REQUEST FOR PROPOSALS
(RFP)

For

City of Erin
Water Treatment Plant Equipment

FILTER EQUIPMENT PACKAGE

Prepared By:

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RFP Sections

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Section 1. - RFP Description

1. The scope of this request for proposals (RFP) consists of supplying the City of Erin (OWNER) with a proposal to supply water treatment plant equipment based upon OWNER provided water treatment plant specifications and deliverables. The type, size, dimensions, capacity, power requirements, life expectancy, operation, maintenance schedule and warranty of each piece of equipment shall be listed in the equipment proposal form. Perspective PROPOSER'S must submit a complete proposal that includes all of the equipment listed in the attached equipment proposal form as well as all other RFP requested information. Alternatively, perspective PROPOSER'S may submit an alternative list of equipment based on an alternate water treatment plant design with the condition that cost, space and energy requirements and time required to supply the OWNER with an alternative water treatment plant design be included with the proposal package.

2. The City of Erin will receive proposals for packaged filter system and equipment on or before **August 1, 2025,** until **2:00 P.M.**, **at the City of Erin, 15 Hill Street, Erin, TN 37061**, at which time and place all proposals will be collected and retained by the Engineer for scoring.

3. The items for which proposals are being requested generally consist of a package water filtration system necessary for the construction of a 1 MGD addition to the existing WTP.

4. Summary

   A. The SUPPLIER shall furnish, provide support for and assist in the placement into satisfactory operating condition package water filtration equipment and appurtenances as described in the specifications.

   B. It is the intent of these Specifications that all equipment called for under this Section shall be supplied by a single manufacturer.

   C. Related Sections

      1. General Conditions, Supplementary Conditions, and General Requirements sections apply to work of this Section.

5. Reference Standards

   A. NSF Standard 61 – Drinking Water Systems Components - Health Effects
   B. American Iron and Steel Institute (AISI) - Material Specifications
   C. American Institute of Steel Construction (AISC) - Guidelines for the Design of Steel Structures
   D. American Society for Testing and Materials (ASTM) - Stainless Steel Material Specifications
   E. American Welding Society (AWS)

6. Submittals

   The System Supplier shall provide product data, drawings and calculations as follows:

   1. Design and layout of equipment indicating all dimensions.
   2. Head loss calculation through the treatment equipment at maximum and design flow.
   3. Complete submittal drawings of all equipment furnished.
   4. Connection locations and support attachment details.
   5. Supplier's literature and cut sheets for all equipment.
   6. Weights for major components and materials of construction
   7. Provide equipment certification by NSF to ANSI Standard 61. To ensure public safety, only certificates issued by NSF are acceptable. Seals or certifications by any agency other than NSF are not acceptable.
   8. Statement indicating terms of the warranties.
   9. Operation & Maintenance Manuals

7. General System Description

   A. The proposed project is for a total of 1.0 MGD of treatment capacity. Based on the specified unit and current configuration, this would consist of 1 – Model 1/2HS-14oo STR treatment train or approved equal. Specifications for the specific treatment equipment are provided as an attachment to this document. The proposed units will be feed settled water from a conventional settling basin.

   B. Raw Water Characteristics Prior to Flocculation:

1.	Temperature, Fahrenheit	33-80
2.	Turbidity, NTU	2-300
3.	pH	6.0 to 9.0

8. No proposals may be withdrawn after the opening of the proposals for a period of sixty (60) days to allow for the review of proposals. The successful PROPOSER may not withdraw his proposal for a period of four hundred (400) days to allow for completion of necessary design, permitting and financial arrangements.

9. The PROPOSER shall be responsible for coordinating delivery schedules with the successful general contractor throughout the construction period.

10. The City of Erin (OWNER) reserves the right to reject any and all proposals and to waive any irregularities and informalities in proposals.

Section 2. - RFP Communications

1. Any verbal communications shall be considered unofficial and non-binding with regard to this RFP.

2. Interested parties must direct all communications regarding this RFP to the following RFP Coordinator, who is the City of Erin's only official point of contact for this RFP.

   James C. Hailey & Company
   Attn: Matthew Tucker, P.E., RFP Coordinator
   360 Cool Springs Boulevard, Suite 100
   Franklin, TN 37067-7216
   Telephone: 615-883-4933
   Email: mtucker@jchengr.com

3. Each PROPOSER shall assume the risk of the method of dispatching any communication or proposal to the OWNER. The OWNER assumes no responsibility for delays or delivery failures resulting from the method of dispatch. Actual or electronic "postmarking" of a communication or proposal to the OWNER by a deadline date shall not substitute for actual receipt of a communication or proposal by the OWNER.

4. The RFP coordinator must receive all written comments, including questions and requests for clarification, no later than the written comments deadline detailed in the RFP schedule of events.

5. The OWNER reserves the right to determine, at its sole discretion, the appropriate and adequate responses to written comments, questions, and requests for clarification. The OWNER'S official responses and other communications pursuant to this RFP shall constitute an amendment of this RFP.

6. The OWNER will convey all official responses and communications pursuant to this RFP to the potential PROPOSER'S from whom the OWNER has received a notice of intent to propose.

7. Only the OWNER'S official, written responses shall be considered binding with regard to this RFP.

8. The OWNER reserves the right to determine at its sole discretion, the method of conveying official responses and communications pursuant to this RFP (e.g., written facsimile, electronic mail, or internet posting).

9. The successful equipment PROPOSER(S) will be issued a P.O. for the equipment upon approval by the OWNER. Upon approval by the OWNER, the successful PROPOSER shall coordinate with the RFP COORDINATOR and the OWNER for scheduling and deliverables.

10. The Successful equipment PROPOSER will coordinate with the OWNER and RFP COORDINATOR to coordinate the delivery and start-up of the selected equipment. The OWNER intends to pre-purchase the equipment and delivery and installation shall be assumed by the successful general contractor. The PROPOSER is required to be prepared for this coordination and shall work with the OWNER and successful general contractor for the installation and start-up of the proposed equipment.

11. Bonding is not required for the proposal packages.

Section 3. - RFP Proposal Requirements

1. The OWNER reserves the unilateral right to amend this RFP in writing at any time. If an RFP amendment is issued, the OWNER will convey such amendment to the potential PROPOSER who submitted a notice of intent to propose. Each proposal must respond to the final written RFP and any such exhibits, attachments, and amendments. City of Erin reserves the right, at its sole discretion, to cancel and reissue this RFP or to cancel this RFP in its entirety at any time.

2. A PROPOSER shall not restrict the rights of the OWNER or otherwise qualify a proposal. The OWNER may determine such a proposal to be a non-responsive counteroffer, and the proposal may be rejected.

3. A PROPOSER shall not submit the PROPOSER'S own contract terms and conditions in response to this RFP. If a proposal contains such terms and conditions, the OWNER may determine, at its sole discretion, the proposal to be a non-responsive counteroffer, and the proposal may be rejected.

