Addendum No. 3
to the Bidding Documents

WPCP Phosphorus Upgrade Project
Town of Southington, Connecticut
Southington Water Pollution Control Plant

Issued September 21, 2018

Under the provisions of Article 7 of Section 00200, Instructions to Bidders, Bidders are informed that the Bidding Documents for the above mentioned Project are modified, corrected, and/or supplemented as follows. Addendum No. 3 becomes part of the Bidding Documents and Contract Documents.

Acknowledge receipt of this addendum by inserting its number on Page 00410-4, Article 5.2 of the Bid form. Failure to acknowledge receipt of the Addendum may subject the Bidder to disqualification.

Project Manual Changes

Item 3-1 In accordance with CT DEEP requirements, addenda shall be issued at least 5 working days prior to bid opening as noted in Attachment D of Section 00800. Therefore, the Town of Southington will not respond to any additional questions from bidders.

Item 3-2 Table of Contents

Add Section 02516, High Density Polyethylene Pipe and Fittings (Odor Control), 9 pages.

Add Section 15830, Negative Pressure Relief Door, 3 pages.

Item 3-3 Section 00410 – Form for General Bid

Delete Section 00410 in its entirety and **replace** it with the attached Section 00410.

Clarification: Bid Item No. 12 added.

Clarification: Bidder is reminded to attach all documents stated in Article 7.

Item 3-4 Section 01110 – Summary of Work

Add the following after Paragraph 1.3.D:

E. If the pre-selected equipment vendors furnishing equipment under Section 11262 or Section 11369 request and are granted a price escalation for their bid items, then General Contractor is not entitled to a fee for overhead and profit for this escalation change as otherwise permitted under Article 11.04.C of Section 00700.

Item 3-5 Section 01140 – Work Restrictions

Delete paragraph 3.1.A.13.a in its entirety and replace it with the following:

a. During the nitrogen removal season required by the Town's NPDES permit (April 1st through October 31st), the denitrification system may be taken offline for a maximum of 2 hours.

b. During the season in which the Town's NPDES permit does not regulate nitrogen limits (November 1st through March 31st), the denitrification system may be taken offline for a maximum of 3 days.

c. Bypassing the denitrification system may be done by utilizing the Town's 48"x60" weir gate located in the Nitrification Settling Tank Bypass Chamber and diverting flow from the Nitrification Settling Tanks directly to the existing UV disinfection system.

Add the following after paragraph 3.1.A.15.a:

b. The existing UV Disinfection System shall remain operational until the new UV Disinfection System is complete, tested, and accepted by the Owner.

Delete paragraph 3.1.A.16.a in its entirety and **replace** with the following:

a. Modifications to the new UV effluent piping shall be coordinated such that there is no interruption in effluent flow.

b. The existing connection from the 36" DNE piping into the Nitrification Settling Tank Bypass Chamber (see Drawing Sheet M-402) shall remain until the new UV disinfection system is tested and accepted by the Owner.

c. The final piping connections at the Nitrification Settling Tank Bypass Chamber and at the Emergency Storage Tank No. 3 (former Chlorine Contact Tank No. 3) shall be made after the UV disinfection system is tested and accepted by the Owner. Final piping connections shall also be coordinated such that there is no interruption in effluent flow.

Item 3-6 Section 01290 – Application and Certificate for Payment

Add the following after paragraph 1.3.F:

G. Item 12 – Mechanical Aerator Field Performance Testing

1. Measurement

a. Measurement for Mechanical Aerator Field Performance Testing shall be as described in Section 11376, Paragraph 3.5 (amended in Addendum No. 3 below).

2. Payment

a. The lump sum payment shall be full compensation for furnishing all materials, tools, equipment, and services required for Mechanical Aerator Field Performance Testing specified in Section 11376, Paragraph 3.5 (amended in Addendum No. 3 below).

Item 3-7 Section 01350 – Health & Safety Plan

Clarification: A Site Safety Official (SSO) is required for the duration of all construction activities.

Item 3-8 Section 01580 – Temporary Bypass Pumping System – Wastewater

Clarification: Temporary bypass pumping as detailed in the Section 01580 and on Drawing C-014 has been shown due to its significance to the project. Other bypass piping and/or pumping systems may be required to complete the Work.

Bypass piping and/or pumping may be necessary from Emergency Storage Tank No. 1 (existing UV channel) to Emergency Storage Tank No. 2 (existing Chlorine Contact Tank No. 2) to complete the new 36" UVE / 42"x36" CPP to DI reducing adapter connection to the effluent structure (as shown on C-011, C-021, and D-701).

Item 3-9 Section 02110 – Contaminated Soil Excavation

Delete Section 02110 in its entirety and **replace** it with the attached Section 02110. The following modifications have been made:

- Paragraph A.1.a was updated to reference the two added soil management drawings (Drawings C-025 and C-026), as well as to reference the presence of contaminated soils in Area SW (in Southwest corner of site as shown on Drawing C-017 (as revised in Addendum No. 3).

- Paragraph 3.1.G was modified to clarify in-site waste characterization program to obtain disposal facility approval for contaminated soils.

- Paragraph 3.1.I was added to provide equipment and tool decontamination requirements.

- Paragraph 3.2.B was revised to provide additional information on the anticipated procedures and responsibilities associated with evaluation of field conditions to confirm soil management objectives have been achieved. The soil management objective for this project is the removal of Contaminated soils within the limit of soil excavation, as shown on Drawings C-017, C-024, C-025, and C-026. It is intended that Contaminated soils within the limits of excavation will be remediated to a depth in which no further contamination exists.

- Paragraph 3.3.A was revised to indicate that the soil stockpile(s) will be sampled by the Engineer to confirm that PCB concentrations are less 1 ppm (i.e. that the stockpiled soils are Polluted soils and not Contaminated soils) prior to reuse as backfill material.

- Paragraph 3.3.A.4 was added.

- Paragraph 3.3.A.5 was added.
- Paragraph 3.5.B was amended to clarify payment for unforeseen contaminated materials excavated and disposed of during the work.
- Paragraph 3.6.B was revised to indicate that laboratory turnaround time for the analysis of confirmation samples collected by the Engineer will be reduced to 48 hours.
- Paragraph 3.7 was revised to indicate that Contaminated soils in Area SW shall be removed prior to stockpiling of Polluted soils in this location.

Item 3-10 Section 02516 – High Density Polyethylene Pipe and Fittings (Odor Control)

Add the attached Section 02516, High Density Polyethylene Pipe and Fittings (Odor Control).

Clarification: Section 02516 is provided as an alternate to the FRP duct specified in Section 15825 for buried odor control ductwork applications. The Contractor may use either High Density Polyethylene Pipe (as specified in Section 02516) or FRP duct (as specified in Section 15825) for buried odor control ductwork. Transition flanges between buried High Density Polyethylene Pipe and above grade FRP duct shall be located 6" above grade. Above grade odor control ductwork shall be FRP duct as specified in Section 15825.

Item 3-11 Section 08110 – Steel Doors and Frames

Delete paragraph 2.5.E in its entirety and **replace** it with the following:

E. Provide Manufacturer's Paired Swing Monorail Door assembly complete with manufacturer's standard hardware engineered to suit application. Door and frame assemblies shall be fabricated from galvanealed steel, custom engineered and constructed to suit application and provided with manufacturer's factory applied industrial primer, ready for field painting. Door assembly shall be provided with all required hardware for a complete installation including but not limited to threshold, floor bolts, top spring-latches, locking hardware, hold-open assembly capable of safely holding the doors in the open position at 90 degrees, and brush type weatherstripping, specifically designed and installed for the opening.

Item 3-12 Section 09900 – Painting

Delete the following from Table 09900-B, Paint System Schedule:

Submerged or Intermittently Submerged Concrete – Non-Potable, Head Space and Top Wall Sections, Exposure to H2S >100 ppm, pH<4	SSPC-SP-13 (Reference ICRI CSP 5 minimum)	Series 218 (~125 mils DFT)		Series 434 (125 DFT)
Submerged or Intermittently Submerged Concrete – Non-Potable, Head Space and Top Wall Sections, H2S>100 ppm, pH<4	SSPC-SP-13 (Reference ICRI CSP 5 minimum)	Series 218 (~125 mils DFT)	Series 434 (125 DFT)	Series 435 (15.0-20.0 DFT)

Clarification: Refer to Specification Section 09930 (Added via Addendum No. 2) for protective lining system for concrete.

Add the words "(required for new or unpainted block only)" after the words "Series 130 (~100 sq. ft. per gallon)" in the "Concrete Block Interior, Non Submerged" row, "Primer" column of Table 09900-B, Paint System Schedule.

