or verified during the equipment testing are within acceptable limits. The startup shall not be considered complete until the unit is fully capable of passing the equipment testing.
F. Where multiple units are provided, each unit shall undergo startup procedures.

G. The duly authorized representative of the Manufacturer shall provide all specialty tools, specialty testing equipment and labor necessary for the start-up of the equipment.
H. The Owner shall provide all power, chemical, tools, equipment, labor, water and fuel as required for Equipment Startup.
I. In the event of an unsuccessful equipment start-up, Manufacturer and Owner shall make necessary alternations, adjustments, repairs and replacements and the equipment start-up shall be repeated.
J. The Manufacturer Representative's shall fill out the Equipment Start-Up Certification form included at the end of this Section. Startup will not be considered complete until this form has been provided to the Engineer along with the Manufacturer Representative's field report.

3.2 EQUIPMENT DEMONSTRATION TESTING

A. Equipment Demonstration Testing shall be performed after the Equipment Startup is completed and it has been verified that equipment functions in accordance with the requirements of the Contract Documents in all aspects. Equipment Demonstration Testing shall be performed by the authorized representative(s) of the Manufacturer.
B. Equipment Demonstration Testing shall not be scheduled concurrently with Equipment Startup without the prior approval of the Engineer.
C. At a minimum during the Equipment Demonstration Testing, the Owner and Manufacturer shall complete the following to the satisfaction of the Engineer:
    1. Demonstrate that the equipment is installed properly and in accordance with Manufacturer's requirements and instructions, and as such, it is appropriate to apply power to the units in question.
    2. Demonstrate all manual and all automatic equipment protection and safety control features of the equipment functions properly, including all alarm, activation and deactivation sequences.
    3. Demonstrate that the equipment can operate without excessive noise, vibration, overheating, overloading, jamming, etc. during normal operating conditions.
    4. Demonstrate the full specified range of equipment operation when controlled remotely by the controls system.
    5. Other specific requirements as outlined within the individual specifications sections.
D. Each piece of equipment shall be tested sufficiently to ensure that all features required to be demonstrated and/or verified are within acceptable limits.
E. Where multiple units are provided, each unit shall undergo equipment testing procedures individually and then with multiple units on-line to verify the total systems output capacity and performance.
F. The duly authorized representative of the Manufacturer shall provide all specialty tools, specialty testing equipment and labor necessary for the start-up and testing of the equipment.
G. The Owner shall provide all power, chemical, equipment, labor, water and fuel as required for startup and testing.
H. All equipment provided on the project shall be demonstrated to function properly.
I. In the event of unsuccessful Equipment Demonstration Testing, Manufacturer and Owner shall make necessary alternations, adjustments, repairs and replacements and

the equipment testing shall be repeated.

J. The Manufacturer Representative's shall fill out the Equipment Demonstration Testing Certification form included at the end of this Section. Equipment Demonstration Testing will not be considered complete until this form has been provided to the Engineer along with the Manufacturer representative field report.

3.3 OPERATOR TRAINING

A. Operator Training shall be performed by the authorized representative(s) of the Manufacturer as identified in the Submittals.

B. Unless otherwise noted within the specific specification sections, provide minimum of one day (8-hour days, not including travel time) of combined training and operational assistance for plant operators for each piece of equipment in the proper operations of provided equipment, and in the techniques, methods, schedules, etc. associated with maintenance.

C. The level of the training and operational assistance provided shall be as required to ensure proper understanding of the equipment's operations, maintenance and warranty conditions. Should manufacturer require time in addition to the minimums indicated herein, or within the individual specification sections, to sufficiently detail the proper operations and maintenance of the equipment, it will be provided at no additional cost to Owner. Under absolutely no circumstances shall warranties become void due to Owner's failure to follow operational and maintenance procedures which were not fully detailed and described to Owner's representatives during these sessions.

EQUIPMENT START-UP CERTIFICATION

Owner: _____ Date: _____

Project _____

Equipment Manufacturer: _____

Specification Number/Equipment: _____

As an authorized representative of the equipment manufacturer, the undersigned certifies that the equipment listed above conforms to the requirements of the Contract Documents. The undersigned authorized representative of the equipment manufacturer further certifies that the equipment has been installed in accordance with the manufacturer's written instructions, that it is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void. Any items that must be completed prior to Equipment Demonstration Testing are listed below.

_____ _____
(Manufacturer's Authorized Representative/ Signature & Printed Name) (Date)

_____ _____
(Owner/ Signature & Printed Name) (Date)

_____ _____
(Witnessed by Engineer/ Signature & Printed Name) (Date)

** Manufacturer's Representative to provide a copy of Field Report via separate transmittal **

OPERATOR TRAINING CERTIFICATION

Owner: _____ Date: _____

Project _____

Equipment Manufacturer: _____

Specification Number/Equipment: _____

I, the undersigned Manufacturer's Authorized Representative, have trained the Owner's personnel listed below in the proper operation and maintenance of the above listed equipment.

_____

_____

_____

_____

_____

_____ _____
(Manufacturer's Authorized Representative/ Signature & Printed Name) (Date)

_____ _____
(Owner's Representative/ Signature & Printed Name) (Date)

_____ _____
(Witnessed by Engineer/ Signature & Printed Name) (Date)

EQUIPMENT DEMONSTRATION TESTING CERTIFICATION

Owner: _____ Date: _____

Project _____

Equipment Manufacturer: _____

Specification Number/Equipment: _____

This certifies that the entire equipment/system has met the requirements of Section 01800.

_____ _____
(Manufacturer's Authorized Representative/ Signature & Printed Name) (Date)

_____ _____
(Owner/ Signature & Printed Name) (Date)

_____ _____
(Witnessed by Engineer/ Signature & Printed Name) (Date)

END OF SECTION

SECTION 11000

EQUIPMENT - GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included: Furnish, install and test all equipment specified herein and as shown on the Drawings.

1.2 REQUIREMENTS SPECIFIED ELSEWHERE

A. Additional Requirements are specified elsewhere including, but not necessarily limited to Division 1.
   1. Section 01340 – Submittals
   2. Section 01800 – Equipment Startup, Certification and Operator Training.

1.3 QUALITY ASSURANCE

A. Provide only equipment of proven reliability manufactured by reputable manufacturers.

B. Acceptable manufacturers are listed in each equipment item section in this Division and are intended to indicate the type and quality of materials expected. Refer to the General and Supplemental Conditions for the manner in which "or equals" and "substitutes" will be evaluated.

C. Certificates, patents, licenses or other required legalities, when applicable, are specified in each Section of this Division.

D. The Specifications and Drawings direct attention to certain required features and performance of the equipment but do not purport to cover all details entering into its design and construction. Nevertheless, the Owner and Manufacturer shall furnish the equipment complete in all details and ready for operation for the intended purpose.

E. These Specifications are intended to provide standard equipment of a recognized manufacturer meeting all the requirements of the Specifications. Due to differences in such prefabricated equipment of various manufacturers, submit complete shop drawings, cut sheets, specifications, etc. to the Engineer to review for compliance with the Contract Documents prior to ordering any equipment. If the equipment differs materially from the dimensions given on the Drawings, submit complete drawings showing elevations, dimensions etc. for the installation. If Engineer's acceptance is obtained for alternate equipment, make any needed changes in the structures, piping or electrical systems necessary to accommodate the equipment at no additional cost to the Owner.

F. Workmanship shall be first class in all respects.

1.4 SUBMITTALS

A. Provide shop drawings and samples as specified in the General Conditions and Section 01340 of the Construction Contract. Equipment Systems Manufacturers shall integrate all required shop drawings into a common package.

B. Catalog Data: Submit manufacturer's literature and illustrations for all equipment to

be installed, including dimensions, construction details, shop painting details, and materials by generic name.

C. Installation Instructions: Submit complete sets of manufacturer's instructions for each equipment item, including equipment storage requirements.

D. Complete Operation and Maintenance Manuals in compliance with Specification Section 01340.

E. Certificates: Submit manufacturer's certification that equipment, accessories and shop painting meet or exceed the Specification requirements. Submit equipment performance testing results as required by these specifications. Should the proposed equipment not comply with all the specification requirements, all deviations from the specification requirements shall be listed.