4. A PROPOSER shall not submit more than one proposal or multiple proposals in different forms. Submitting more than one proposal shall result in the disqualification of the PROPOSER.

5. If the OWNER determines that a PROPOSER has provided for consideration in the RFP process or subsequent contract award execution incorrect information that the PROPOSER knew or should have known was materially incorrect, that proposal shall be determined non-responsive and shall be rejected.

6. The PROPOSER awarded a contract pursuant to this RFP shall not subcontract, transfer, or assign any portion of the contract without the OWNER'S prior written approval.

7. A submitted proposal may be withdrawn at any time up to the proposal deadline time and date detailed in the RFP schedule of events. To do so, a PROPOSER shall submit a written request, signed by a PROPOSER'S authorized representative to withdraw a proposal.

8. Each PROPOSER is liable for all proposal errors or omissions. A PROPOSER shall not be allowed to alter or amend proposal documents after the proposal deadline time and date detailed in the RFP schedule of events unless such is formally requested in writing by the OWNER.

9. Each PROPOSER shall submit a proposal in response to this RFP with the most favorable terms that the PROPOSER can offer. There will be no best and final offer procedure.

10. Proposals shall include the completed proposal package cover attachment, which is to be affixed to the outside of the proposal package.

11. The RFP coordinator must receive all proposals in response to this RFP, at the following address, no later than the proposal deadline time and date detailed in the RFP schedule of events:

    Attn: Matthew Tucker, P.E., RFP Coordinator
    City of Erin
    15 Hill Street
    Erin, TN 37061

12. A PROPOSER shall not deliver a proposal orally or by any means of electronic transmission.

13. Each PROPOSER shall use the RFP proposal evaluation form to organize, reference, and draft the proposal. PROPOSER may use the RFP proposal evaluation form as a table of contents covering the proposal.

Section 4. - RFP Deliverables

1. Submission of the following items is the minimum requirement for a proposal submittal to be considered complete. Incomplete submittals will not be considered.

2. Listing of and data submittals for all major equipment components and appurtenances to be supplied. Data submittals must clearly show the size, model, type, mounting, electrical wiring diagrams, structural, etc., necessary to easily evaluate the equipment. Standard charts, graphs, table, etc., may be used but must be highlighted to show the specific unit being proposed. In addition to the major equipment components, PROPOSER must also provide details as to what parts, pieces, bolts, fasteners, flanges, etc. will be included as part of the proposal. Included spare parts shall also be listed. If the equipment proposed will require additional or special physical, structural, or electrical provisions, the PROPOSER shall submit drawings which illustrate the special requirements.

3. Listing of at least three (3) similarly-sized installation references including the name, address and telephone number of the Operator. Please be advised that contact may be made with the references in the evaluation of proposals. Include the effluent limits of each reference.

4. Maintenance and service recommended (weekly, monthly, annually) for all mechanical components.

5. Description of the manufacturer's service capability, manpower, experience and response time relative to the following:

    A) Startup – both mechanical and process technical support. Identify the number of trips and days provided for startup and training.

    B) Warranty support.

6. Present day cost information for the following:

A) All equipment and appurtenances included as part of the proposal's proposal price. The formula for scoring is preset as follows: *Lowest number (y) gets maximum points, all other numbers (n) get prorated points as follows: (y/n)*max points = points value*.

B) All mechanical equipment subject to replacement (motor drives, diffusers, actuated valves, bearings, pumps, etc.) with a service life less than 20 years. Include the cost and expected service life for these items.

C) Detailed information on the availability of replacement parts listed in

7. After "Award of Contract/Notice of Award" submit shop drawing files that provide detailed site-specific drawings of all equipment included as part of the proposal price. Drawing files shall be provided in latest version of AutoCAD drawing format (.dwg), or MicroStation (.dgn).

8. The PROPOSER shall review all design development plans and specifications in detail and provide comments and questions to coordinate the incorporation of their equipment into the plans and shall make sure it is clear what is being provided by the PROPOSER and General Contractor.

9. The PROPOSER shall review all construction drawings and specifications and provide comments and recommendations prior to advertisement for proposals for final coordination. This shall include a complete review of equipment/facility dimensions.

Section 5. - RFP Proposal Deadline

1. The proposal submission deadline time and date is on or before **August 1, 2025,** until **2:00 P.M.** PROPOSER'S shall respond to the written RFP instructions and any RFP exhibits, attachments, and amendments. Late proposals will not be accepted, and a PROPOSER'S failure to submit a proposal before the deadline shall cause the proposal to be disqualified.

Section 6. - RFP Schedule of Events

1. The OWNER reserves the right, at its sole discretion, to adjust the schedule, as it deems necessary. The OWNER will communicate any adjustment to the schedule of events to the potential PROPOSER'S from whom the OWNER has received a notice of intent to propose.

2. This project is on an expedited schedule and submittals shall be provided for review and approval within 6 weeks of signed purchase order and contract execution. Equipment delivery shall be within 24 weeks with equipment ready to ship by February 2026.

Section 7. – RFP Proposal Evaluation

1. The OWNER will consider the categories listed in the proposal evaluation form. The maximum points that may be awarded for each of these categories are detailed below.

2. Each category is weighted as follows, one hundred (100) points is the maximum total number of points that may be awarded to a proposal:

Categories	Maximum Points Possible
a. Equipment Manufacturer Experience	10 points
b. Equipment O&M Requirements	10 points
c. Owner Familiarity	20 points
d. Equipment References	10 points
e. Equipment Cost	50 points

Basis for Category Evaluation

a. Equipment Manufacturer Experience: Number of years and quantity of current operating installations in USA and Tennessee.
b. Equipment O&M Requirements: The number of personnel required to operate equipment and annual maintenance costs.
c. Owner Familiarity: The OWNER'S experience with the equipment and/or concept of the PROPOSER.
d. Equipment References: The quantity and relativity of the equipment references.
e. Equipment Cost: The total cost to the OWNER for the purchase and on-site delivery of the equipment. Proposal price will form the basis for evaluation and the formula for scoring is preset as follows: *Lowest number (y) gets maximum points, all other numbers (n) get prorated points as follows: (y/n)*max points = points value*. This proposal price is the price that will be required to be held for four hundred (400) days.

3. The proposal evaluation process is designed to award the contract to the qualified proposal having the highest total score.

4. A proposal evaluation team made up of three (3) individuals will evaluate and score each proposal based upon the evaluation form categories. The final PROPOSER'S scores will be based on the average score for each category. The final score for each category will be calculated by summing the scores of all three (3) evaluators for each category and dividing this total by three (3) to obtain the average score for each individual category.

5. Proposals will be evaluated based on the scoring rubric provided in following sections. The proposal price will be adjusted on the bid advertisement date for the prime construction contract using the consumer price index and will be included in the bid documents as an allowance. The selected general contractor will be expected to purchase and install the proposed equipment.