Clarification: Surface preparation for existing non-submerged concrete surfaces scheduled to be painted shall be in accordance with SSPC-SP-13.

Clarification: Voids and bugholes for new interior concrete walls and ceilings shall be filled in accordance with Table 09900-B, Paint System Schedule. Filling voids and bugholes is not required for existing interior concrete walls and ceilings scheduled to be repainted.

Clarification: Copper piping to be insulated shall not be coated. Non-insulated copper piping shall be coated in accordance with the "Non-Ferrous Metal (Other Than Galvanized), Interior and Exterior Non-Submerged" row in Table 09900-B, Paint System Schedule.

Clarification: Ductile Iron piping located within the Thickened Sludge Storage Tanks shall be coated in accordance with the "Ferrous Metals, Submerged or Intermittently Submerged – Non-Potable – Enclosed, H2S" row in Table 09900-B, Paint System Schedule.

Item 3-13 Section 11010 – Spare Parts

Delete paragraph 1.1A.6 in its entirety.

Delete paragraph 1.1A.9 in its entirety.

Delete paragraph 2.1I in its entirety.

Delete paragraph 2.1L in its entirety.

Item 3-14 Section 11285 – Cast Iron Slide Gates

Add the following after Paragraph 1.1.B:

C. As an alternate to cast iron slide gates, the sixteen 8"x8" slide gates specified in this section may be manufactured of fabricated stainless steel provided that the gates meet the requirements of Section 11286.

Item 3-15 Section 11337 – Primary & Intermediate Settling Tank Refurbishment

Add the words "Provide field touch up painting as required using the same manufacturer approved painting system as applied in the factory." after the words "shall be performed at the factory." in paragraph 3.3.B.

Item 3-16 Section 11338 – Nitrification Settling Tank Refurbishment

Add the words "Provide field touch up painting as required using the same manufacturer approved painting system as applied in the factory." after the words "shall be performed at the factory." in paragraph 3.3.B.

Item 3-17 Section 11339 – Trickling Filter Rehabilitation

Clarification: The stationary column, support manifold, bearing cap, and the manifold shall be hot dip galvanized as part of the rehabilitation in accordance with Paragraph 3.3. Components which are not rehabilitated as part of this project, such as the trickling filter distribution arms, do not require field painting.

Item 3-18 Section 11376 – Mechanical Aerators

Delete Section 11376 in its entirety and **replace** it with the attached Section 11376. The following modifications have been made:

- Paragraph 1.1.D.1.a was amended to indicate that Field Performance Testing shall be conducted following installation of the first four aeration units.
- Paragraph 1.3.O on Manufacturer's Performance Testing was significantly revised.
- Paragraph 1.3.Q.2 was added.
- Paragraph 1.7.A.1 was amended to clarify Performance Guarantee requirements.
- Paragraph 3.2.A was revised.
- Paragraph 3.5.C on Oxygen Transfer Field Performance Tests was added.

Clarification: The Form for General Bid (Section 00410) has been revised to include a separate Bid Item No. 12 for Mechanical Aerator Field Performance Testing as specified in Paragraph 3.5 of Section 11376. All other work of Section 11376 shall be included in Bid Item No. 1.

Item 3-19 Section 13228 – Odor Control Systems

Add the words "e. Two (2) suction negative pressure relief doors" after paragraph 1.1.A.1d.

Add the following after paragraph 1.1.B.10:

11. Section 02516 – HDPE Pipe and Fittings (Odor Control Duct)
12. Section 15830 – Negative Pressure Relief Doors

Delete paragraph 2.4.A.1 and **replace** it with the words "1. Vessels shall be designed to withstand a maximum loading of 21 inches water column of positive and negative (i.e. vacuum) pressure."

Delete paragraph 2.8.E.3.a and **replace** it with the words "a. Centralized Odor Control Vessel: 40 HP (minimum) each."

Add the following after paragraph 2.9.E:

F. Each train shall be provided with negative pressure relief between the fan suction isolation damper and the suction of the fan to relieve vacuum pressure above 10-inches W.G.. Relief to be provided as part of the Odor

Control System Manufacturer's equipment and shall meet the requirements of Section 15830 – Negative Pressure Relief Doors.

Add the following after paragraph 2.10.C.2.i:

j. Negative Pressure Relief Door shall be provided in the wall of each prefilter to relieve vacuum pressure above 10-inches W.G.. Relief door to be provided by the Odor Control System Manufacturer and meet the requirements of Section 15830 – Negative Pressure Relief Doors.

Clarification: Headloss calculations for the odor control ductwork shall be the responsibility of the odor control system supplier, in accordance with Paragraph 1.4.D.

Item 3-20 Section 13420 – Instrumentation

Delete paragraph 2.1.F.3 in its entirety and **replace** with the following:

3. The flow tube lining shall be PTFE or hard rubber.

Item 3-21 Section 13421 – Aeration System Instrumentation and Controls

Clarification: A two-channel RTC (RTC-N) is required as shown on Drawing PI-401. Although the plant is generally operated with only one aeration train online at a time, the probe modules shall have unique identification codes based on their location (Train A or B).

Clarification: The RTC shall send an aerator motor speed reference signal to the plant SCADA system for each of the four aerators in each train. The plant SCADA system will scale motor frequency to each aerator VFD.

Clarification: The plant SCADA PLC shall be CompactLogix 5380 series by Rockwell Automation as specified in Section 13460. Data exchange between Beckhoff IPC and CompactLogix shall be via Ethernet. Ethernet protocol shall be Ethernet/IP.

Clarification: Drawing M-401 indicates that all mounting hardware shall be provided for two sets of sensors (one set for each aeration train); only one set of sensors (four DO sensors, two NH4 sensors, and one MLSS sensor) shall be provided and mounted in the active train as directed by the Owner. The plant is generally operated with only one aeration train online at a time. The intent is for the sensors to be moved from one train to the other. Therefore, only one complete set of sensors is required, but mounting hardware shall be provided in each train.

Clarification: Regarding number of probe and display modules, provide four probe modules (PM1A, PM1B, PM2A, and PM2B) at the reactor tanks. Provide a fifth probe module and one display module in the Electrical Room. Refer to PI-401.

Item 3-22 Section 13457 – Ethernet Equipment

Clarification: Space must be provided in the MCC for the Ethernet switch. Refer to Drawing E-2010 for an example layout.

Item 3-23 Section 15830 – Negative Pressure Relief Door.

Add the attached Section 15830, Negative Pressure Relief Door.

Item 3-24 Section 15825 – FRP Duct, Dampers & Airflow Measurement

Add the words "11. Section 02516 – HDPE Pipe and Fittings (Odor Control Duct)" after paragraph 1.1.B.10.

Add the following after paragraph 2.3.A.6:

7. High Density Polyethylene Pipe (HDPE) designed in accordance with Section 02516 – HDPE Pipe and Fittings (Odor Control Duct) is an acceptable substituted for the buried (below grade) FRP ducts specified for the odor control ductwork on this project. Contractors substituting HDPE for the buried (below grade) FRP odor control ducts shall coordinate the connections between the buried HDPE and the above grade FRP ductwork in accordance with the requirements of the odor duct specifications. Non-buried odor control ductwork shall be FRP and the transition from HDPE to FRP shall be made within 6-inches of the ground surface or as required by the Engineer, to minimize HDPE duct exposure.

Item 3-25 Section 15910 - Direct-Digital Control (DDC) System for HVAC

Clarification: Third party commissioning is not required. Contractor shall perform the specified functional performance testing requirements noted in the specifications and coordinate the observance of all functional tests and testing and balancing with the Engineer.

Drawing Changes

Item 3-26 Drawing C-017, Sheet 26 of 304 – Soil Management Site Plan

Delete Drawing C-017 in its entirety and **replace** it with the attached Drawing C-017.

Item 3-27 Drawing C-024, Sheet 33 of 304 – Soil Excavation Profiles

Delete Drawing C-024 in its entirety and **replace** it with the attached Drawing C-024.

Item 3-28 Drawing C-025, Sheet 33A of 304 – Soil Excavation Profiles 2

Add Drawing Sheet C-025, Soil Excavation Profiles 2 after Drawing Sheet C-024.

Item 3-29 Drawing C-026, Sheet 33B of 304 – Soil Excavation Profiles 3

Add Drawing Sheet C-026, Soil Excavation Profiles 3 after Drawing Sheet C-025.