F. Specific submittal requirements may be defined in individual sections in this Division.

G. Guarantees/Warranties as specified below.

H. Attention is directed to the fact that the Drawings are based upon a particular piece of equipment.

I. Manufacturer shall provide a Submittal Certification certifying that the Equipment Manufacturer has:

1. Reviewed the Contract Documents, the intended installation by the Owner, and the intended functional and operational conditions;
2. Determined all conditions to be acceptable; and
3. Found no conditions which would cause the warranty to be void; or the equipment to function improperly, or not meet the performance requirements.
4. The submittals will not be reviewed without the inclusion of these noted certifications. Process Equipment Manufacturer Submittal Certification Form is provided in Section 01340.

J. Proposed equipment/valve identification tag information.

1.5 SEISMIC CONTROL

A. NOT APPLICABLE

1.6 GUARANTEE/WARRANTIES

A. The Manufacturer shall provide the Owner with a Guarantee/ Warranty for the entire equipment package provided for one year from the date of acceptance of all equipment in field by Owner and Engineer.

B. Any specified extended warranties shall be prepared in the name of the Owner and shall become effective after the completion of the Correction/ Warranty Period. Extended warranties shall meet the requirements specified in the relevant Section. Proposed extended warranty language shall be submitted to the Engineer for review as a part of the Shop Drawing process.

C. Equipment that is supplied by a system supplier and is intended to function as a complete and integrated system shall be warranted accordingly.

D. Any part of a mechanical equipment system that shows undue or excessive wear, or that fails due to normal operational conditions during the Correction/ Warranty Period, shall be considered as evidence of defective material or defective workmanship, and it shall be replaced with equipment or parts to meet the specified requirements at no cost to the Owner.

1.7 DELIVERY, STORAGE AND HANDLING

A. Coat all machined surfaces subject to corrosion with an easily removable rust preventive compound prior to shipment.
B. Ship fabricated assemblies in the largest sections permitted by carrier regulations, properly labeled for field erection.
C. Deliver equipment in manufacturer's original, unopened and undamaged packages, unless mounted on equipment assembly.
D. Owner shall store and maintain all equipment in strict accordance with the manufacturer's written short term and long term storage requirements.
E. Store in a manner to protect items with epoxy shop coatings from exposure to UV light which can cause chalking of the epoxy. Length of acceptable exposure prior to providing UV protective measures shall be in accordance with coating manufacturer's recommendations. This includes protection from UV light after installation while awaiting covering or filling of tanks, or prior to field painting for items scheduled to be top-coated
F. Should damage occur, immediately make all repairs and replacements necessary to the satisfaction of the Engineer at no costs to the Owner.

PART 2 - PRODUCTS

2.1 GENERAL DESIGN OF EQUIPMENT

A. All parts and components of mechanical equipment shall be designed for satisfactory service under continuous duty without undo wear under the specified operating conditions.
B. All parts of mechanical equipment shall be amply proportioned for all stresses which may occur during operations, and for any additional stresses which may occur during fabrication and erection. Iron castings shall be tough, close-grained gray iron casting, Class 30, in accordance with ASTM A48, latest revision. Structural steel shall conform to ASTM A36.
C. All equipment and machinery furnished under this Contract shall be the latest improved design suitable for the service specified. All equipment and machinery shall be designed and constructed to operate efficiently, continuously and quietly under the specified requirements with a minimum of maintenance, renewals and repairs. The design and construction of all equipment and machinery shall be such as to permit operation with minimum wear, vibration and noise when properly installed.
D. Ample room for erecting, repairing, inspecting and adjusting of all equipment and machinery shall be provided. The design, construction and installation of all equipment and machinery shall conform to and comply with the latest safety codes and regulations.
E. All equipment of identical size, type and service shall be the product of the same manufacturer.
F. All equipment selected shall suit the general arrangement of the space in which it is to be installed.
G. Suitable provisions shall be made for easy access for service and replacement parts.

2.2 BOLTS, ANCHOR BOLTS AND NUTS

A. Furnish all necessary bolts, anchor bolts, nuts, washers, lock washers or locking nuts,

plates and bolt sleeves in accordance herewith. Anchor bolts shall have suitable washers, lock washers and, where so required, their nuts shall be hexagonal.

B. All bolts, anchor bolts, nuts, washers, lock washers, plates, and bolt sleeves shall be galvanized unless otherwise indicated below or specified elsewhere.
   1. Galvanized steel unless otherwise indicated below or specified elsewhere.
   2. Stainless steel hardware (minimum of Type 304, unless otherwise indicated) is required in all corrosive atmospheres, exterior areas, and/or areas with NEMA 4X or NEMA 7 rating.
   3. Stainless steel hardware (minimum of Type 316, unless otherwise indicated) is required in all submerged applications, including but not limited to the aeration basins.

C. Expansion bolts shall have malleable iron and lead composition elements of the required number of units and size.

D. Unless otherwise specified, stud, tap, and machine bolts shall be of the best-quality refined bar iron. Hexagonal nuts of the same quality of metal as the bolts shall be used. All threads shall be clean cut and shall conform to AN Standard B 1.1-1974 for Unified Inch Screw Threads (UN and UNR Thread Form).

E. Anchor bolts, epoxy anchors, and expansion bolts shall be set accurately. If anchor bolts are set before the concrete has been placed, they shall be carefully held in suitable templates of acceptable design. Where indicated on the Drawings, specified, or required, anchor bolts shall be provided with square plates at least 4 in. by 4 in. by 3/8 in. or shall have square heads and washers and be set in the concrete forms with suitable pipe sleeves, or both. If anchor or expansion bolts are set after the concrete has been placed, all necessary drilling and grouting or caulking shall be done by the Owner and care shall be taken not to damage the structure or finish by cracking, chipping, spalling, or otherwise during the drilling and caulking.

F. All anchors shall be designed and supplied by the equipment manufacturer. Anchors include, but are not limited to, anchor rods, epoxy anchors and expansion anchors. All anchor designs shall include the following:
   1. Anchors shall be designed for all applicable loads and load combinations in accordance with the Building Code applicable to the Project as by the equipment manufacturer. Equipment dynamic loads shall also be included with the other loads.
   2. Anchor design shall include the quantity, material, finish, diameter, type, spacing and concrete embedment depth of anchors. Design of epoxy and expansion anchors shall be based on cracked concrete.
   3. Expansion anchors are not permitted for exterior applications, wet service conditions, or dynamic loads. Cast-in anchor rods or epoxy anchors shall be used in these applications.
   4. All anchors shall be installed with the required embedment depth. If anchors are fully developed in the concrete equipment pad and are not embedded in the slab, the anchorage capacity of the pad to the slab shall be verified by the Engineer prior to placement of the pad.
   5. Anchors shall be no less than 3/8” diameter.
   6. Concrete strengths are as follows:
      a. Existing concrete: f’c = 3,000 psi

7. Anchors shall be shown on the equipment shop drawings, with all the required information indicated.

2.3 FOUNDATIONS, INSTALLATION AND GROUTING

A. The Owner shall furnish the necessary materials and construct suitable concrete foundations for all equipment installed by the Owner, even though such foundations may not be indicated on the Drawings. The tops of foundations shall be at such elevations as will permit grouting as specified below.

B. All such equipment shall be installed by skilled mechanics and in accordance with the instructions of the manufacturer.

C. In setting pumps, motors, and other items of equipment customarily grouted, the Owner shall make an allowance of at least 1 in. for grout under the equipment bases. Shims used to level and adjust the bases shall be steel. Shims may be left embedded in the grout, in which case they shall be installed neatly and so as to be as inconspicuous as possible in the completed work. Unless otherwise permitted, all grout shall be a suitable non-shrink grout.

D. Grout shall be mixed and placed in accordance with the recommendations of the manufacturer. Where practicable, the grout shall be placed through the grout holes in the base and worked outward and under the edges of the base and across the rough top of the concrete foundation to a peripheral form so constructed as to provide a suitable chamfer around the top edge of the finished foundation.