RFP Related Project History Form

1. Name of Project: _____

2. Address of Project: _____

_____

_____

3. Project Contact Person: _____

3. Project Contact Telephone #: _____

4. Location where Equipment was installed: _____

_____

_____

5. Date equipment was installed: _____

PROPOSER'S are to fill out a separate RFP Related Project History Form for each project the PROPOSER wishes to submit to the OWNER for review and consideration. A minimum of three (3) related project history forms are required for the proposal, however the PROPOSER'S may submit as many additional related project history forms as desired.

RFP Proposal Evaluation Form

This form is to be used to evaluate manufacturer's water treatment plant equipment and compare the capabilities and limitations of each manufacturer's equipment.

CATEGORY	*Points	Weight (%)	Item Total (Points x %)
1. Equipment Manufacturer Experience		10%	
2. Equipment O&M Requirements		10%	
3. Owner Familiarity		20%	
4. Equipment References		10%	
5. Equipment Cost		50%	
Total Score			

Attachments

ADVERTISEMENT FOR BIDS

The City of Erin will receive proposals for filter equipment on or before **August 1, 2025,** until **2:00 P.M.**, at **City of Erin, City Hall, 15 Hill Street, Erin, TN 37061**, at which time and place all proposals will be collected and retained by the Engineer for scoring.

The work to be proposed on is as follows:

> **WTP equipment** – supply settling and filter equipment necessary for the construction of a 1.0 MGD WTP addition in accordance with Request for Proposals.

The PROPOSAL PACKET may be examined electronically at www.jchengr.com or at the addresses below:

> James C. Hailey & Company, 360 Cool Springs Blvd., Suite 100, Franklin, TN 37067-7216
>
> City of Erin, 15 Hill Street, Erin, TN 37061

PROPOSAL PACKETS may be obtained by contacting JAMES C. HAILEY & COMPANY at 615-883-4933.

No bid may be withdrawn within 60 days after the scheduled time for receipt of bids.

July 2025

City of Erin
By: Paul Bailey - Mayor

Package Water Treatment System - Specification

Part 1 – General

1.1 Quality Assurance

A. This specification covers the furnishing of WesTech Engineering, LLC, water treatment equipment as Base Bid. The equipment and material specified is deemed most suitable for the proposed water treatment system. The contractor shall prepare his bid on the basis of the materials and equipment listed herein. Alternative equipment submitted for consideration will be reviewed per the proposal criteria and will be scored for consideration. The contract will be awarded for this equipment based on the evaluation of the submitted proposals. Alternative equipment submittals shall include all information and will be required to met the same design criteria.

B. The Equipment shall be: Microfloc™ products Trident HS Model ½HS-1400 STR Water Treatment System as manufactured by WesTech Engineering, LLC or approved Equal.

C. The Trident HS is a pre-engineered system consisting of a pretreatment and filtration system contained in a single shippable tank. The internal components and all ancillaries shall be shipped loose for field installation by the Contractor.

D. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install and test (if applicable) the treatment, and shall furnish and install all piping and fittings, all valve pneumatic (or hydraulic) piping, all wiring and conduit, plus valves not furnished by the plant supplier as shown on the plans, to include couplings, check and isolation valves, and all other manual valves for pneumatic or hydraulic service.

1.2 Alternate Equipment

A. The contractor may submit other manufacturer's equipment for consideration as an alternative to the equipment specified as the Base. To qualify alternate equipment, the supplier shall provide the following information to the Engineer within the submitted proposal documents:

1. Drawings, specifications, and product literature with adequate detail to determine that what is proposed will meet the requirements of the plans and specifications. This design pre-submittal shall be complete and shall include as a minimum, the following:

    a. Detailed Layout Drawings.

    b. Detailed component specifications and catalog cut sheets.

    c. Process Flow Diagram (PFD) Drawing.

    d. Detailed list of variations required from original design, referencing appropriate sections of the specifications and locations on the drawings.

    e. History of the process offered, including pilot data and experience.

    f. Installation list including actual scale-up data from pilot testing to full scale plant operation, also including plant contact names and telephone numbers.

    g. A detailed System Performance Guarantee.

2. A list of ten installations of similar type and size with plant addresses and telephone numbers. The engineer and owner may contact these installation sites to determine experience. The alternate equipment supplier shall also provide a list of total plants. The total number of units installed shall not be less than twenty for experience purposes.

3. Evidence of design capability including a description of facilities, the number and professional qualifications of personnel, and quality control practices. The alternate

equipment supplier shall identify major outside fabricators for the purpose of determining experience.

4. Evidence of technical capability to design and check out the complete alternate system, including modifications which will be required in structures, foundations, and equipment provided by others.

5. Show evidence of being able to provide the quality of equipment and services described in this specification, the equipment supplier shall submit their ANAB-accredited ISO 9001 quality system certification. AIAO-BAR accredited systems are not a recognized equivalent and are therefore specifically prohibited. The quality procedures shall provide for a means of qualifying all sub-vendors and shall specify that the fabrication facility is a critical vendor and shall require inspection. The quality system shall be audited on-site by a third-party independent registrar at least annually. Certification shall remain in effect throughout the project start-up.

6. Evidence of financial responsibility adequate to complete the project and assure viability of equipment warranty.

7. A complete listing of changes which will be required in the contract plans and specifications to accommodate the alternate equipment.

B. Alternate bidders shall guarantee, in writing, signed by an officer of the company that the equipment offered will provide comparable or superior features, performance quality, and materials of construction as the equipment specified. Prior approval of the alternate equipment shall not constitute final approval of specific equipment, but rather constitute only approval of the respective equipment manufacturers to provide price quotations based on equipment meeting the specifications. Alternate equipment manufacturers shall modify their standard products as necessary to meet all provisions of the specifications without exception.

C. If after installation the alternate equipment does not perform in accordance with the specifications or other deficiencies are noted, the owner will require the modification or replacement of such equipment to meet the specifications at no additional expense.

1.3 Work Included

A. The Trident HS is a pre-engineered system consisting of a pretreatment and filtration system contained in a single shippable tank. The internal components and all ancillaries shall be shipped loose for field installation by the contractor.

B. The supplier shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install and test (if applicable) the treatment, and shall furnish and install all piping and fittings, all valve pneumatic (or hydraulic) piping, all wiring and conduit, plus valves not furnished by the plant supplier as shown on the plans, to include couplings, check and isolation valves, and all other manual valves for pneumatic or hydraulic service.

C. The following items are a part of this section and shall be furnished by one manufacturer to ensure a properly designed and integrated water treatment system.

1. Factory built steel modular tank designed with tube settling compartment, up flow Adsorption Clarifier® compartment, and down flow gravity filter compartment with Mixed Media and a direct retention underdrain system.

2. The treatment system shall include chemical treatment, tube sedimentation, Adsorption Clarification, Mixed Media Filtration section with flat plate media retaining underdrain, automatic process valves, controllers, air blowers, and the system control panel.