Item 3-30 Drawing A-302, Sheet 63 of 304 – Architectural Plan Intermediate Settling Tanks

Delete the words "& Epoxy Overlay System" after the words "Provide new rigid insulation, plaza deck roof system, conc topping slab with WWF" on the call out on the Plan – Intermediate Gallery.

Item 3-31 Drawing A-402, Sheet 65 of 304 – Architectural Plan Nitrification Settling Tanks

Delete the words "& Epoxy Broadcast Overlay System" after the words "New rigid insulation, plaza deck roof system, concrete topping slab with WWF" on the call out on the Plan – Nitrification Settling Tanks.

Item 3-32 Drawing A-1003, Sheet 81 of 304 – Architectural Plan Operations Building High Roof

Delete the words "Elastomeric Coating" in the Direct Applied Finish System Ceiling detail and **replace** them with the words "Direct Applied Finish System".

Item 3-33 Drawing A-1107, Sheet 91 of 304 – Room Finish Schedule

For Conference Room in the Operations Building, **add** the words "painted wood paneling" after the words "paint existing" for the wall finish.

For Operations Room in the Operations Building, **add** the words "CMU" after the words "paint existing" for the wall finish.

For Boiler Room in the Influent Pump Station, **add** the words "CMU" after the words "paint existing" for the wall finish.

For Room 103 (Toilet) in the Phosphorus Removal Building, **delete** the words "Chemical Resistant Coating" and **replace** them with the words "Ceramic Tile" for the floor finish, and **delete** the word "Vinyl" and **replace** it with the words "Ceramic Tile" for the base finish.

Item 3-34 Drawing PI-003, Sheet 160 of 304 – Network Architecture

Clarification: Contractor shall provide all ethernet cables to connect devices (VFDs, I/O adapters) to network.

Item 3-35 Drawing PI-401, Sheet 166 of 304 – Piping & Instrumentation Diagram Nitrification Reactor Tanks

For the DO Setpoint Analog Input (AI) signal shown above the PLC line, **replace** the quantity of 1 with the quantity of 4. Four DO setpoints are required per train to allow each aerator in the four zones to operate at different speeds.

Item 3-36 Drawing PI-701, Sheet 173 of 304 - Piping & Instrumentation Diagram Ultraviolet Disinfection System

Clarification: The five existing 42" x 42" sluice gates (1 in each Emergency Storage Tank, 2 in Chlorine Distribution Box) are operable.

Clarification: As shown on this sheet, there is no existing trough and slide gate connecting Emergency Storage Tank No. 1 (former UV Channel / Chlorine Contact Tank No. 1) and Emergency Storage Tank No. 2 (former Chlorine Contact Tank No. 2). Record drawings and Drawing D-701 show a trough and 72" x 48" self-contained sluice gate; however, the trough has been closed with concrete.

Item 3-37 Drawing H-1200, Sheet 234 of 304 – HVAC Schedules, Phosphorus Removal Building and Operations Buildings

Clarification: The Automatic Temperature Controls Contractor (ATCC) shall provide all controls for the indoor air handlers listed in the "Air Handling Unit Schedule" on Drawings H-1200 and H-1203, per Section 15720, Paragraph 2.9.

Clarification: The rooftop units and make-up air unit listed in the "Rooftop H.V.A.C. Unit Schedule" on Drawing H-1200 shall be provided with controls by the air handling unit manufacturer as stated in Section 15730. The ATCC shall provide additional controls and devices in accordance with the HVAC DDC System Control Diagrams and specifications.

Item 3-38 Drawing H-1203, Sheet 237 of 304 – HVAC Schedules

Clarification: The Automatic Temperature Controls Contractor (ATCC) shall provide all controls for the indoor air handlers listed in the "Air Handling Unit Schedule" on Drawings H-1200 and H-1203, per Section 15720, Paragraph 2.9.

Clarification: The gas fired air handlers listed in the "Indirect Gas Fired Air Handling Unit Schedule" on Drawing H-1203 shall be provided with controls by the air handling unit manufacturer as stated in Section 15722. The ATCC shall provide additional controls and devices in accordance with the HVAC DDC System Control Diagrams and specifications.

Item 3-39 Drawing E-002, Sheet 242 of 304 – Electrical Site Plan 1

Clarification: All buried ductbanks (including single conduits) shall be concrete encased as specified in 16138 and 16131. The detail labeled "A-A ductbank detail" on E-002 is intended for conduit size/contents and spacing/depth purposes only.

Bidding Period Questions & Responses

The following responses/clarifications are based on questions raised during the bidding period.

1. Per Specification Section 13228 - Odor Control Systems, the odor control system vessels are sized for a maximum 50 fpm airflow. Will increase in maximum air flow rate, decreased in vessel sizes and decrease in the media quantity be allowed?
   The odor control system vessel maximum airflow rate, vessel size and media quantities shall be as specified in Section 13228 – Odor Control Systems.

2. For Specification Sections 11285 and 11286, are North American fabricators allowed if all stainless steel raw materials are purchased from the United States?
   No. Per Clean Water State Revolving Fund American Iron and Steel requirements, all manufacturing processes, including forming, rolling, and fabricating of iron and steel products must take place in the United States. Refer to Section 00800-Paragraph 18.11, Section 00800-Attachment E, and Section 01330-Paragraph 1.4.E.7.

3. Do the American Iron and Steel requirements of the Clean Water Act apply to Stainless Steel Nuts and Bolts used in Pipe Couplings, Restraints, Joints, Flanges, and Saddles?
   As of August 24, 2018, the "Final Extension of the Short-Term National Product Waiver for Stainless Steel Nuts and Bolts used in Pipe Couplings, Restraints, Joints, Flanges, and Saddles for State Revolving Fund Projects" was signed. The decision memorandum states that the third and final extension to the waiver will be extended 18 months from the signing date of this waiver (sunset date) and this waiver will not be renewed after the sunset date. The Contractor is required to comply with the American Iron and Steel requirements of the Clean Water Act, including compliance with waivers and the expiration of waivers, at no additional cost to the Owner.

END OF ADDENDUM NO. 3

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SECTION 00410

FORM FOR GENERAL BID

PROJECT IDENTIFICATION:

Town of Southington, Connecticut

Water Pollution Control Facility

Phosphorus Removal Upgrade

TABLE OF ARTICLES

ARTICLE 1 - BID RECIPIENT

1.1 This Bid is submitted to:

Town of Southington Office of Town Manager

75 Main Street

Southington, CT 06489

1.2 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 - BIDDER'S ACKNOWLEDGEMENTS

2.1 Bidder accepts all of the terms and conditions of the Advertisement for Bids and Instructions to Bidders, including without limitation, those dealing with the disposition of Bid deposit. The Bid will remain subject to acceptance for 120 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.1 In submitting this Bid, Bidder represents, as set forth in the Agreement, that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents and hereby acknowledges the receipt of all Addenda.

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

K. Bidder is aware that the estimated quantities on the Bid Form are subject to Article 13.03 of the General Conditions (Section 00700).

ARTICLE 4 - BIDDER'S CERTIFICATION

4.1 Bidder certifies that Bidder will comply with the CT DEEP Clean Water Fund Memorandum regarding Disadvantaged Business Enterprise (DBE) Subcontractor Participation on Clean Water Fund (CWF) Construction Projects. The Bidder, if this Bid is accepted, shall be required to obtain from each of its subcontractors a copy of the certification by said subcontractor. The Subcontractor Verification Form and corresponding MBE/WBE certifications must be submitted to the Owner within fourteen (14) calendar days after the Bid opening.

4.2 Bidder certifies that, under penalty of perjury, Bidder is not presently debarred from doing public construction work in the State of Connecticut under the provisions of Section 31-53a of the Connecticut General Statutes or any other applicable debarment provisions of any other chapter of the General Statutes or any rule or regulation promulgated thereunder; and is not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency.

4.3 Bidder hereby certifies under the penalties of perjury, to the best of Bidder's knowledge and belief, that Bidder has filed all State tax returns and paid all State taxes required by law.

4.4 Bidder certifies that this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation.

4.5 Bidder certifies that Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid.

4.6 Bidder certifies that Bidder has not solicited or induced any individual or entity to refrain from bidding.

4.7 Bidder certifies that Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph:

A. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;

B. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of the Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

C. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

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

ARTICLE 5 - BASIS OF BID

5.1 Bidder proposes to furnish all labor and materials required for construction of the WPCF Phosphorus Upgrade, Southington, CT in accordance with the accompanying Bidding Documents prepared by Tighe & Bond, Inc., for the Contract Price specified below, subject to additions and deductions according to the terms of the Bidding Documents.