E. Where such procedure is impracticable, the method of placing grout shall be as permitted by the Engineer. After the grout has hardened sufficiently, all forms, hoppers, and excess grout shall be removed, and all exposed grout surfaces shall be patched in an approved manner, if necessary. All foundation and grout exposed surfaces shall be given a burlap-rubbed finish and painted with at least two coats of the epoxy-based paint specified for concrete.

F. If threaded rod with lower support nuts are used to secure the equipment in place temporarily during concrete equipment pad placement, the support nuts shall be removed prior to grouting so that the threaded rod anchor bolts are not supporting the equipment and the top nuts can be tightened to secure the equipment directly to the large bedding surface provided by the non-shrink grout and concrete equipment pad. Equipment foundations shall be designed to absorb equipment vibration and transmit forces to building structure or ground.

2.4 SPARE PARTS AND SPECIAL TOOLS

A. For each type of equipment furnished, the Manufacturer shall provide spare parts, as specified on the respective sections of the Division, and a complete set of all special tools (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation, maintenance, and disassembly of such equipment.

B. Tools shall be high-grade, smooth, forged, alloy, tool steel. Grease guns shall be lever type.

C. Special tools are considered to be those tools which because of their limited use are not normally available, but which are necessary for the particular equipment.

D. All spare parts and special tools shall be delivered at the same time as the equipment to which they pertain.

E. Spare parts shall be appropriately labeled and containerized, and shall be properly

packaged for long-term storage.

2.5 PROTECTION AGAINST ELECTROLYSIS

A. Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis.

B. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or other acceptable materials.

2.6 NAMEPLATES

A. Each piece of equipment shall be provided with a substantial nameplate of noncorrodible metal, securely fastened in place and clearly and permanently inscribed with the manufacturer's name, model or type designation, serial number, principal rated capacities, electrical or other power characteristics, and similar information as appropriate.

B. An enlarged paper copy of all the nameplate data on equipment and motors shall be provided in the Shop Drawings and Operation and Maintenance Manuals.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Owner shall carefully inspect receiving structures and anchor supports for defects in workmanship prior to equipment arrival.

B. Owner shall carefully inspect all equipment for:
   1. Damage in shipping.
   2. Defects in workmanship and materials.
   3. Tightness of all nuts and bolts.

C. Inspection shall include, but not be limited to, the following as applicable:
   1. Soundness (without cracked or damaged parts).
   2. Correctness of setting, alignment, and relative arrangement of various parts.
   3. Adequacy and correctness of packing, sealing and lubricants.
   4. Completeness in all details, as specified.

D. Field Quality Control
   1. As part of the equipment cost, the Manufacturer shall assist the Owner with equipment adjustment, start-up, and necessary testing to prove that the equipment is in proper and satisfactory operating condition.
   2. On completion of the work, the Manufacturer's representative shall provide written certification that the equipment conforms to the requirements of the Contract and is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void, as outlined in the equipment certification form provided in Section 01800.
   3. As part of the startup services, the Manufacturer's representative shall provide the Owner's personnel with training in the proper operation and maintenance of all associated equipment. The equipment training certification form provided in Section 01800 shall be used for this purpose.
   5. When the work is substantially complete the Owner will be required to demonstrate, to the satisfaction of the Engineer, the ability of all equipment to

operate as intended without defect including binding, vibration, jamming, overheating, etc.All equipment found defective by the Engineer shall be replaced by the Manufacturer at no expense to the Owner.

3.2 PREPARATION

A. Provide all required adhesives, sealants, insulation, lubricants, waterproofing, fireproofing or other protection specified in each Section of this Division.

3.3 INSTALLATION

A. Owner shall install equipment in accordance with Manufacturer's requirement. Manufacturer(s) shall work with the Owner to ensure that the equipment has been properly installed.
B. Do not install equipment until all defects or inadequacies in receiving structure have been corrected to meet Specifications.
C. Erect and lubricate equipment in strict accordance with the manufacturer’s instruction. Installation shall include all oil and grease required for proper operation.
D. All equipment mechanisms shall withstand all stresses that may occur during fabrication, erection, and intermittent or continuous operation.
E. Owner to furnish and install supports as required by the equipment manufacturer.
F. Thoroughly clean all equipment and appurtenant piping to remove all dirt, grease, mill scale, and other foreign matter and touch up factory finish to the satisfaction of the Engineer.

3.4 STARTUP AND TESTING

A. Test and adjust all equipment in accordance with the general requirements of Specification Section 01800, and the specific requirements of the various Division 11 Specification Sections.
B. Demonstrate the equipment's ability to operate without overloading jamming, excessive vibration, etc. during normal operation conditions.
C. Demonstrate the equipment's ability to meet all the performance requirements specified for the equipment system to make a complete operational system, suited for its intended use.

END OF SECTION

SECTION 11378

FINE BUBBLE AERATION SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:
   1. Furnish a complete fine bubble membrane aeration system in Aeration Basins as shown on the Drawings in Attachment B and as specified herein.
   2. Fine bubble aeration system includes items downstream of the stainless steel drop legs. The system includes, but is not limited to the diffuser assemblies, air piping, fittings, supports, drains, anchorages, and manual isolation valves.

1.2 REQUIREMENTS SPECIFIED ELSEWHERE

A. Additional Requirements are specified elsewhere including, but not necessarily limited to Section 11000 – Equipment – General (and as referenced).

1.3 QUALITY ASSURANCE

A. In accordance with the requirements of Section 11000.
B. All equipment in this Section shall be furnished by a single supplier. The Owner and equipment manufacturer shall be responsible for the design coordination and proper operation of the entire system. Equipment shall be fabricated, assembled, erected and placed in proper operating condition in full conformity with the Drawings, Specifications, instructions and recommendations of the equipment manufacturer.
C. Qualifications of Manufacturer:
   1. Minimum of 5 years of experience in the design and fabrication of the equipment as described herein, used for similar applications and shall have at least five installations in satisfactory operation.
   2. Products model proposed shall have proven reliable in similar installations over a five year period.
D. Acceptable Manufacturers:
   1. Environmental Dynamics, Inc. (Nexom), Columbia, MO
   2. Sanitaire - A Xylem Brand, Worcester, MA
   3. Envirex – An Evoqua Brand, Pittsburgh, PA
   4. Or Equal

1.4 SUBMITTALS

A. In accordance with the requirements specified in Section 01340 and 11000. Submit such shop drawings, manufacturer's literature, short-term and long-term storage requirements, and operations and maintenance manuals.
B. In addition the following items shall also be submitted:
   1. Layout of aeration equipment showing all air pipe sizes and length and location of all diffusers, supports, airlift purge lines and expansion joints.

2. Calculations demonstrating that the proposed system is capable of meeting the maximum allowable pressure drop for the maximum airflow rates specified. Head-loss data for the proposed equipment supporting these calculations shall also be submitted.
3. Calculations showing the distribution and balancing of air within each aeration basin for the minimum and maximum airflow rates specified.
4. Factory SOTE test protocol
5. Catalog data for diffusers, headers, diffuser connection and supports.
6. Complete technical information including layout dimensions, weights, materials of construction.
7. Manufacturer's installation recommendations.

1.5 DELIVERY, STORAGE, AND HANDLING

A. In accordance with the requirements of Section 11000. Manufacturer shall deliver equipment to the project site where and when directed by the Owner.

1.6 WARRANTY

A. In accordance with the requirements of Section 11000.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. The diffused aeration equipment shall dissolve oxygen in, and mix the contents of, the aeration tanks under the following conditions:

1. Tank Configuration

Number of Aeration Tanks	2
Number of Aeration Zones per Tank	1

2. Aeration Zone Nominal Dimensions (each):

Zone	Length	Width
Aeration A	100'-0"	22’-0”

Tank Wall Depth	17’-6”
Side Water Depth @ Minimum Condition	14'-0”
Side Water Depth @ Maximum Condition	15’-6”'
Diffuser Depth @ Minimum Condition	13’-0”
Diffuser Depth@ Maximum Condition	14’-6”

3. Operating Conditions

Mixed Liquor Suspended Solids Concentration, mg/l

Average	3,500 to 6,250
Range	2,000 to 7,000
pH of Mixed Liquor	6.3 to 7.6
Temperature, degrees C	6 to 23
Altitude, feet above MSL	141.00 (tank floor)

4. Performance Requirements
   a. The diffused aeration equipment shall be capable of diffusing the following quantities of air into each zone of each aeration tank:

Zone	Airflow (scfm)	
	Maximum	Minimum
Aeration A	1,880	608

   b. The diffused aeration equipment shall be capable of meeting the following minimum Standard Oxygen Transfer Rates (SOTR) in each zone of each aeration tank as defined in the sub-Section "Factory Oxygen Transfer Performance Test" at the airflow rates specified above and at the side water depth presented above.