3. An air scouring system including air blowers and automatic valves for the operation of this system to flush the Adsorption Clarifier section and to aid in the Filter backwash.

4. The filtration section shall consist of Mixed Media with a flat plate underdrain direct media retention system. The underdrain shall provide for simultaneous air/water and water only backwashing. The high-rate water only backwash of the filter shall be 15 gpm/ft^2 based on a water temperature of 25 degrees (C) with an available head of 30-45 feet at the backwash rate control valve.

Note: The design backwash rate listed is based on a temperature of 25 degrees C. The actual backwash water rate must be adjusted 2% up or down for each degree Celsius difference above or below from design temperature, i.e. above 25^o C increase by 2%, below 25^o C decrease by 2%.

1.4 Product Delivery, Storage and Handling

A. Comply with the pertinent provisions of the delivery schedule.

B. Equipment and materials to be shipped F.O.B. shipping points, with freight prepaid to the jobsite. Fabricated parts when delivered to the site shall be stored off the ground and protected from weather and damage. Control and electrical devices shall be stored indoors.

C. Ship fabricated assemblies in largest sections permitted by carrier regulations. Match-mark all sections for ease of field installation

D. Handle so as to prevent damage to equipment during handling and transportation.

E. Equipment supplied under this section shall not be delivered to the site until construction has progressed to the point where installation may properly commence.

1.5 Job Conditions

A. All work must be accomplished within the constraints of the construction schedule as specified.

B. All work shall be scheduled with the Owner and Engineer.

1.6 Submittals

A. Approval Drawings: Submit one electronic copy for approval of the following:

1. Approval drawings showing dimensions, construction and installation details,
2. Materials used, and shipping and operating weights.
3. Manufacturer's literature and catalog cuts of purchased items.
4. Show evidence of being able to provide the quality of equipment and services described in this specification, the equipment supplier shall submit their ANAB-accredited ISO 9001 quality system certification. AIAO-BAR accredited systems are not a recognized equivalent and are therefore specifically prohibited. The quality procedures shall provide for a means of qualifying all sub-vendors and shall specify that the fabrication facility is a critical vendor and shall require inspection. The quality system shall be audited on-site by a third-party independent registrar at least annually. Certification shall remain in effect throughout the project start-up.

1.7 Installation, Operation & Maintenance Manuals

A. Submit three copies in electronic format and three copies in hard copy format, each including the following:

1. Complete manufacturer's installation instructions with detailed installation drawings.
2. Complete manufacturer's operational instructions.
3. Complete manufacturer's maintenance instructions with complete catalog information, electric motor information, parts list, recommended spare parts list and instructions for periodic

maintenance of the treatment unit.

B. This information shall be provided to the Contractor and Engineer at least two weeks prior to the shipment of the equipment.

1.8 General Requirements

A. This equipment shall consist of one (1) Trident HS Model ½HS-1400 STR Water Treatment unit with associated equipment to comprise a complete system.

B. The unit shall be for treating raw water of the following approximate characteristics at a design flow rate of 700 gpm.

C. The treatment system shall be furnished by a single manufacturer who shall comply with the following:

1. The single manufacturer supplying equipment to this specification shall furnish proof of a minimum of 100 installations and 10 years of manufacturing treatment systems similar to the specified system.

2. Due to a potential for higher than normal turbidities, the system manufacturer must furnish proof of treating over 60 NTU raw water for sustained periods of time, and spike loading in excess of 400 NTU.

3. If there is potential taste and odor problem, or to provide the capability for carbon adsorption, the system manufacturer shall furnish proof of the system's ability to perform properly while feeding Powdered Activated Carbon at a minimum dosage level of 25 mg/l. This must be demonstrated by a minimum of 3 pilot studies and/or operating plants showing positive results.

4. The system must be capable of operating at a range of 50 percent to 100 percent of the standard design flow.

5. In addition to normal start-up service, the systems detailed above shall be fully operational including the demonstration of a fully automated control sequence for the backwash and flush of the system, based on reaching design terminal headloss in both the filter and clarifier.

6. Components of the packaged treatment system shall be certified to NSF® Standard 61. Specifically, the tube settlers, Adsorption Clarifier media, filtration media and underdrain system shall satisfy this requirement.

Part 2 – Products

2.1 General

A. All component parts and equipment utilized in the pre-engineered water treatment system shall be furnished as a complete integrated system by one manufacturer. The internal components and ancillaries shall be shipped loose for field installation by the Contractor. The equipment shall be a Microfloc® products Trident HS Water Treatment Plant model ½HS-1400 STR. The equipment shall be as listed below:

Number of Tanks: 1

Flow per Tank (gpm): 700

Total Plant Flow (gpm): 700

Tube Clarifier Area (ft^2): 140

Tube Clarifier Hydraulic Loading (gpm/ft^2): 5

Absorption Clarifier Area (ft^2): 46.7

Absorption Clarifier Hydraulic Loading (gpm/ft^2): 15

Filter Area (ft^2): 175

Filter Hydraulic Loading (gpm/ft^2): 4

B. A static mixer shall be provided for the common plant raw water line. Static mixer shall be sized for the common influent line and include flanged end connections.

C. Influent operating pressure of 20-30 feet (measured from base of tank) shall be available at the inlet to the static mixer. It is recommended that the raw water pump(s) be controlled via VFD and pressure feedback. This is to prevent flow control issues if using flow meters in series on the raw water line and the influent line to the unit.

2.2 Package System Construction

A. Tank Fabrication

1. The clarification and filtration processes shall be contained in single, rectangular steel tank. Major components shall be of the size and configuration shown on the drawings and fabricated of 0.3125 (5/16) inch thick minimum steel plate, except the bottom which should be a minimum of 0.250 (1/4) inch thick, suitably braced and supported. In no case shall a single steel plate wall separate filtered and unfiltered water. A double bulkhead shall be provided between the Adsorption Clarifier section and top of filter media with free drainage from the space to indicate leaks.

2. All exterior tank connections except the sludge recirculation connection shall be provided with flanged connections.

3. Adsorption Clarifier flush and filter backwash waste trough shall be factory installed in tank.

B. Tube Clarifier Details

1. Primary clarification shall be provided by tube settlers with integral sludge recirculation system.

2. The tube clarifier influent distribution system shall be constructed of Sch. 40 steel headers with orifices located to provide uniform dispersion of the raw water across the bottom of the tube settlers. The header system shall be factory installed and supported from the settling tube supports.

3. Settling tube supports shall be provided as required by the manufacturer.

4. A fixed sludge recirculation pipe shall be provided directly below the tube settlers to allow collection of flocculated solids while minimizing grit and sand passage through the recirculation pump.

5. A sludge removal header system shall be field installed to collect the sludge from the bottom of the tube clarifier basin. The header, guide rails, cable, and sludge withdrawal hose shall be constructed from corrosion resistant materials. The guiderails shall be designed to support the header from the tank side walls. The header shall be supported from the guiderails using V-groove roller wheels to minimize friction forces.