5.2 This Bid includes Addenda numbered _____.

5.3 The proposed Contract Price for the base bid is the sum of Items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12 below:

Item 1 – Water Pollution Control Facility Improvements: The work of the Contractor, being all base bid Work other than that covered by Items 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12.

_____ dollars
(Bid in words)

($ _____)
(figures)

Item Number	Item Name and Unit Bid Prices Written in Words and Figures	Estimated Quantity	Total Amount of Item (in figures)
2	Ballasted Flocculation System including all ancillary equipment, spare parts, tools, and special services specified in Section 11369, furnished only (equipment installation included in Item 1), the price of:		
	One million two hundred nineteen thousand one hundred dollars ($1,219,100.00)	x 1 L.S. =	$1,219,100.00
3	Ballasted Flocculation System Validation Testing Services (see Section 11369), the price of:		
	Twenty thousand dollars ($20,000.00)	x 1 L.S. =	$20,000.00
4	Ballasted Flocculation System Extended Warrantee (see Section 11369), the price of:		
	Zero dollars ($0.00)	x 1 L.S. =	$0.00
5	Ballasted Flocculation System Seller's Service Agreement (see Section 11369), the price of:		
	Thirty-eight thousand one hundred forty dollars ($38,140.00)	x 1 L.S. =	$38,140.00

6	UV Disinfection System including all ancillary equipment, spare parts, tools, and special services specified in Section 11262, furnished only (equipment installation included in Item 1), the price of: Five hundred sixty-eight thousand dollars ($568,000.00)	x 1 L.S. =	$568,000.00
7	UV Disinfection System Extended Warrantee (see Section 11262), the price of: Zero dollars ($0.00)	x 1 L.S. =	$0.00
8	UV Disinfection System Seller's Service Agreement (see Section 11262), the price of: Eight thousand dollars ($8,000.00)	x 1 L.S. =	$8,000.00
9	Equipment and Electrical Spare Parts (see Sections 11010 and 16110), the price of: ($)	x 1 L.S. =	$_____
10	Office Furniture (see Section 12510), the price of: ($)	x 1 L.S. =	$_____
11	Contaminated Soil Excavation and Disposal (≥1 ppm PCBs at a TSCA Approved Disposal Facility), per ton, the price of: ($)	x 3,360 Tons =	$_____
12	Mechanical Aerator Field Performance Testing (as specified in Paragraph 3.5 of Section 11376), the price of: ($)	x 1 L.S. =	$_____

5.4 The proposed Contract Price (base bid, the sum of Items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12 above, excluding alternates) is:

_____ dollars
(words)

($_____)
(figures)

5.5 The proposed Contract Prices for the Alternate Work is provided below:

Alternate No. 1, Third Trickling Filter No. 1 Dome Cover Add $_____

_____ dollars

(words)

Alternate No. 2, West Sludge Storage Tank Upgrades Add $_____

_____ dollars

(words)

Alternate No. 3, Intermediate Tanks Odor Control Add $_____

_____ dollars

(words)

Alternate No. 4, Full-Width Pavement Overlay Add $_____

_____ dollars

(words)

Alternate No. 5, Nitrification Reactor Weir Gates Add $_____

_____ dollars

(words)

Alternate No. 6, Primary Gallery Lighting Replacement Add $_____

_____ dollars

(words)

Alternate No. 7, Intermediate Settling Tank and Nitrification Settling Tank Mechanisms Replacement Add $_____

_____ dollars

(words)

Alternate No. 8, Operations Building Roof Replacement Add $_____

_____ dollars

(words)

ARTICLE 6 - TIME OF COMPLETION

6.1 Bidder agrees that the Work will be substantially completed and ready for final payment in accordance with paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.2 Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times as stated in the Agreement.

ARTICLE 7 - ATTACHMENTS TO THIS BID

7.1 The following documents are attached to and made a condition of this Bid:

A. Bid deposit in the amount of _____ dollars ($_____), consisting of a bid bond in the amount of five percent of the total amount of Bid

B. Evidence of authority to sign

C. List of Project References

D. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids

E. A list of adversarial proceedings in which the bidder is or was a party within the past 5 years that relate to the procurement or performance of any public or private construction contract together with a brief statement as to outcome if concluded or status if pending.

F. A list of any projects on which the firm was terminated or failed to complete the work within the past 5 years, including a brief explanation for each instance listed.

G. Evidence of Bidder's qualifications in accordance with Article 3 of Section 00200

H. Clean Water Fund Memorandum 2016-003: DBE Subcontractor Participation on CWF Construction Projects

I. Department of Administrative Services Prequalification Certificate

J. Department of Administrative Services Update (Bid) Statement

K. List of Subcontractors

L. Town of Southington New Vendor Disclosure Statement

M. Town of Southington Non-Collusion Affidavit

N. American Iron and Steel Acknowledgement Form

ARTICLE 8 - BID SUBMITTAL

BIDDER: *[Indicate correct name of bidding entity]*

_____

By:
[Signature] _____

[Printed name] _____
(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

_____

_____

_____

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

_____

Bidder's License No.: _____
(where applicable)

END OF SECTION

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SECTION 02110

CONTAMINATED AND POLLUTED SOIL EXCAVATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Excavation, handling, stockpiling, reuse, and temporary storage of Contaminated and/ or Polluted Soils.

a. Refer to Soil Management Drawings C017, C024, C025, and C026 (the Soil Management Drawings) for the location of known areas of Contaminated and Polluted soils. As shown on the Soil Management Drawings, Contaminated soils are present in Area 1, the Lagoon Area, and Area SW, and Polluted soils are present in Area 3.

2. Movement and placement of Polluted Soil into temporary controlled stockpile area(s) as shown on Drawing C017.

3. Decontamination of tools, equipment, and vehicles and the collection, management and disposal of resulting liquids and/or solids.

4. Other work involving the handling of Contaminated and Polluted soils which may be required including but not limited to miscellaneous facility component removal, removal of obstructions, excavation support systems, and any incidental work related thereto.

B. Related Sections

1. Section 01350, Health & Safety Plan

2. Section 02120, Transportation and Disposal of Contaminated Soil

3. Section 02315, Excavation, Backfill and Compaction

1.2 REFERENCES

A. Regulations of Connecticut State Agencies (R.C.S.A) Sections 22a-133k-1 though 22a-133k-3

B. 40 CFR Part 261, Identification and Listing of Hazardous Waste

C. 40 CFR Part 268, Land Disposal Restrictions

D. In preparation of Drawings and Specifications, the Engineer has conducted environmental investigations at the project site consisting of soil and groundwater testing for PCBs with limited analysis of other contaminants. Documents describing Contaminated and Polluted soil present at the site are described/depicted in the documents below, which may be reviewed in the Engineer's office upon request. Full laboratory data reports for work conducted by the Engineer can be made available upon request.

1. Design Memorandum No. 16 - Subsurface Environmental Investigation

2. PCB Soil Management Letter, dated July 16, 2018

3. Southington Wastewater Treatment Plant PCB Soil Data Figures 1-5

1.3 DEFINITIONS

A. Natural Soil: Soil in which all substances naturally occurring therein are present in concentrations not exceeding the concentrations of such substance occurring naturally in the environment and in which soil no other substance is analytically detectable.

B. Contaminated Soil: Means treated or untreated soil affected by a known or suspected release and determined, or reasonably expected to contain substances exceeding Residential Direct Exposure Criteria or GA Pollutant Mobility Criteria, as these terms are defined in section 22a-133k-1 of the Regulations of Connecticut State Agencies. For PCBs, Contaminated soil shall be considered soil with PCB concentrations $\geq$ 1 ppm.

C. Polluted Soil: Means soil affected by a release of a substance at a concentration above the analytical detection limit for such substance. For PCBs, Polluted soil shall be considered soil with PCB concentrations $<$ 1 ppm.

D. Clean Fill: Means (1) natural soil and (2) rock, ceramics, uncontaminated brick and concrete.

E. Special Handling: Methods used to excavate, collect, grade, load, move, transport, stockpile, dispose, or otherwise manage a contaminated material or Contaminated Soil or Polluted Soil are such that (1) the spillage, loss, co-mingling, or uncontrolled deposition of such material is minimized, (2) personal exposure to contaminants present in such a material are minimized, (3) the adverse impacts to the community and the surrounding environment from contaminants present in such material are minimized, (4) all applicable regulatory requirements applicable to such activity are satisfied.

1.4 QUALITY ASSURANCE

A. All Contaminated soil and/or Polluted soil excavated or otherwise collected, consolidated and managed during the course of the work will require Special Handling in accordance with these specifications, Contractor Health and Safety Plan, and all applicable permits, approvals, authorizations, and Regulations.