Zone	SOTR (lb O_2/day)	
	Maximum	Minimum
Aeration A	11,862	4,630

   c. The number of diffusers per grid shall be determined by the manufacturer to meet the specified performance requirements. However, the number of diffusers shall not be less than 640.
   d. The maximum allowable pressure drop from the connection of the dropleg to the main air supply through the diffuser and the liquid to the liquid surface shall be 6.54 psig (maximum airflow rate) and 7.79 psig (minimum airflow rate).
   e. At the minimum airflow specified above (Aeration A) sufficient mixing shall be provided to maintain the suspended solids in suspension at the maximum concentrations specified herein.

2.2 MATERIALS

A. Stainless Steel Materials and Fabrication
   1. All welded parts and assemblies shall be fabricated from sheets and plates of 304L stainless steel.
   2. All non-welded parts and assemblies shall be fabricated from sheets and plates of 304 stainless steel.
   3. All stainless surfaces shall be pickled after fabrication by completely immersing all stainless steel assemblies and parts after welding and brushing in a pickling solution of 10-percent nitric acid and 3-percent hydrofluoric acid in a water bath at 140 degrees F for a minimum of 15 minutes. Parts shall be free of iron particles or other foreign material after this procedure.
   4. All factory welding shall use MIG, TIG or plasma-arc welding inert gas processes. No field welding will be permitted.

B. PVC Materials and Fabrication
   1. All PVC pipe and fittings shall be produced from PVC compound with a minimum tensile strength of 7000 PSI.

2. All PVC manifolds shall be Schedule 40. Schedule 40 material shall comply with ASTM D1784, D1785 and D2466.
3. Add a minimum of 1-1/2 parts by weight of titanium dioxide per 100 parts of resin to PVC compounds for air distribution headers, diffuser element holders and retainer rings to minimize ultraviolet light degradation.
4. Factory solvent weld all PVC joints. No field solvent welding will be permitted.
5. Air distributors shall be minimum SDR 33.5 in accordance with ASTM D-3034.

C. Diffuser Membrane Materials and Fabrication
1. The circular diffuser membrane discs shall be manufactured of EPDM synthetic rubber compound with precision die formed slits. Thermoplastic materials such as plasticized PVC or polyurethane will not be acceptable.
2. Diffuser membrane shall be a one-piece compression molded part with a nominal diameter of 9 inches.
3. The EPDM rubber compound shall have the following minimum characteristics:

	Value/Units	ASTM
Nominal Diameter	9”	
Material Thickness	0.080”	
Durometer, Shore A:	58 Point	D2240
Tensile Strength:	1200 PSI	D412
Elongation:	500%	D412
Specific Gravity	1.25 or Less	
Base Polymer:	EPDM	
UV Resistance:	Carbon Black	
Elongation:		
- Retained, 70hrs @100°C	75% max	D573
- Minimum @ Break	350%	D412

4. Diffuser membranes shall provide uniform distribution of air bubble release across the active surface of the diffuser element when submerged in water.
5. Diffuser membranes shall be manufactured with integral sealing gasket.
6. Diffuser membranes shall meet or exceed the following criteria:
   a. Membrane shall collapse and seal when aeration system air is turned off.
   b. Membrane shall collapse onto support disc when air is not being diffused.
7. The membrane shall be molded to the shape of the support disc. The membrane shall be molded with an integral O-ring. The membrane shall be retained on the support disc by means of a screw-on retainer ring with a positive O-ring seat. The retainer ring shall hold the diffuser membrane and membrane support plate securely in the diffuser element holder. A minimum of 2-1/2 complete turns for engagement shall be provided. Threads shall have a minimum cross section of 1/8 inch.

D. Aeration Piping System Equipment and Components
1. The existing stainless steel drop pipe shall remain to a point three-feet six-inches above the manifold; from this point a PVC drop pipe shall be utilized.

2. The PVC drop pipe shall be connected to the stainless steel drop pipe with a stainless steel band clamp or coupling, and shall be of Type 304 stainless steel construction. The band clamp shall have a single, full circle, tapered neoprene inner gasket which is capable of operating at temperatures up to 275 degrees F. The stainless steel drop pipe shall not under any conditions apply a vertical load to the PVC drop pipe.
3. PVC manifolds shall be provided. Manifold size shall be as shown on the Drawings at a minimum, or larger if required by the manufacturer. The manifold shall be supported with a minimum of two stainless steel supports. The maximum spacing between supports shall not exceed 8 feet. The manifold, connections and supports shall be designed to resist thrust generated by expansion and contraction of the air distribution headers. The manifolds, connections and supports shall resist all uplift forces due to buoyancy. The manifolds shall be designed for long term exposure to 130 degrees F mean-wall temperatures. The manifolds shall be fabricated with a fixed joint connection to each air distribution header.
4. Air distribution headers shall be provided (minimum 3-inches).
    a. Sections of distribution headers shall be joined with positive fixed threaded union or flange type joints to prevent blow apart. All underwater joints shall be positive locking type. Push on or bell in spigot type joints will not be acceptable.
    b. Distribution headers shall be fabricated with diffuser element holders factory solvent welded to the crown of the header. The attachment of diffuser element holders to distribution headers shall be designed to resist a dead load of 200 lbs. applied vertically to the outer most edge of the diffuser holder.
        i. Mechanical mounting saddle attachment may also be used to mount the disc holder assembly onto the lateral.
    c. Each section of distribution header shall be supported with a minimum of two supports having a maximum spacing of seven and half feet. Distribution header supports, or guides, shall allow longitudinal movement of the header section to prevent stress build-up in the header due to thermal expansion/contraction forces.
    d. The minimum header spacing shall not be less than 1.0 ft and the maximum header spacing shall not be greater than 6.0 ft.

E. Diffuser Assemblies
1. Diffuser assemblies shall consist of a diffuser membrane, diffuser element holder, membrane retaining device.
2. The membrane support disc shall be manufactured of PVC or Glass-Filled Polypropylene.
3. PVC diffuser element holders shall be provided with either an air plenum chamber or a pipe saddle below the membrane support disc. Provide a mechanism to attach the diffuser to the holder.
    a. The element holders shall provide complete support for the membrane support disc.

b. The element holders shall be solvent welded or threaded to the distribution headers in the factory to resist dead load of 200 lbs. applied vertically to the outer edge of the diffuser unit.
   i. Mechanical mounting saddle attachment may also be used to mount the disc holder assembly onto the lateral. Saddle mounted diffusers may be installed in the field.

4. The membrane retaining device shall securely hold and seal the diffuser membrane to the membrane support disc and/or the diffuser element holder.
   a. The diffuser assembly and membrane retaining device shall be designed to prevent air escape at the diffuser membrane-retaining device interface.
   b. A method to vary the applied sealing force between the sealing gasket and diffuser membrane shall be provided. The retaining device shall generate a minimum of 50 pounds per inch of circumference of the retaining device to provide a long term positive seal and prevent air escape except through the active area of the diffuser membrane.