6. A 3 inch diameter flexible high density polyethylene sludge extraction hose shall be provided to effectively remove sludge and operate within appropriate headloss constraints. The flexible hose shall be smooth on the interior and heavily ribbed on the exterior for strength and abrasion resistance. It shall be field installed to a tank wall connection which terminates with a flanged connection.

7. Each sludge removal header shall include a drive unit which includes a vertical helical gear reducer driven by a ¼ horsepower TEFC, variable speed DC electric motor with stainless steel shaft, sheave arrangement and overload clutch. All drive components shall be mounted on an adjustable base. A corrosion resistant enclosure shall be provided for each drive.

8. PVC settling tubes shall include a 60 degree incline design. Modules shall be 41 inches deep and cut to fit the tank interior. Settling tubes shall be field installed.

9. A series of five sample lines and manual valves shall be provided for sample collection directly below and from within the tube settlers at various depths. The sample lines and associated valves shall be routed to a waste collection trough on the outside of the unit. The waste collection trough will be equipped with a drain coupling. The installing contractor shall provide and install drain piping to the waste sump.

10. A Sch. 80 PVC header and lateral collector shall be provided for uniform collection of clarified water. The header and laterals shall be properly supported and designed for field installation.

11. A 14 inch x 18 inch access manway shall be included near the base of the settling tube compartment to allow access to the area below the tube settlers without removing the tubes.

12. The manufacturer shall furnish the components shipped loose for field installation by the Contractor.

C. Adsorption Clarifier Details

1. The contractor shall install Adsorption Clarifier components as noted below. Secondary clarification shall be accomplished using buoyant adsorption media specifically manufactured for use in water treatment. The media shall be designed to optimize the removal of coagulated particles with a minimum of headloss. The Adsorption Clarifier section shall be able to build solids to a headloss of six feet without disruption or movement of the clarifier media.

2. A 48 inch depth of adsorption media shall be provided. Media shall be buoyant with specific gravity of less than 1.0. A media retention screen shall be provided to allow for upflow, restrained operation eliminating any chance of fluidizing the bed during operation. The retainer assembly shall be easily accessible and removable from the top of the tank. To allow for proper cleaning, the media shall be easily fluidized by the addition of diffused air. Clarifier media that is not restrained and/or media that will not easily be fluidized by the addition of air alone shall not be considered acceptable.

3. An aluminum grating assembly shall sit above the air scour system near the bottom of the Adsorption Clarifier unit. The grating allows for free passage of water but contains the adsorption media particles.

4. Buoyant media shall be manufactured of 50% compressible fiber balls and 50% virgin HDPE beads. The fiber balls shall be designed to provide additional solids storage over an all bead bed design to increase clarifier run time. At least one-half of the beads in the bed shall be rolled to produce an elliptical shape and shall also be scarified to place a groove on the media surface. The rolled and scarified shape provides improved floc retention inside of the clarifier bed. Media that does not include a dual media bed of fiber balls and HDPE beads is not acceptable due to its lower capability of floc retention and solids storage capacity.

5. NSF 61 approval of the buoyant media is required, and a copy of the NSF approval shall be submitted with the contractor's bid. Bids without a copy of the NSF approval shall be rejected.

6. The Adsorption Clarifier section shall be equipped with influent water distribution and air scour system consisting of a fixed distribution grid with non-clog air diffusers consisting of a slotted plastic nozzle body. The distribution systems shall be constructed from Sch. 80 PVC.

7. Splash guards shall outline the perimeter of the Adsorption Clarifier system to prevent water from burping over the edge during the flushing process.

8. Clean Adsorption Clarifier media shall be capable of being floated over to the filter side of the tank for clarifier internal inspection and/or service. The media shall be capable of being floated back to the clarifier section of the tank without media loss or damage.

9. Non-buoyant alternates using an up flow unrestrained media are not acceptable.

10. The manufacturer shall furnish the components shipped loose for field installation by the Contractor.

D. Filter Details

1. The filter in each tank shall be designed for gravity flow with the flow rate regulated by a liquid level sensor and modulating effluent butterfly valve.

2. The filter media shall be a 30 inch deep Mixed Media separation bed composed of three materials, each of different effective size and specific gravity, providing uniform void distribution from coarse to fine in the direction of flow. The Mixed Media shall consist of 18 inches of anthracite coal, 9 inches of silica sand and 3 inches of high density sand. The top of the bed shall consist of material of approximately 1.1 millimeter particle size, and the bottom of approximately 0.2 millimeter particle size.

3. The filter media shall be supplied by the manufacturer and shall be shipped in bags for ease of installation. The manufacturer will advise exact volume of each layer of Mixed Media to be installed by the contractor.

4. Filter media shall meet the provisions of AWWA standard B-100 (latest revision).

5. The underdrain shall utilize a factory installed flat plate underdrain plate with media retaining nozzles. The underdrain shall provide area coverage as shown in the table in section 2.1 B. of this specification. The underdrains shall accommodate air and water backwash and be specifically designed to provide uniform distribution of air, water and simultaneous air/water during backwashing. Underdrains that have a perforated pipe insert are not considered acceptable.

6. In order to reduce filter backwash cycle time and improve cleaning efficiency, the filter trough section shall be provided with stainless steel media separator baffles to prevent loss of media during combined air and water backwash. A double baffle design with plastic localized velocity dissipation devices included between the upper and lower baffles shall be used. Baffles shall be attached to the tank walls and to the washtrough. The baffles shall be designed to resist oscillations caused by flow of water over the trough edges. Baffle to baffle and trough to baffle stabilizers shall be furnished as required by the manufacturer.

7. The manufacturer shall furnish the components shipped loose for field installation by the Contractor.

E. Plant Process Valves

1. The treatment plant manufacturer shall provide all process control valves in sizes shown on the drawings.

2. Automatic modulating control valve system for the tube clarifier influent line shall incorporate a mag meter and modulating valve to control the flow rate. The mag meter shall be installed in the influent line upstream of the control valve.

3. Automatic modulating control valve system for the filter effluent and filter to waste flows shall incorporate a level sensor and modulating valves to maintain filter water level. Level sensor shall be mounted at the top of the filter section and positioned to properly sense the liquid level.

4. All automatic modulating valves shall be provided with an integral filter-regulator assembly mounted at the valve actuator.

5. Automatic open-close valves shall be provided for the Adsorption Clarifier air scour, filter air scour, sludge recirculation, Adsorption Clarifier influent, tube clarifier sludge blowdown, filter backwash supply, and flush/backwash waste for each tank. One automatic open-close high rate backwash supply valve common for all tanks shall be provided for backwash control.

6. The automatic valves for all systems shall be wafer-type butterfly valves with pneumatic actuators. The modulating valves shall have positioners to accept a 4-20 mA signal. The open/close valves shall be pilot solenoid controlled and arranged so that the valves shall automatically return to the service position should power fail.