B. Perform the handling of Contaminated and Polluted materials with equipment and techniques in accordance with the performance requirements defined in this specification.

C. Contractors handling and disposing of Contaminated and/or Polluted soils shall be a qualified remediation Contractor and shall possess relevant and sufficient experience in the excavation, handling, stockpiling, and disposing of Contaminated media such as soil and groundwater. Contractor shall have all appropriate training including OSHA HAZWOPER trained personnel.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.1 GENERAL

A. Provide all employees and subcontractor(s) with personal protective equipment and protective clothing consistent with the levels of protection for this work as indicated in Contractor's Health and Safety Plan.

B. Perform all contaminated or polluted material handling operations in accordance with standard engineering practices applicable to such activity, according to CTDEEP regulations, and according to the provisions of Contractor Health and Safety Plan. Utilize methods which consider the health and safety of all Contractor and subcontractor personnel, support personnel, Engineer and his representatives, and the surrounding environment.

C. All site health and safety controls shall be fully established and in operation prior to beginning any contaminated material handling activity. Site controls shall include but not be limited to work zones properly barricaded, decontamination facilities, air monitoring, and all support equipment and supplies including personal protective equipment. Comply with the requirements of Section 01350, Health and Safety Plan.

D. Minimize the spread of contaminated and polluted materials during handling. Transport vehicles used to move soil at the Project Site shall be free from leaks. Trucks or other conveyances deemed unacceptable for use by Engineer shall not be used for the movement of contaminated materials.

E. Keep work areas, including but not limited to, areas adjacent to excavations, roadways leading to and from excavation areas, driveways, parking areas, and public roadways free of contaminated or polluted materials. If such materials are deposited, spilled, or spread, such material shall be removed promptly, and properly disposed of to the satisfaction of Engineer no later than the end of each working day or as requested by Engineer.

F. Owner is the generator and will sign all manifests and bills of lading. Except for materials required to be transported under manifest, transport all Contaminated or Polluted Soil material under bills of lading regardless of the chemical quality of the soils.

G. Within two weeks of notice to proceed and prior to excavation, Engineer shall implement an in-situ soil waste characterization program to obtain disposal facility approval for contaminated soils. The waste characterization program shall consist of one to two days of test pitting. Contractor shall supply labor and equipment to conduct test pits. Engineer will provide personnel to collect waste characterization soil samples for laboratory analysis. Soil samples will be collected at frequency of approximately one composite sample per 500 cubic yards of contaminated soil. Soil sample analyses will be selected based on input from the Contractor based on the analytical requirements of the disposal facility selected by the Contractor. Upon receipt of analytical soil results, Engineer shall furnish waste characterization results to the Contactor (5-day lab turnaround is anticipated). Contractor shall be responsible for obtaining approval of acceptable of contaminated materials. In addition, at the time waste characterization soil sampling is conducted, a pre-excavation kick-off meeting shall be held at the site to discuss the Contractor's excavation work plan as noted in 3.1 H below.

H. Prior to the commencement of excavation activities, areas subject to excavation shall be surveyed by a licensed surveyor retained by the Contractor to the satisfaction of the Engineer to separate soils within Area 1, Area 3, and the Lagoon. The Contractor shall prepare excavation work plan describing the means and methods for conforming with this specifications and related sections. The work plan shall provide information such as soil handling procedures, sediment and erosion controls, control of dust, work and support zone delineation, decontamination of equipment (see below Section 3.1 I), equipment transportation routes, etc.

I. All non-disposable equipment and tools employed during the project shall be decontaminated by the Contractor prior to removal from the site in accordance with EPA self-implementing procedures outlined in 40 CFR 761.79 or 40 CFR Part 761, Subpart S. In addition, the Contractor shall collect wipe samples referencing wipe sample procedure in TSCA and 10 ug/100 cm2 standard prior to removal from the site. These procedures shall also be performed for equipment and tools that are reused in-between excavation of Area 1, Area 3, Lagoon, and Area SW. The Contractor shall be responsible for proper disposal of all contaminated media generated during any decontamination procedures. The Contractor shall supply the Engineer with wipe sampling results as well as all waste disposal documentation at the time of disposal.

3.2 EXCAVATION OF CONTAMINATED AND POLLUTED MATERIALS

A. Perform excavation in accordance with the requirements of Section 02315, Excavation, Backfill and Compaction, and this section.

B. Engineer will evaluate field conditions to determine if additional excavation is required to achieve soil management objectives. At this time, initial excavation limits are anticipated to be as shown on the Soil Management Drawings. Contractor shall excavate Contaminated and Polluted soils to the limits shown on the Soil Management Drawings or as directed by the Engineer. During excavation Engineer shall evaluate the need for additional excavation. This evaluation may require Engineer to work in close proximity to Contractor's excavation equipment and may require frequent pauses in the work to evaluate soil conditions. It is anticipated that the Contractor will first excavate to the initial excavation limits shown on the Soil Management Drawings, at which time the Engineer will evaluate soil conditions and collect confirmation samples to determine if any Contaminated soils remain within the excavation limits. The Engineer will provide 48 hour turnaround for confirmation samples. If the confirmation samples indicate the presence of remaining Contaminated soils within the excavation, the Contractor shall remove the remaining Contaminated soil and the Engineer shall then collect additional confirmation samples. This procedure shall be repeated until Contaminated soils are no longer present in the excavation. Contractor shall work in a cooperative manner at all times during these operations to ensure the safety of Engineer, and to allow for thorough field evaluations to be conducted.

1. When contaminated and polluted material excavation is undertaken, Engineer will make the final determination as to the limits of excavation required to achieve soil management objectives. Such limits shall be based upon actual conditions encountered at the time of excavation and will be determined based on analytical results (PCBs < 1 ppm) associated with confirmation soil sampling by the Engineer.

C. Minimize the spread and loss of contaminated or polluted materials during excavation activities.

1. Following excavation, live load and transport Contaminated soils (Area 1 and the Lagoon) directly to an approved TCSA disposal facility. Excavated contaminated materials shall not be placed directly on the ground.

2. Following excavation, transport polluted materials (Area 3 Soils) directly to the temporary controlled stockpile areas for stockpiling as shown on Drawing C017.

D. Employ methods necessary to isolate contaminated materials from non-contaminated soils to the degree practicable. During interim phases of excavations, Contractor shall make appropriate measures to protect abutting areas of Contaminated soil at the project excavation limits from cross contamination, migration, erosion, etc. Areas that are determined to be have been recontaminated will require additional excavation to removed Contaminated soils. Final excavation limits in all areas subject to excavation will be subject to confirmation testing as described in Section 3.6.

E. Segregate construction debris from excavated contaminated materials at the point of excavation, prior to the movement of contaminated materials from excavation areas. Engineer may evaluate debris during excavation to determine if such material can be designated uncontaminated general demolition material.

F. Open excavations represent a substantial hazard. Contractor shall implement measures as appropriate to secure open excavations while awaiting Engineer's confirmation test results from soils (refer to Item 3.6) or any other period when excavations remain open. Refer to the requirements of Section 02315.

G. Implement measures to divert surface water around excavation sites to prevent water from directly entering into open excavations.

3.3 ON-SITE MANAGEMENT AND REUSE OF POLLUTED SOILS

A. Polluted soils are known to be located within Area 3 shown on Drawing C017. Soils excavated from Area 3 shall be directed to the controlled stockpile area (s) as shown on Drawing C017. A portion of these soils may be used to backfill building foundations and excavation areas associated with Area 1 and the Lagoon. Prior to soil reuse, Polluted soil stockpile(s) will be sampled by the Engineer. If any portion of the Polluted soils stockpile(s) are determined to be unsuitable based on soil quality, then those soils will be subject to off-site disposal as Contaminated soils. Soil reuse in these areas should also conform to the following requirements.

1. Cannot be placed below the water table

2. Cannot be placed in an area subject to erosion

3. A map showing the location and depth of all re-used soil must be prepared by the Contractor following the completion of site work. This map will be included in a soil management summary report to be prepared by the Engineer.

4. Polluted and stockpiled soils used as backfill and backfilling work shall be in accordance with Section 02315. Polluted soils shall be granular and free of organic material, large stones, and other unsuitable materials as determined by the Engineer.

5. An area of known unsuitable soils is located in Area 3 and shown on the Soil Management Drawings. The Contractor should further segregate these soil within the controlled stockpile area(s) provided that the unsuitable soil is not Contaminated soil. If other Polluted soil is determined to be unsuitable for reuse, such soils shall remain in the controlled stockpile area(s).