F. Supports
   1. Manifold supports shall include manifold hold-down, guide straps, anchor bolts and supporting structure. Guide straps shall be a minimum of 0.5-inches wide. Manifold supports shall have a mechanism to provide for plus or minus 2-inches vertical adjustment for alignment of the manifold in the field. Supports shall be designed to allow for complete removal from the tank (less anchor bolt) to facilitate cleaning and maintenance of tank bottom.
   2. Air Distribution Header Supports
      a. Stainless steel or glass-filled polypropylene air distribution header supports of both guide and fixed type shall be provided to allow for expansion of the system. Supports shall be designed to allow for complete removal from the tank (less anchor bolt) to facilitate cleaning and maintenance of tank bottom.
      b. Guide supports shall consist of a self-limiting hold down and sliding mechanism. Hold down and sliding mechanism shall provide a full circumferential 1-1/2-inches wide contoured bearing surface with chamfered leading edges to minimize binding of the air distribution header. Sliding mechanism shall provide minimum resistance to movement of the air distribution header under full buoyant up-lift load. Mechanism shall provide 1/8-inch clearance around header and be self-limiting if the mechanism is overtightened.
      c. Fixed supports shall consist of a hold down mechanism and self-limiting clamp device. Hold down mechanism and clamp shall provide a full circumferential 1-1/2-inches wide contoured bearing surface for the air distribution header when tight and be self-limiting to prevent overstressing the header if the clamp is overtightened.
      d. Guide and fixed supports shall have a mechanism to provide for plus or minus 2-inches vertical adjustment for alignment of the air distribution headers in the field. Adjusting and aligning mechanism shall be adjustable within its limits to allow precise leveling of the air distribution

headers and diffuser assemblies to within plus or minus 1/4-inch of a common horizontal plane without removing the header from the support.

e. Supports shall be attached to tank floor with stainless steel expansion type anchor bolt(s) designed for embedment in concrete. Anchor bolts shall be designed with pull-out strength, design safety factor of 10 or more.

G. Header and Manifold Pipe Joints

1. Positive type connection joints bolted, flanged or threaded union type shall be used for all submerged header and manifold joints. All couplings shall be easily removable to permit replacement.
2. Threaded union joints shall consist of a spigot section solvent welded to one end of a distribution header, a threaded socket section solvent welded to the mating distribution header, an "O" ring gasket and a threaded screw on retainer ring. Solvent welding shall be done in the factory. Flanged joints shall be of follower type with stainless steel hardware and shall have standard 125 lb. drilling.

H. Drainline, Sump and Airlift Purge System

1. Each aeration grid shall have one PVC drainline, sump, airlift purge eductor line and eductor carrier column to drain the entire submerged aeration piping system for the grid.
2. Each manifold shall have an integral drainline terminating at a sump. The sump bottom elevation shall be lower than the invert of the air distribution headers and drainline.
3. The drainline shall be connected to a one-inch airlift eductor line extending from the drainline invert elevation to a point 36-inches above the top of wall elevation of the tank and terminating with a PVC ball valve. The eductor line shall be contained in a PVC carrier pipe.
4. Wall brackets and anchoring components shall be stainless steel.

I. Test Pressure Taps

1. A standard NPT 1/4-inch male threaded test pressure tap with a threaded cap shall be installed by Owner on all of the stainless steel dropleg sections downstream of the isolation valves (12” downstream) for the purpose of field testing.
2. The pressure tap locations shall be within arms reach from the basin walkway.

J. Butterfly Valves for Air Service

1. Each valve operator shall be marked with an arrow and the words "OPEN" and “CLOSED”. Each valve shall have position graduations equally spaced between “OPEN” and “CLOSED” position.
2. All valves shall be carefully erected in their respective positions, free from all distortion and strain, and shall be packed and left in satisfactory operating condition.
3. All valves shall be complete with operators as specified herein. Valves shall be tested and coated as specified.
4. Valves shall be of the lug body type. Lugs shall be cast solid and faced accurately at right angles to the axis of the casting. Lug shall be faced, drilled, tapped and shop coated with a rust-preventive compound before shipment.

5. Dimensions and drillings of lugs shall be designed to meet the requirements of ANSI B16.1 Class 125 flanges. The pressure-temperature ratings shall exceed the specified test pressure of the pipeline in which the valve is installed and shall not be less than Class 125. Special drillings shall be provided where required.
6. The maximum force required to operate all manual valves, levers and handwheels shall be 40 pounds. The overall length of each wrench or single-arm lever shall not exceed 18 inches.
7. Valve Materials (for valves installed in applications where the maximum temperature shall not exceed 250 degrees F).
    a. Butterfly valves shall be 125 psi gas pressure rated with resilient seats giving bubble-tight shutoff at temperatures up to 250 degrees F.
    b. The valve body shall be cast iron meeting the requirements of ASTM A126 Class B. The disc shall be of electroless nickel coated cast iron.
    c. Valve shall have a 416 stainless steel stem, self-lubricating bronze bearings at both ends, and Nordel seats.
8. Valve Materials (for valves installed in applications where the maximum temperature is expected to exceed 250 degrees F).
    a. Butterfly valves shall be 125 psi gas pressure rated with a 316 stainless steel seat giving Class IV shutoff at temperatures up to 700 degrees F.
    b. The valve body shall be 316 stainless steel. The disc shall be of 316 stainless steel, plated and heat treated.
    c. Valve shall have a 17-4 PH stainless steel stem, nickel stainless steel bearings at both ends, and 316 stainless steel seats.
9. Valves shall be designed to fit between two ANSI B16.1 150-pound steel or cast iron flanges.
10. Manually operated valves located five feet or more above the operating floor shall have chains and chainwheel operators. Provide suitable hooks fastened to wall or other parts of the structure on which chains may be hung when not in use.
11. Butterfly valves six inches and smaller shall be provided with a ten-position lever operator, unless specified otherwise. Butterfly valves greater than six inches shall be provided with a ten-position handwheel operator, unless specified otherwise.

2.3 SOURCE QUALITY CONTROL

A. General
    1. The diffused aeration equipment shall be capable of meeting the performance required specified herein.
B. Factory Oxygen Transfer Performance Test
    1. A clean water oxygen Transfer test shall be performed to verify the Standard Oxygen Transfer Rate (SOTR) of the aeration equipment. The SOTR of the diffused aeration equipment at specified air flow conditions shall equal or exceed the SOTR specified herein.
    2. All oxygen transfer tests used as a basis for verification of the diffused aeration equipment performance shall be done by nonsteady-state reaeration. An oxygen transfer test shall consist of three reaeration test runs. The SOTR

for each airflow condition shall be the average of the SOTR's obtained for each reaeration test run. Sodium sulfite catalyzed by cobalt shall be used to strip residual dissolved oxygen between reaeration test runs.

3. All oxygen Transfer performance testing shall be conducted in test facilities provided by the manufacturer and subject to the approval of the Engineer. The test facility shall be capable of providing the sidewater depth and diffuser submergence specified. The test aeration tank shall be rectangular with a minimum surface area of 200 square feet. Air headers shall be placed in the test tank in the same manner as will be used in the final installation. The spacing of diffusers shall be as proposed by the manufacturer for the diffused aeration equipment layout. The airflow rate, scfm/1,000 cubic feet of tank volume, shall equal the specified airflow rate divided by the zone volume.
4. The testing procedures to be used in determining the oxygen transfer capacity of the diffused aeration equipment shall be as described in the latest edition of the ASCE Standard for the Measurement of Oxygen Transfer in Clean Water. A theta value of 1.024 shall be used.

2.4 SPARE PARTS

A. In accordance with the requirements of Section 11000.
B. Provide the following spare parts:
   1. 50 membranes wrapped and sealed for protection from any environmental degradation during storage.
   2. 50 Plugs for sealing off diffuser ports.
   3. Any special tools required for maintenance of the equipment

PART 3 - EXECUTION

3.1 EXAMINATION, PREPARATION AND INSTALLATION

A. In accordance with the requirements of Section 11000 and the manufacturer’s written instructions.
B. The aeration system shall be installed, cleaned and tested for air tightness in strict accordance with the manufacturer's written instructions.
C. The aeration system shall be packaged in a manner that the diffusers and aeration piping are kept clean during storage and transit.
D. Before the installation of diffuser headers, the air main drop leg and manifold pipe shall be hydraulically cleaned of all debris. Before the diffusers are installed, the diffuser headers shall be hydraulically cleaned of all debris and then all water purged from the air piping with air.
E. The Owner shall pressure test all the air piping to ensure an air-tight system.
F. All the piping shall be straight and true.
G. Until the tanks are filled, all necessary measures shall be taken to ensure that the aeration system is not damaged. Once the system is ready for operation, the Owner shall be responsible for filling the tanks with clean water for acceptance testing, as outlined in the following section.
H. After installation, but before operational demonstration testing, check that all diffusers are level and installed at the same elevation (plus or minus 1/4”) by filling the tank with clean water to the top of the diffusers. Inspect all of the grids and

adjust as required.