7. All automatic and manual butterfly valves shall be of wafer construction with nylon coated disc, EPDM seat and seals, carbon steel stem and semi-steel body.

8. Manual wafer-type butterfly valves complete with lever actuators shall be provided by the treatment plant manufacturer. Manual butterfly valves shall be provided for influent isolation, backwash high rate and low rate control, and tube clarifier pump suction isolation.

9. Manual valves for tube clarifier and Adsorption Clarifier drain, sludge recirculation isolation shall be ball valves with lever actuators.

10. A manual plug valve shall be provided for installation in the sludge blowdown line for the purposes of controlling rate.

11. Recirculation pump discharge, air backwash and blower check valve shall be supplied as recommended by the treatment plant manufacturer.

12. All valves shall be shipped loose for field installation by the Contractor.

13. The Contractor shall furnish and install all valves not furnished by the manufacturer as shown on the plans. This item to include couplings, check and isolation valves, and all other manual valves for pneumatic or hydraulic service.

F. Clarifier Transfer and Sludge Recirculation Pump Systems

1. Each treatment unit shall include a clarifier transfer pump between the tube settler and Adsorption Clarifier sections and a sludge recirculation pump. Both pumps shall be a product of the same manufacturer.

2. The pumps shall be designed so that they operate at maximum possible efficiency throughout the duty range, cause no overloading of motors under all operating conditions and be capable of continuous operation.

3. The centrifugal pumps shall be direct connected to the drive motor. The electric motor shall be sized to be non-overloading at all points on the pump performance curve. Motor enclosure shall be TEFC, and suitable for operation in a humid, outdoor environment. Motors shall be 3 phase, 60 Hertz, 460 volt power. All motors shall comply with manufacturer's standard design, construction and testing procedures as defined by applicable IEEE, NEMA, and ANSI standards.

4. Automatic flow adjustment of the sludge recirculation pump shall incorporate a mag meter and variable speed pump controller to maintain set point flow rate.

5. Recirculation pump and motor assemblies shall be field mounted on the treatment tanks with factory installed mounting brackets. Clarifier transfer pump and motor assemblies shall be field mounted next to the treatment tanks on a concrete base provided by the installer.

6. Interconnecting piping for the transfer pump system shall be provided by the system supplier.

7. Automatic flow adjustment of the transfer pump shall incorporate a level sensor and variable speed pump controller to maintain water level in the tube settler compartment. Level sensor shall be mounted at the top of the tube settler section and positioned to properly sense the liquid level.

8. The manufacturer shall furnish the components shipped loose for field installation by the Contractor.

G. Air Supply Blowers

1. The treatment plant manufacturer shall supply two regenerative blowers, each with a capacity of 263 scfm at 4.1 psig for aiding in the cleaning of the Adsorption Clarifier and Filter sections during flushing and backwashing. Blower motors shall be 460 V, 3 phase, 60 Hz.

2. Each blower shall be provided with an inlet filter, pressure relief valve and dirty filter indicator.

3. The manufacturer shall furnish the blower shipped loose for field installation by the Contractor.

4. All motor starters (if required) shall be furnished and installed by the Contractor

H. Piping, wiring, and conduit

1. The installing contractor shall furnish and install all piping and fittings, plus all valve pneumatic (or hydraulic) piping, all wiring and conduit.

2.3 Plant Control-General

A. Influent flow to the system shall be regulated by an operator adjustable flow control loop consisting of a flow element (mag meter); PLC/PID based flow control, and modulating butterfly valve in each tank influent line.

B. The Adsorption Clarifier section and filter sections shall be equipped with pressure transmitters to allow pressure trending and initiation of the flush and backwash sequences. The filter section shall also provide protection of the underdrain during backwash in the event of over-pressurization and a

vacuum. Analog signals shall be continuous 4-20 mA and the discrete signals shall allow for adjustable set-points.

C. The equipment manufacturer shall provide each tank, the following control devices, for installation by the contractor: Adsorption Clarifier pressure transmitter with local display (as noted above); filter pressure transmitter with local display (as noted above); liquid level transmitter to control the clarifier transfer pump; liquid level transmitter to control filter effluent flow control valve, influent magnetic flow meter with transmitter, and turbidimeters, effluent sample pump.

D. PLC based control subsystem shall be supplied to monitor and control the Package Treatment System. The PLC based system shall be capable of operating in an automatic mode, completely autonomously, or semi-automatic mode requiring some operator intervention. The control panel shall provide automatic starting and stopping of the Treatment System, based on clearwell level or device failure.

E. The control panels shall be supplied complete including all necessary equipment to provide a complete and functioning system. The components shall include PLC, operator interface, control relays, push-buttons & selector switches, indicating lights, power supplies, fuses and terminal strips. The PLC shall have an interface port, capable of future interface to a SCADA System via Ethernet network.

F. Control panels shall be shipped loose for installation by the Contractor.

G. The contractor shall furnish and install all wiring and conduit.

2.3.1 Treatment System Control Panel

A. The treatment system controls shall consist of one Master Control Panel (MCP) per system working in conjunction with Unit Control Panels (UCP, one per unit). The control panels shall be supplied in a NEMA 12 steel enclosure suitable for indoor use. The front panel of the cabinet shall contain all push buttons, and operator interface (MCP only) as detailed within this specification. The internal portion of the cabinet shall contain all rail-mounted PLC equipment, power supply, processor, and interface cards. Relays and terminals shall also be contained within the cabinet. The PLC subsystem shall be as manufactured by Allen Bradley. Terminal strips for all field wiring shall be furnished within the panel.

B. Fuses and duplex outlet shall be provided within the panel.

C. All digital outputs shall be provided with relay contacts.

2.3.2 PLC Based Control Panel I/O Field Interface Signals

A. Within the PLC based control panel all PLC ladder logic shall reside performing all necessary process monitoring and control for the Package Treatment System. All necessary I/O cards shall be supplied to monitor and control the field signals. All PLC and I/O rails shall be supplied with 10 percent spare I/O point to accommodate future expansion.

B. The PLC based MCP shall be comprised of the following

1. NEMA 12 Wall Mounted Control Panel
2. PLC CPU Card – (dc voltage)
3. PLC I/O Rail
4. PLC I/O Cards
5. Operator Interface Terminal – Allen-Bradley PanelView Plus 6 series 10” color/touch
6. Power Supplies
7. Pilot Lights and Pushbuttons
8. Fuses

9. Terminal Strips
10. Convenience Outlet
11. Remote I/O via Ethernet
12. Control Relays
13. Misc. Wire and Conduit

C. Each UCP shall be comprised of the following:

1. NEMA 12 Wall Mounted Control Panel
2. Interface Module
3. PLC I/O Cards and module mounting rail
4. Power Supplies
5. Pilot Lights and Pushbutton
6. Fuses
7. Terminal Strips
8. Misc. Wire and Conduit

2.3.3 Devices for Operator Interface

External face mounted devices for operator interface shall be as follows:

A. Pushbuttons

1. Pushbuttons shall be as manufactured by Allen Bradley. Panel Mounted Pushbuttons shall be provided for Emergency Stop purposes.