3.4 DEMARCATION AND BACKFILL

A. Prior to backfilling of excavation areas, a demarcation layer (such as polyethylene sheeting, snow fencing, etc.) to be approved by the Engineer shall be placed along excavation sidewalls as shown on Drawings C017 and C024.

B. Backfill excavations in accordance with Section 02315, Excavation, Backfill & Compaction. As possible, the source of backfill shall include soils derived from Area 3.

C. Backfill excavations as soon as possible after Engineer has indicated that test results, if required by Engineer, confirm soil management objectives have been achieved and backfilling may proceed. Prior to backfill, Contractor shall protect open excavation slopes from sloughing and erosion due to the work and weather.

3.5 UNFORESEEN CONTAMINATED MATERIALS

A. In the event that unforeseen contaminated materials are encountered during the course of the work, permit the Engineer sufficient time to devise an appropriate course of action based upon the conditions present.

1. Until such appropriate course of action is devised, Contractor shall secure the work area in question such that it does not pose a health and safety risk.

2. Engineer will provide Contractor with a scope of work and performance requirements for the collection, consolidation, removal or excavation of unforeseen contaminated material. Contractor shall then undertake contaminated material remediation with equipment and techniques established by Contractor in accordance with said scope of work and performance requirements.

B. Contaminated material removal shall be performed in accordance with this specification and related sections. The Contractor shall be paid for the excavation and disposal of unforeseen contaminated materials on a unit price basis under Bid Item No. 11 (Contaminated Soil Excavation and Disposal) in Section 00410.

3.6 CONFIRMATION TESTING BY ENGINEER

A. At such time the Engineer is satisfied that the limits of contaminated material have been reached, Engineer will perform appropriate confirmation sampling to confirm soil management objectives have been achieved and no additional contaminated material excavation or removal is required. Confirmation resampling may be conducted if it is determined that excavation areas have been recontaminated by abutting areas of Contaminated soil present in areas abutting the project area.

B. Contractor is hereby notified that laboratory turnaround time for the analysis of confirmation samples will be 48 hours. If from date of collection. No claim for delay will be considered based upon Contractor failing to accommodate the laboratory turnaround time as defined herein.

C. Engineer will inform Contractor if test results confirm remediation objectives have been achieved and backfilling may proceed.

D. Should the results of Engineer's testing indicate additional contaminated material excavation or removal is required, Engineer will define those areas beyond the limits originally indicated where additional contaminated material excavation or removal shall be required.

3.7 STORAGE OF POLLUTED MATERIALS

A. Excavated polluted material (Area 3) shall be temporarily stockpiled on-site as shown on Drawing C017. Prior to stockpiling Polluted soil in Area SW, the Contractor shall excavate and dispose of Contaminated soils from Area SW. Stockpile polluted soils in an area designated by the Engineer in such a manner to protect existing site surface, materials and structures from contamination, runoff and erosion. Place the Polluted soil on a minimum of 20 mil polyethylene sheeting and at the end of each day the stockpiled soil shall be covered with 10 mil polyethylene sheeting and secure the covering to prevent the stockpile from becoming uncovered due to winds. The Contractor shall provide erosion and sediment controls as required by the General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer).

B. Stockpiles will be subject to a General Permit for Contaminated Soil and/or Sediment Management (Staging and Transfer), to be obtained by the Engineer on behalf of the Town of Southington. Contractor shall be responsible for complying with all aspects of this permit.

3.8 DUST CONTROL

A. Implement fugitive dust suppression to prevent unacceptable levels of dust resulting from handling operations associated with Contaminated and polluted materials excavation and management. Dust suppression methods shall be subject to approval from Engineer. Supervise fugitive dust control measures and monitor airborne particulate matter as required.

END OF SECTION

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SECTION 02516

HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS (ODOR CONTROL DUCT)

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. The Contractor shall furnish and install high density polyethylene (HDPE) duct/piping for below grade odor control duct, flanged connections to FRP above grade duct, and all appurtenances, complete and in place, all in accordance with the requirements of the Drawings.

a. Centralized Odor Control System – below grade odor control duct from gooseneck intake vents and sources to odor control skid (limit of Odor Control Package).

b. Intermediate Pumping & Settling Odor Control System – below grade odor control duct from gooseneck intake vents and sources to odor control skid (limit of Odor Control Package).

2. Related System accessories including hardware for each system.

B. Related Sections

1. Section 02315 – Excavation, Backfill, Compaction and Dewatering

2. Section 02320 – Borrow Materials

3. Section 15825 – FRP Duct, Dampers and Airflow Measurement (Odor Control)

4. Section 15950 – Testing, Adjusting and Balancing

1.2 REFERENCES

A. Air Movement and Control Association (AMCA)

B. ASTM D1248 – Standard Specification for Polyethylene Plastics Extrusion Materials For Wire and Cable

C. ASTM D2321 – Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications

D. ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

E. ASTM D3261 – Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

F. ASTM D3350 – Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

G. ASTM F894 - 13 – Standard Specification for Polyethylene (PE) Large-Diameter Profile Wall Sewer and Drain Pipe

H. ASTM F714-13 Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter

I. AWWA C906 – Polyethylene (PE) Pressure Pipe and Fittings, 4-Inch (100 mm) Through 63-Inch (1,575 mm), for Water Distribution and Transmission

J. State of Connecticut Building Code (current edition)

1.3 SUBMITTALS

A. Material specifications and shop drawings for all materials and equipment furnished under this Section.

B. Layout drawing and connection details with above grade FRP ductwork.

C. Submit product data on the pipe, fittings, and accessories.

D. A copy of this specification with check-marks by each line signifying full compliance.

E. Design calculations performed by the manufacturer and stamped by a qualified professional engineer prior to release for fabrication.

F. Inspection & testing reports as described herein. Submit a letter signed by a registered professional engineer stating that testing results meet the specified performance requirements.

G. Prior to first shipment of pipe, submit certified test reports that the pipe for this Contract was manufactured and tested in accordance with the appropriate ASTM standards specified herein.

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

I. Additional Duct Submittals

1. Certificates of Compliance on all duct materials

2. Construction details for flexible connectors, expansion joints, elbows, transitions, junctions, spectacle flanges and flanged fittings, including flange fabrication and assembly details.

J. Submit resumes for all personnel performing heat fusion joining.

1.4 QUALITY ASSURANCE

A. Secure all permits and pay all fees required to carry out the ductwork. Comply with all laws, ordinances, codes, rules, and regulations of the local and state authorities having jurisdiction over any of the work specified herein. Where provisions of the Contract are in conflict with the codes, the more stringent of either the codes or the Contract Documents shall govern.

B. The drawings and diagrammatics show the duct/piping sizes and general routing. Offsets and fittings required to avoid field interferences and address actual field conditions shall be provided at no additional cost to the Owner.

C. Personnel performing heat fusion joining shall have adequate training and experience in the procedure, demonstrated by at least twelve months applicable experience.

D. Use an adequate number of skilled laborers, equipment of adequate size, capacity, and quantity to perform the work of this Section, and its related Sections, in a timely manner.

1.5 DELIVERY, STORAGE AND HANDLING

A. When lifting with slings, only wide fabric choker slings capable of safely carrying the load shall be used. Wire rope or chain shall not be used to handle pipe.

B. Care shall be taken in loading, transporting, and unloading to prevent damage to the duct/piping. Duct/pipe or fittings shall not be dropped. All duct/pipe or fittings shall be examined before installing, and no piece shall be installed which is found to be defective. Any damage to the duct/pipe shall be repaired as directed by the Engineer at no additional cost to the Owner.

C. If any defective duct/pipe is discovered after it has been installed, it shall be removed and replaced with a sound duct/pipe in a satisfactory manner. All duct/pipe, fittings shall be thoroughly cleaned before installing, shall be kept clean until they are used in the work, and when installed shall conform to the lines, grades and dimensions required.

D. Observe all manufacturer's storage and handling requirements and recommendations.

PART 2 PRODUCTS

2.1 GENERAL

A. The manufacturer shall have manufacturing and quality assurance facilities capable of producing and assuring the quality of the pipe and fittings required by these specifications. The general quality assurance practices and methods shall be in accordance with ISO 9001:2015 standard..

B. Supplier shall be responsible for the system compatibility between pipe and fittings components.

2.2 HDPE DUCTWORK MANUFACTURERS

A. Product /Manufacturer/Distributors: Named Manufacturers/Distributors are not relieved from conforming to the specification requirements. Any alternative products submitted or named products / manufacturers listed below must conform to the specification without exception.