I. The tanks shall not be filled with wastewater until the Engineer receives the manufacturer's certification that the complete system was installed, tested and adjusted in accordance with the manufacturer's written instructions, and that the system is ready for operation.

3.2 STARTUP, TESTING AND TRAINING

A. In accordance with Specification Sections 01800 and 11000, and including both classroom and "hands on" training in the operation and maintenance of the systems.

B. After installation and check out of the blower and air supply system, but before filling the basins with wastewater, fill the tanks with clean plant water to 1-foot over the diffusers and check for air leaks and uniform distribution of the air flow over the basins and correct any deficiencies.

C. Once the tanks are filled to the normal operating depth, the Owner will be required to demonstrate that the system will operate as specified. The system will be initially operated at maximum air flow rate and pressure for five (5) days. After this initial operation subsequent testing will include, but will not be limited to, demonstrating uniform air distribution over the range of air flows specified, and demonstrating the ability of the system to purge itself of all water after the air supply is shutoff for a period of 4-hours. The pressure at the top of the dropleg shall be measured at the minimum and maximum airflow rates specified. Pressure gauge shall have a 0 to 15 psi range, 0.25 percent accuracy, with readings to at least 100ths. The pressure variation between each dropleg, at the same airflow rate, shall not exceed 0.4 psi. Should any portion of the system fail to meet the requirements specified, then the Owner shall make any and all necessary modifications such that the system does meet the requirement of this Specification. Where new blower systems are installed as part of the project, the start-up of the blower system must be completed, and the blower system must be completely operational prior to start-up of the aeration system.

END OF SECTION

ATTACHMENT B
Conceptual Layout

Disclaimer: Sketches are included to show conceptual layout only and are not inclusive of all modifications that the Town of Montague Clean Water Facility may be implementing.

AERATION TANK DEMOLITION

SCALE: "SCANNED"
(APPROXIMATELY: 1/4"=1'-0")

1 SECTION

SCALE: "SCANNED"
APPROX: 1/4"= 1'-0"

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PROJECT NO: C3500
DESIGNED:
CAD COORD:
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APPROVED:
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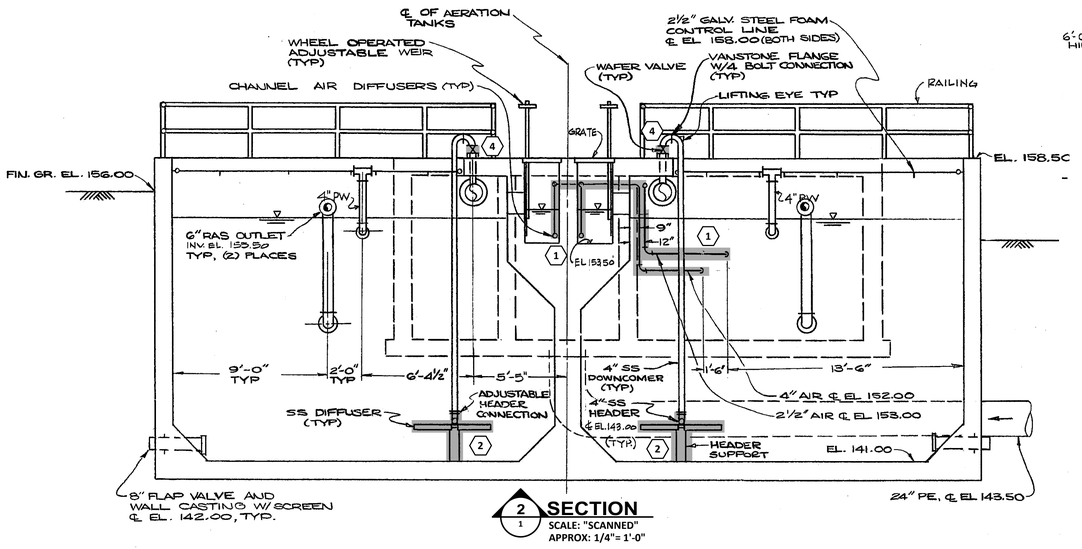
THE TOWN OF MONTAGUE, MASSACHUSETTS
CLEAN WATER FACILITY
AERATION SYSTEM DIFFUSER UPGRADE

AERATION BLOWER UPGRADE DEMOLITION PLAN

DRAWING
1



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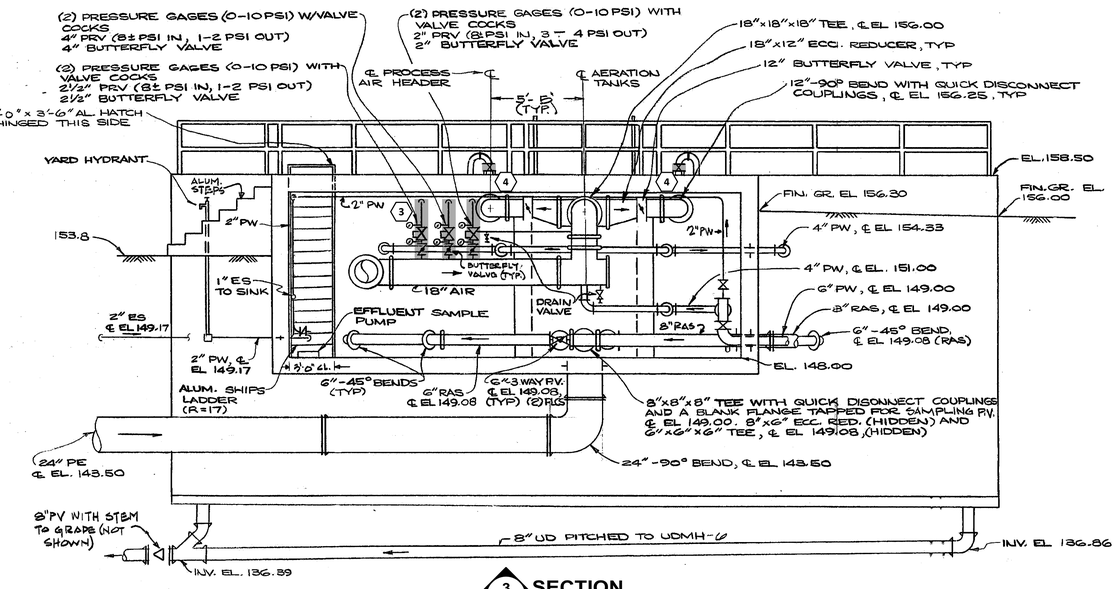


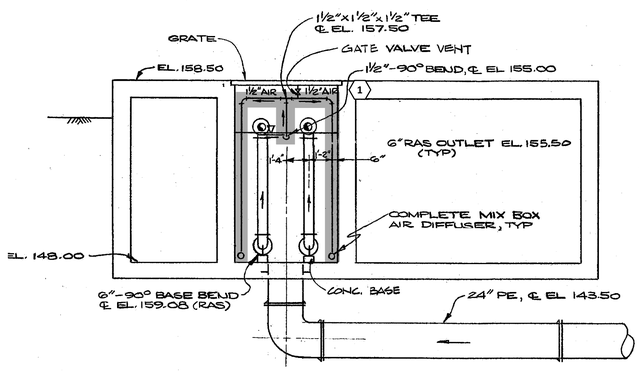
3 1 **SECTION**
SCALE: "SCANNED"
APPROX: 1/4"= 1'-0"

DEMOLITION NOTES:

1. OWNER TO REMOVE/DEMOLISH EXISTING AIR DIFFUSERS AND AIR PIPING IN THE INFLUENT AND EFFLUENT CHANNELS INCLUDING BUT NOT LIMITED TO VERTICAL DROP LEGS, SUPPORTS, VALVES AND ALL ASSOCIATED APPURTENANCES TO EXTENTS SHOWN ON DEMOLITION DRAWINGS.
2. OWNER TO REMOVE/DEMOLISH EXISTING AIR DIFFUSERS AND AIR PIPING IN THE AERATION TANKS INCLUDING BUT NOT LIMITED TO ADJUSTABLE CONNECTION, 4" SS HEADER, SS DIFFUSERS, AND SUPPORTS.
3. OWNER TO DEMOLISH SECONDARY AIR PIPES TO THEIR CONNECTION WITH 18" AIR PIPE. INCLUDING ALL OTHER ASSOCIATED APPURTENANCES. OWNER TO CAP REMAINING STUBS.
4. OWNER TO REMOVE/DEMOLISH EXISTING 4" WAFER VALES AT DROPLEG TO HEADER CONNECTION.