B. Operator Interface Terminal (MCP Only)

1. An Operator Interface Terminal to the PLC shall be included and mounted on the front of the MCP enclosure. The Interface shall allow the operator to view and modify system variables within the PLC. The display shall be a touch screen. The color display shall be STN type, VGA 640 x 480 pixels (10 inches) with 60,000 hour backlight. The unit shall include a real-time clock, built-in alarm functionality, Ethernet communications port and RS-232 Printer port. The unit shall operate on 24 VDC with 0.6 A maximum power consumption. The display shall support the standard ASCII character set. Terminal configuration shall be via Microsoft Windows based software. The unit shall be manufactured by Allen Bradley Panel View Plus 7 series 1000, or approved equivalent.

2.4 Process Control System Functions

A. The MCP shall automatically control the treatment process. The MCP Terminal shall provide control input for the following process and field equipment.

1. Coagulation Pump
2. Polymer Pumps
3. Sludge Recirculation Pumps
4. Sludge Collector Drive
5. Clarifier Transfer Pumps
6. Air Wash Blowers
7. Backwash Pump
8. Trident HS Process Valves

B. The MCP shall control the following process functions:

1. Filter Level Control
2. Tube Clarifier Level Control
3. Automatic System Start-Up and Shut Down
4. Influent Flow Control to each unit
5. Emergency Shutdown of each unit via pushbutton

6. Effluent Turbidity Feedback Coagulant Feed Control with flow pacing
7. Automatic Start/Stop Polymer Feed Control
8. Timed Based Backwash Initiation
9. Loss of Head Backwash Initiation

C. The MCP Interface shall provide operator adjustable set points for the following parameters:

1. Influent Flow Rate Setpoint
2. Effluent Turbidity Coagulant Control Setpoint
3. Recirculation Flow
4. Blowdown Frequency and Duration

D. The MCP Interface shall provide running and alarm indication for the following devices:

1. Raw Water Pump (pump by others)
2. Sludge Recirculation Pumps
3. Clarifier Transfer Pumps
4. Sludge Collector Drive
5. Backwash Pump (pump by others)

E. The following manual control switches/pushbuttons shall be part of the Operator Interface which is mounted on the door of the MCP.

1. Sequence Start
2. Sequence Stop
3. Alarm Acknowledgement
4. Fault Acknowledgement
5. Clarifier Transfer Pump Start/Stop
6. Sludge Recirculation Pump Start/Stop
7. Sludge Collector Drive Start/Stop
8. Auto/Manual Filter Control
9. Process Valve Open/Close Control
10. Backwash Pump Start/Stop Control
11. Blower Start/Stop Control

F. A Power On indicator light shall be mounted on the doors of the panels noted.

G. The following alarm conditions shall be monitored by MCP. All alarms shall be visible via the Operator Interface Terminal.

1. Sludge Recirculation Pump Fault
2. Sludge Collector Drive Fault
3. Sludge Recirculation Low Flow Alarm
4. Transfer Pump Fault
5. Adsorption Clarifier High Pressure Alarm
6. Filtered Water High Turbidity Alarm
7. Filtered Water High High Turbidity Alarm

2.4.1 Motor Starters

A. The installing contractor shall provide motor starters for the following:

1. Backwash supply pump
2. Air wash blowers

2.4.2 Field Instruments

A. Low Range Turbidity Monitoring (effluent)

1. The turbidity monitoring system shall include at least two turbidimeters per tank (tube clarifier effluent and filter effluent) and one interface unit. The system shall be capable of functioning as a single or dual sensor system and shall have two 4-20 mA outputs and three setpoint alarms, each equipped with an SPDT relay with unpowered contacts.

2. The turbidimeters shall be a microprocessor-based, continuous-reading, on-line nephelometric instrument meeting all design and performance criteria specified by USEPA method 180.1. Light shall be directed through the surface of the sample and the detector shall be immersed in the sample, eliminating glass windows and flow cells. The turbidimeter body shall be constructed of corrosion-resistant polystyrene, and shall include an internal bubble trap to vent entrained air from the sample stream. The turbidimeter shall offer the choice of formazin-based (20 or 1 NTU) or instrument comparison-based calibration methods. Accuracy shall be ± 2 percent of reading from 0 to 40 NTU.

3. The interface unit shall allow operators to control sensor and network functions with user-friendly, menu-driven software, and shall provide data logging of measurement data from one or two turbidimeters for 15 minute, 1 hour, 24 hours, 30 days, or 180 days, and the optional capability to transfer data to a computer or printer via direct MODBUS communications or directly into a Personal Digital Assistant (PDA) via a wireless IR port. The interface unit and internal DC power supply shall be housed in NEMA-4X (indoor) industrial metal/plastic enclosure and the power supply shall automatically accept input in the range of 100 to 230 Vac, 50/60 Hz. All system components shall be ETL listed to UL 61010A-1, certified to CSA C22.2 No. 1010.1 and CE certified by manufacturer to EN61010-1. All system components shall be CE certified to EN 61326 (industrial levels) for immunity and emissions, Class A. All system components shall be meet FCC Part 15 for North America and Canadian Interference-Causing Equipment Regulation ICES-003 and CISPR 11 Class A levels for the rest of the world. The turbidimeters shall be Hach TU5300 sc low range turbidimeter with SC-4500 controller or equal.

B. High Range Influent Turbidity Monitor

1. One high range turbidimeter shall be provided for installation in the Treatment System's Raw Water stream. The MCP shall receive a 4-20mA signal from the influent turbidimeter and will provide an alarm on rapid changes in the turbidity of the raw water. The MCP shall cause a plant shutdown on adjustable high-high turbidity setpoint with time buffering. The setpoint shall be manually adjustable by the plant operator by means of the operator interface.

2. The turbidimeter shall be a continuous-reading, on-line instrument using the nephelometric methods of measurement. The design shall meet or exceed performance criteria as specified in USEPA Method 180.1. Digital display with automatic decimal point placement shall read from 0-9999 NTU. Accuracy shall be better than ± 5% from 0-2000 NTU and ± 10% from 2000-9999. Resolution shall be 0.01 NTU. The turbidimeter shall consist of two main component parts: a sample unit and a control unit connected with an 11-conductor cable.

3. The control unit shall provide a digital LED display with four digits and automatic decimal positioning. The control unit shall also provide a linear output signal, which can be programmed to span all or any portion, of the 0-9999 NTU range. A 4-20 mA current output and selectable voltage outputs of 0-10 mV, 0-100 mV and 0-1 Vdc shall be provided. Two set-point alarm systems shall be fully adjustable over the entire range of the instrument and actuate SPDT normally open/normally closed dry relay contacts.