1. Vari-Tech LLC

2. Infra Pipe Solutions (Formerly Uponor Infra and KWH Pipe)

3. Or equal.

2.3 PERFORMANCE CRITERIA

A. The HDPE ductwork shall effectively convey air from various parts of the waste-water treatment plant process without excessive noise or pressure drop. Airstream will contain various corrosive gasses typically generated by the wastewater treatment plant process plus sulfuric acid formed in condensate.

B. Ducts shall be designed to withstand a maximum loading of 40 inches water column of positive and negative (i.e. vacuum) pressure.

C. The HDPE ductwork shall be designed and fabricated for odor control service to moisture-laden air with hydrogen sulfide, mercaptans and other organic and inorganic compounds typically associated with wastewater treatment.

D. The following physical/chemical/moisture/temperature conditions are expected to exist at various times in the air stream. The material used shall be suitable for all of the following:

1. Flow medium and velocity - air at 4000 feet per minute

2. H2S (hydrogen sulfide) – up to 10 ppm

3. Water Vapor – up to 100% RH with low ph (<2) probable

4. Temperature Range: 20 to 125°F

E. Buried (Below-Grade) HDPE Ducts: All buried HDPE duct shall meet the requirements of ASTM F894 and/or ASTM F714, the Plastic Pipe Institute Handbook of PE Pipe and shall be rated for H-20 Loading.

The minimum burial depth and anchorage of duct to prevent uplift from floatation shall be in accordance with the requirements of the Plastic Pipe Institute Handbook of PE Pipe,

1. All burial calculations for deflection, compression, combined loads and buckling shall meet the requirements of the Plastic Pipe Institute Handbook of PE Pipe, whichever is more stringent.

F. All metal parts shall be Type 304 stainless steel.

2.4 HDPE DUCT

A. The duct shall be manufactured by continuous winding of a special profile onto suitably sized materials and shall meet the requirements of ASTM F-894.

B. Duct shall be made of virgin, extra high molecular weight polyethylene compounds, as per ASTM F714 Solid Wall Pipe which meet or exceed the requirements of ASTM D-3350, Cell Class 445574Cas specified in ASTM F714 or as per ASTM F894 pipe which meet or exceed the requirements of ASTM D-3350.

C. The minimum wall thickness for all buried duct shall meet the requirements of, of ASTM F894 for the specific diameter and required RSC or ASTM F714 for the specific diameter and required DR the Plastic Pipe Institute Handbook of PE Pipe and shall be rated for H-20 Loading at the installation depth. The minimum allowable pipe class shall be RSC 63 for ASTM F894 pipe and DR 11,17, 21. Diameters shown on the drawings should be construed as clear inside diameters.

D. Solid wall pipe and fittings shall be free from foreign inclusions and visible defects. The ends of the pipe shall be cut squarely and cleanly so as not to adversely effect joining.

E. Solid wall pipe and fittings shall be joined by butt fusion welding or electrofusion.

F. Polyethylene fittings shall be fabricated to the same class as the mating pipe.

2.5 HDPE DUCT FITTINGS

A. General

1. Fittings and fabricated specials shall be made from material meeting the same requirements as the duct. Polyethylene fittings shall be molded or fabricated by the manufacturer of the duct.

2. Elbows, wyes, and other fabricated specials shall be mitered from solid wall or profile wall pipe sections welded together using extrusion welding.

3. Molded fittings shall be manufactured in accordance with ASTM D3261 (butt fused) and shall be so marked.

4. Fittings shall meet the requirements of either ASTM F-894, ASTM F714 or AWWA C906, whichever is applicable.

5. The pipe sections forming miters shall be cut to fit with no gap.

6. Tolerances on the angle of all elbows shall be plus or minus 1 degree.

7. Corrosion resistance and working pressure of fittings shall be equal or greater to that of the connecting pipe.

8. Elbows shall be per the following table:

Angle of Elbow (Degree)	Number of Miters
0 to 30	1
31 to 60	2
61 to 90	3

B. Flanged Transitions

1. Flanged transition between HDPE and FRP pipe shall be made by means of either a HDPE flanged adapter with stainless steel lap joint flange follower or a fabricated HDPE flat flange with stainless steel backing ring. Nuts and bolts shall be 304 stainless steel.

2. Flange adapters shall be fitted with convoluted stainless steel back-up rings. The backup ring bore shall be chamfered or radiused to provide clearance to the flange adapter radius. Flange bolts and nuts shall be Grade 2 or higher.

3. Contractor to coordinate flange dimensions to mate with above ground duct and/or appurtenances.

C. Bell and Spigot Gasketed Joints

1. Joints shall be integral bell and spigot gasketed joints with the spigot confined in a machined spigot groove.

2. Joints shall meet the requirements of ASTM D-3212.

3. The gasket shall conform to ASTM F-477

4. The maximum angular deflection shall be 3 degrees.

5. Extrusion welding of joints is permissible.

2.6 PIPE IDENTIFICATION

A. The following shall be continuously indent printed on the pipe or spaced at intervals not exceeding five-feet:

1. Name and/or trademark of the pipe manufacturer.

2. Nominal pipe size.

3. Dimension ratio or ring stiffness class.

4. The letters “PE” followed by the polyethylene grade in the ASTM designation.

5. A production code from which the date and place of manufacture can be determined.

2.7 DRAINS

A. Provide flanged nozzles or flanged tees or weld a HDPE drain in the bottom of the pipe for attachment of field installed drain piping and valves at all low points. Provide 1½ -in minimum schedule 80 PVC pipe and PVC ball valve duct drains in the bottom of all main, branch and riser ducts to allow removal of condensate.

2.8 DUCTWORK AT TERMINATIONS

A. Where ducts connect to or terminate at new or existing ductwork, floor or wall penetrations provide any required matching flanges with EPDM or Hypalon gaskets and stainless steel fasteners.

PART 3 EXECUTION

3.1 PREPARATION

A. The Contractor shall verify that the surface has been prepared to the proper line and grade by shooting invert elevation grades.

3.2 INSTALLATION

A. Polyethylene duct and fittings shall be installed in accordance with ASTM Standards, and the manufacturer’s recommendations.

B. Duct is to be lifted or rolled into position, not dragged over the prepared bedding.

C. Ducts shall be installed with sufficient slopes for venting or drainage of liquids and condensate to low point drains as shown on the Drawings. Ducts shall be installed sloped as directed on the drawings to allow for complete drainage of liquid due to condensation.

D. All HDPE piping shall be bedded in 6” of crushed stone unless noted otherwise. Classification for bedding and backfill as per ASTM D2321.

E. Crushed stone shall be used as backfill to a point of 12” above the top of the pipe unless noted otherwise.

F. Excavation, trenching and back filling procedures shall be in accordance with Section 02315 and ASTM D2321. Bedding material below and to the sides of the duct shall be compacted sufficiently to resist duct movement and minimize deflection and ovalization.

1. The nominal trench widths are listed by pipe size in Table 1 below.

TABLE 1 - DUCT TRENCH WITH REQUIREMENTS

NOMINAL DUCT DIAMETER (INCHES)	MIN. WIDTH OF TRENCH (INCHES)	MAX. WIDTH OF TRENCH (INCHES) *
4	18	28
6	20	30
8	23	32
10	25	34
12	26	36
14	31	38
16	33	40
18	36	42
20	39	44
24	44	48
30	52	56
36	60	64
* TRENCH WIDTH MAY INCREASE DEPENDING ON SOIL CONDITIONS		

2. The trench bottom bedding material shall be carefully placed and tamped by hand to ensure complete pipe support.

3. The bedding material at the sides of the HDPE duct shall be added in lifts, not to exceed 6″ at a time. Lifts shall be mechanically compacted to a minimum of 95% of the materials tested proctor density, and continued to 12″ above the top of the HDPE duct. Compaction testing shall be performed in accordance with specification Section 02315.

   a. Soil stiffness categories shall be as defined in accordance with as per ASTM D2321.

   b. Maximum particle size shall be 3/4-inch for all backfill material categories.

   c. A permeable fabric trench liner shall be used where significant ground water flow is anticipated.

4. Backfill 12” above the HDPE duct and higher may be placed and compacted in 12” lifts utilizing a machine. No material larger than 6” diameter shall be placed in the trench and no materials larger than the specified duct bedding sieve size shall be placed within the bedding area of the HDPE duct.