NOTES:

1. OWNER TO NOTE A SCANNED IMAGE OF THE EXISTING CONTRACT DRAWINGS HAS BEEN USED FOR THE AERATION TANK DEMOLITION. OWNER IS RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO SHOP DRAWING APPROVAL AND/OR COMMENCING CONSTRUCTION.



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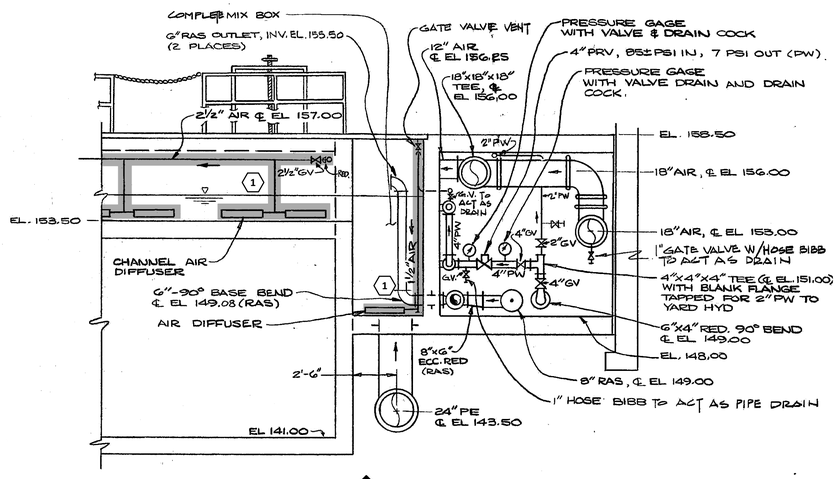

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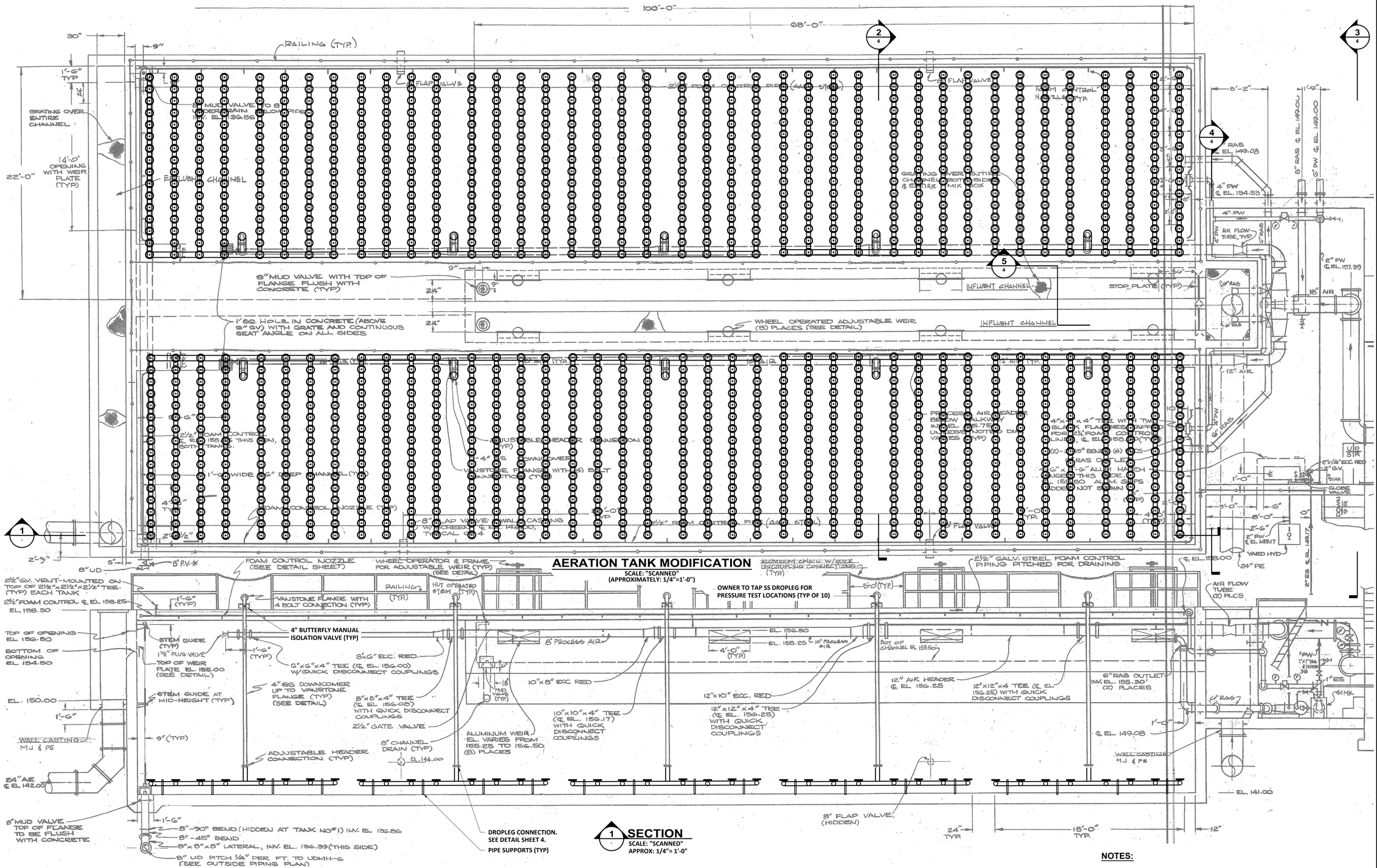
AERATION BLOWER UPGRADE DEMOLITION SECTIONS

DRAWING
2



NOTES:

1. OWNER TO NOTE A SCANNED IMAGE OF THE EXISTING CONTRACT DRAWINGS HAS BEEN USED FOR THE AERATION TANK MODIFICATION. OWNER IS RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO SHOP DRAWING APPROVAL AND/OR COMMENCING CONSTRUCTION.
2. COMPLETE AERATION SYSTEM NOT SHOWN FOR CLARITY. COORDINATE NUMBER OF DIFFUSERS, PIPE LATERALS, SUPPORTS, AND LOCATIONS WITH EQUIPMENT MANUFACTURER.