4. The control unit and sample unit shall be housed in NEMA-4X and NEMA-12 industrial plastic enclosures suitable for indoor installation. Power requirement shall be selectable: 115/230 VAC, 50/60 Hz. The turbidimeters shall be Hach Model Surface Scatter 7 or equal.

C. Streaming Current Monitor

1. The instrument shall be a streaming current monitor that continuously measures electrical charge in a water sample after the water has been dosed with coagulants to destabilize suspended colloids. The instrument shall be capable of indicating on a digital meter the numerical value that corresponds to optimum coagulant dose.

2. The sensor shall receive a sample at the rate of 5 gallons per minute to ensure sample line cleanliness and sensor cell reliability. The sensor shall have its sample exit orifice larger than the entrance orifice to avoid pressurizing the cell. The sensor shall not contain any signal processing circuitry or electronic circuit cards. The sensor response time shall not be greater than 2 seconds at recommended sample flow rate. The sensor shall have a high flow, self cleaning cell that does not require any extra cleaning devices. Sample must enter the cell from the side and exit at a 45 degree downward angle to prevent accumulation of grit, sludge, sand, etc. The unit shall be supplied with one spare replacement probe cartridge. Stainless steel electrodes located in the top and bottom of the electrode module shall transmit the generated signal through shielded coaxial cable to the monitor. A timing signal from an optoelectric device in the sensor module shall be transmitted through a shielded twisted pair wire to the monitor.

3. The monitor shall contain all circuitry and signal processing cards to provide outputs of 4-20 mA DC, 0-10 VDC, +/- 10 VDC, and High/Low alarm contacts. All outputs and alarm contacts shall be integral in the monitor circuitry, and not require any external devices. The monitor shall have the following control functions: (1) High and Low alarm contact adjustments and LED indicators for both. (2) Meter zero adjustment, full scale on all ranges. (3) Signal gain switch adjustable 1X, 2X, 5X, 20X. (4) Internal, continuous adjustment for higher gain. (5) LED digital meter with +/- 10 span. (6) Flashing LED sensor operation light. Monitor shall have wall mount or flush panel mount option. The instrument shall be a Streaming Current Monitor Model HA600 Analyzer with DuraTrec 4 Sensor as manufactured by Chemtrac Systems, Inc. or approved equal.

4. The MCP shall receive a 4-20mA signal from the streaming current monitor and shall adjust the coagulant dosage to maintain the streaming current setpoint. The unit shall also include an adjustable timelag from the point of chemical addition to the point of streaming current measurement to assure that the system is responding accurately to current treatment conditions before another change is initiated. The setpoint shall be manually adjustable by the plant operator by means of a control panel keyboard. In addition, the streaming current setpoint shall be automatically adjusted to maintain the effluent turbidity setpoint.

D. All instruments listed above that are furnished by the manufacturer shall be shipped loose for installation by the Contractor. The Contractor shall furnish and install all wiring and conduit.

E. The contractor shall furnish and install all wiring and conduit.

2.5 Chemical Mixing And Feed Systems

A. All chemical feed systems listed below are furnished by the plant supplier and shall be shipped loose for installation by the contractor. All other chemical feed systems are to be provided by the contractor.

B. Three chemical feed systems as shown on the plans and as specified below shall be provided with the packaged water treatment system.

1. Coagulant feed consists of:
    a. One (1) chemical feed pump skid, to include positive displacement diaphragm type pumps with a NEMA 4X terminal box.
    b. Included is calibration column, suction & discharge connections.
    c. Electronic speed control by Aquaritrol® PLC program.
2. A liquid emulsion polymer feed system for flocculation aid shall be provided. This system be an inline system and shall consist of:
    a. A direct-coupled, motor driven high energy mixing chamber.
    b. Mechanically actuated diaphragm-type polymer metering pump with high viscosity liquid handling unit,
    c. Water solenoid valve.
    d. Electronic flow sensor for primary water.
    e. 304 stainless steel open chassis design, and system controls.
    f. One unit shall be required for each treatment tank.
3. A polymer feed for filter aid shall be provided. This system shall consist of:
    a. One (1) day tank batching system with neat polymer feed pump, mix chamber, pre and post water dilution lines, electronic flow sensors, and control panel in NEMA 12 enclosure.
    b. One (1) polymer solution tank with cover; HDPE.
    c. One (1) chemical feed pump skid, to include positive displacement diaphragm type pumps with a NEMA 4X terminal box. Skid configured for one pump per unit. Electronic speed control by Aquaritrol® PLC program, calibration and accessories included.

        Note: Limit of three pumps per skid

A. **Note:** Chemical feed systems are matched to the particular water supply. Based upon a raw water analysis, or results of pilot testing, this section may include other feed systems; examples:

- Soda Ash, or Caustic
- Potassium Permanganate

2.6 Finish

A. The interior and exterior of the tank shall be thoroughly cleaned of loose mill scale and grease.

B. The interior of the treatment units shall be sandblasted to SSPC-SP10 and prime painted with one shop coat of Tnemec Series 21-1255 (Beige) Epoxoline primer, or equivalent, one shop stripe coat of Tnemec Series 21-WH16 (Off-White) Epoxoline, and one shop of finish coat of Tnemec Series 21-WH16 (Off-White) Epoxoline. The interior of the tank shall include painting above and below the underdrain system.

C. The exterior of the tank and piping shall be sandblasted to SSPC-SP6 and painted with one shop coat of Tnemec Series 21-1255 (Beige) Epoxoline primer. Finish paint coat(s) by others.

D. The tank bottom shall be bare for field placement onto a coal tar or mastic base pad coating to be provided and installed by the contractor.

Part 3 – Execution

3.1 Installation Inspection, Start-Up and Operator Training

A. The Trident HS is a pre-engineered system consisting of a tube and Adsorption Clarifier pretreatment and filtration processes contained in a single shippable tank. The internal components and ancillaries shall be shipped loose for field installation by the contractor.

B. The Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish, install and test (if applicable) the treatment, and shall furnish and install all piping and fittings, all valve pneumatic (or hydraulic) piping, all wiring and conduit, plus valves not furnished by the plant supplier as shown on the plans, to include couplings, check and isolation valves, and all other manual valves for pneumatic or hydraulic service.

C. The Manufacturer shall be present during placement of filter Mixed Media.

D. The Manufacturer shall inspect the installation of all equipment in this section prior to start-up in order to verify that the equipment has been properly installed and operates properly as a system and individually.

E. After the equipment has been properly installed the Manufacturer shall calibrate the equipment with the Owner's operator present.

F. The Manufacturer's representative shall be present for 16 days in 5 trips for installation assistance described above.

G. Effluent quality laboratory analysis shall be provided by the Owner.

3.2 Warranty

A. A warranty shall be provided covering all materials and workmanship for twelve (12) months from the initial startup or eighteen (18) months from ready-to-ship notification, whichever occurs first.