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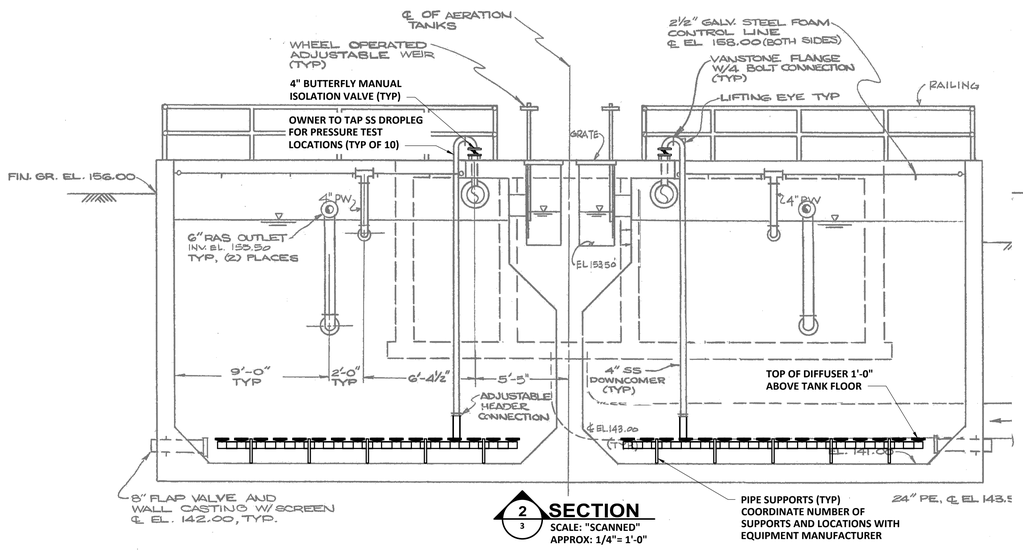
AERATION BLOWER UPGRADE MODIFICATION PLAN

DRAWING
3



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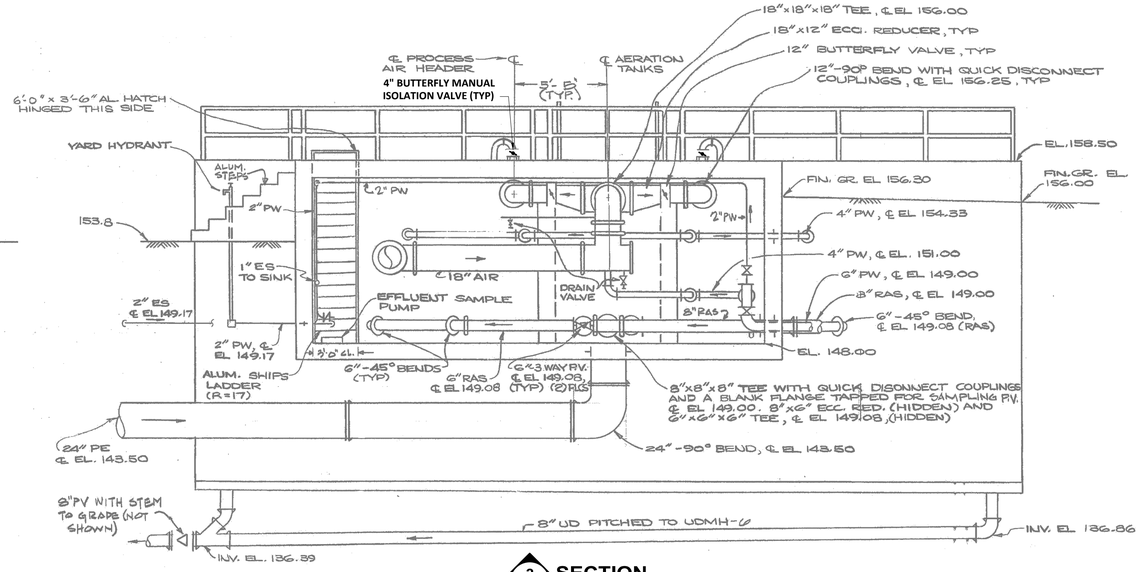

3/3 SECTION
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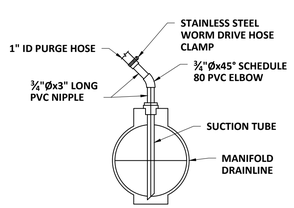
APPROX: 1/4"= 1'-0"

NOTES:

1. OWNER TO NOTE A SCANNED IMAGE OF THE EXISTING CONTRACT DRAWINGS HAS BEEN USED FOR THE AERATION TANK MODIFICATION. OWNER IS RESPONSIBLE FOR VERIFYING ALL EXISTING CONDITIONS PRIOR TO SHOP DRAWING SUBMITTAL APPROVAL AND/OR COMMENCING CONSTRUCTION.
2. COMPLETE AERATION SYSTEM NOT SHOWN FOR CLARITY. COORDINATE NUMBER OF DIFFUSERS, PIPE LATERALS, SUPPORTS, AND LOCATIONS WITH EQUIPMENT MANUFACTURER.
3. COORDINATE PIPE SUPPORT LOCATIONS WITH AERATION SYSTEM SUPPLIER. SUPPORTS SHOWN ARE FOR CLARITY ONLY AND DO NOT PURPORT TO REPRESENT ALL REQUIRED SUPPORTS. SUPPLIER SHALL PROVIDE ALL NECESSARY PIPE SUPPORTS.
4. PROVIDE SUPPORTS AS REQUIRED BY THE MANUFACTURER. REFER TO DETAILS ON THIS SHEET FOR TYPICAL SUPPORT INFORMATION.
5. INSTALL FIVE MANUAL WATER PURGE ASSEMBLIES IN EACH AERATION TANK. LOCATIONS SHALL BE AS SELECTED BY THE DIFFUSER MANUFACTURER.



PURGE SUMP
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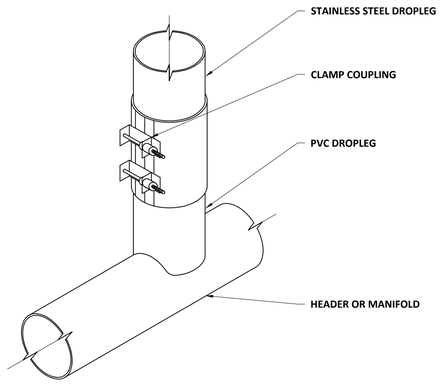

DROPLEG TO HEADER CONNECTION
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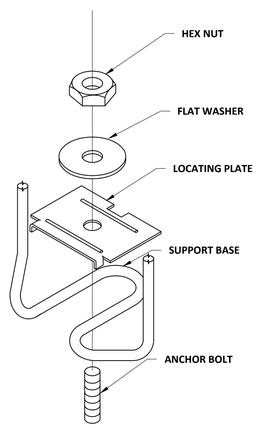

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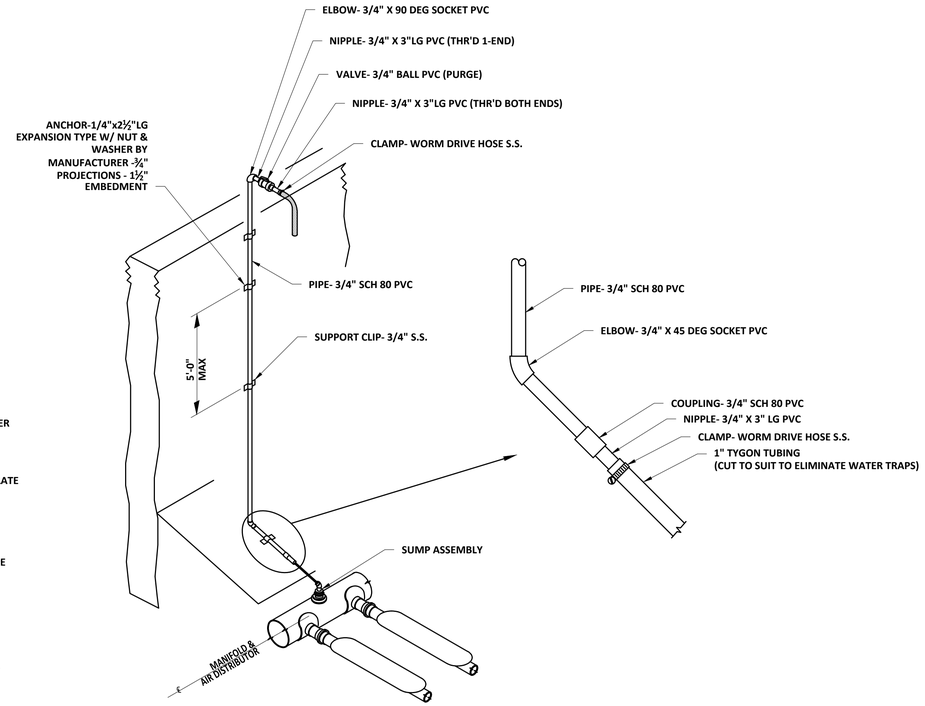

MANUAL WATER PURGE DETAIL
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DRAWING
4