5. No single piece of pipe shall be laid unless it is generally straight. The centerline of the pipe shall not deviate from a straight line drawn between the

centers of the openings at the ends of the pipe by more than 1/16 inch per foot of length. If a piece of pipe fails to meet this requirement check for straightness, it shall be rejected and removed from the site. Laying instructions of the manufacturer shall be explicitly followed.

6. Install piping and fittings true to alignment and grade. If necessary, each length of pipe shall be cleaned out before installation.

G. Flange Installation

1. Flange connections shall be installed in accordance with the manufacturer's recommended procedure.

2. Flanges shall be centered and aligned to each other before assembling and tightening bolts.

3. In no case shall the flange bolts be used to draw the connection into alignment.

4. Bolt threads shall be lubricated, and flat washers should be used under the nuts.

5. Bolts shall be evenly tightened according to the tightening and torque pattern of the manufacturer.

3.3 PIPE JOINING

A. Heat Fusion Joining

1. Joints between plain end or prepped pipes and fittings shall be made by means of butt fusion. or extrusion welding

2. Joints between the main and saddle branch fittings shall be made using saddle fusion procedures, as recommended by the manufacturer. or by fabricated specials fabricated by the manufacturer

3. Fusion of pipes of the same nominal diameter but with different wall thickness is acceptable, with previous written approval of the Engineer, if the difference in wall thickness is limited to one SDR.

4. For transitions between pipes of the same nominal diameter with wall thicknesses that differ by more than one SDR, transition nipples will be required.

B. Joint testing

1. Butt Fusion Testing - On every day that butt fusion is to be performed, the first fusion of the day will be performed on a trial joint. After the trial joint has been allowed to cool completely, three test coupons will be cut across the joint. Each coupon shall then be bent until its opposing ends come in contact. If any of the coupons fail at the joint, the fusion will be considered unsatisfactory.

2. Vary the fusion setup and procedure and rerun the test as necessary to produce a satisfactory joint. Production butt fusion will not commence until the trial joint has satisfactorily passed this test.

3. Coupon length shall be the lesser of either twelve inches or thirty times the wall thickness. The joint shall be centered in the coupon. Coupon width shall be the greater of one inch or one and one half times the wall thickness.

3.4 MANUFACTURER'S FIELD SERVICES

A. The Contractor shall obtain the services of a qualified Field Service Engineer provided by the supplier. Field Service Engineer shall be on-site for the following minimum periods (travel time excluded):

1. Installation assistance and trouble-shooting – 2 person-day and provide to the engineer and contractor a written report should any part of the installation relating to the HDPE pipe installation require remedial action.

3.5 INSPECTION

A. All finished installations shall be carefully inspected for proper joints and sufficient supports, anchoring, interference, and damage to pipe, fittings, and coating. Damage shall be repaired to the satisfaction of the Engineer.

3.6 FIELD TESTING

A. Field Leak Testing: Prior to enclosure or burying, all duct systems shall be pressure tested at 1-1/2 times the maximum working pressure. The Contractor shall furnish all test equipment, labor, materials and devices at no extra cost to the Owner.

1. Leakage may be determined by loss of pressure, soap solution, chemical indicator, or other positive and accurate method. All fixtures, devices, or other accessories which are to be connected to the lines and which would be damaged if subjected to the test pressure shall be disconnected and ends of the branch lines plugged or capped as required during the testing procedures.

2. Leaks shall be repaired to the satisfaction of the Engineer and the system shall be re-tested until no leaks are found.

B. Performance Testing: Once leak testing is complete and after each odor control system is in place, the ductwork for each odor control system will be tested, adjusted and balanced as a system, in accordance with Section 15950 – Testing, Adjusting and Balancing. Performance Testing shall be conducted by the Contractor under the direction of the Engineer in conjunction with the testing, adjustment and balancing subcontractor.

3.7 FINAL ACCEPTANCE AND WARRANTY

A. Final acceptance of all ductwork furnished under these Specifications will be withheld until after the installation and satisfactory field testing. The manufacturer and the Contractor shall warranty the equipment against defects of any kind for a period of one year after Substantial Completion.

B. Warranty shall include 100% parts and labor.

C. If the ductwork system, should fail during the warranty period due to a defect, it shall be replaced and the system restored to service at no expense to the Owner.

END OF SECTION

SECTION 11376

MECHANICAL AERATORS

PART 1 GENERAL

1.1 SUMMARY

A. Sections Includes

1. Low speed mechanical surface aerators for mixing and aerating the nitrification reactors.

2. The mechanical aerators specified herein shall include an electric motor, coupling, gear reducer, surface impeller and shaft, submerged lower mixing impeller and lower shaft, and appurtenances.

3. All the equipment specified under this section shall be furnished by a single manufacturer (the aeration equipment manufacturer) fully experienced, reputable, and qualified in the manufacture of the equipment specified.

4. VFDs are to be provided under Section 16265.

B. Related Sections

1. Section 09900 – Painting

2. Section 11000 – Equipment – General

3. Section 11010 – Spare Parts

4. Section 13421 – Aeration System Instrumentation and Control System

5. Section 16220 – AC Motors

6. Section 16265 – AC Adjustable Frequency Drives

7. Division 16 – Electrical

C. Summary of Existing Treatment Plant Process and Equipment

1. The nitrification reactors consist of two trains, and each train consists of four square reinforced concrete stages that are normally operated in series (Stage 1 to 2 to 3 to 4). Under current conditions, the plant operates with one nitrification reactor train online at all times. Slide gates between each stage will allow any one of the stages to be taken offline if needed. Each stage has a different tank bottom elevation and adjustable weir gates to allow the mixed liquor suspended solids to flow from stage to stage. Refer to drawings for tank bottom elevations and top of aerator platform elevations.

2. Average tank depth is 21 feet and average side water depth varies but is approximately 15 feet in each stage. Refer to hydraulic profile showing water elevations per stage at design peak and average flows.

3. The existing two-speed mechanical surface aerators in each stage (typical of 8) are to be replaced in accordance with this section.

D. Work Restrictions

1. The installation of the aeration units shall be conducted in two separate segments.

   a. During the first segment, the Contractor shall install, start-up, and test four units simultaneously in the offline nitrification reactor train. Following final acceptance of the four aeration units in accordance with this section and the nitrification reactor train is online, the Owner will take the second nitrification reactor train offline and dewater the offline basins. During the first segment, conduct the field performance test on one aeration tank to determine its oxygenation capacity.

   b. During the second segment, the Contractor shall install, start-up, and test the remaining four units simultaneously in the offline nitrification reactor train.

2. One nitrification reactor train must be online at all times.

3. The time between segments will be determined by the Owner, based on the time required to dewater the nitrification reactor train after it is taken offline.

1.2 REFERENCES

A. American Iron and Steel Institute (AISI):

1. Type 304/304L Stainless Steel

2. Type 316/316L Stainless Steel

B. American Society for Testing and Materials (ASTM):

1. A36 - Specification for Structural Steel

C. American Society of Civil Engineers (ASCE):

1. Standard for the Measurement of Oxygen Transfer in Clean Water (latest edition)

D. American Welding Society (AWS):

1. Welding Code – Current Edition

E. The Society for Protective Coatings (SSPC):

1. Surface Preparation Specifications

F. Anti-Friction Bearing Manufacturers Association (AFBMA)

G. American Gear Manufacturers Association (AGMA)

1. AGMA 2001-C95 Fundamental Rating Factors and Calculation Methods for Involut Spur and Helical Gear Teeth

2. AGMA 6010-F97, Standard for Spur, Helical, Herringbone, and Bevel Enclosed Drives

3. AGMA 6025-D98, Sound for Enclosed Helical, Herringbone and Spiral Bevel Gear Drives

H. American National Standards Institute (ANSI) Standards

I. National Electrical Equipment Supplier's Association (NEMA)

J. Occupational Safety and Health Administration (OSHA) Standards

1.3 SUBMITTALS

A. Provide submittals in accordance with Section 01330. Submittals shall describe the equipment in sufficient detail, including parts list and materials of construction, to permit an item comparison with the specifications and to indicate full conformance.

B. As specified in Section 01330, submit certifications for all applicable iron or steel products indicating that all manufacturing processes occurred in the United States.

C. Provide qualifications of the aeration equipment manufacturer demonstrating compliance with the Quality Assurance requirements (Paragraph 1.5).

D. Provide manufacturer's instructions for shipping, storage and protection, handling, and installation of the equipment.

E. Submit certified shop and erection drawings showing all important details of fabrication, construction dimensions, anchor bolt locations, aerator impeller diameter, aerator impeller rotational speed (rpm), aerator impeller tip speed (fps), and field connections. Provide tolerances for anchor bolts.

F. Provide bill of materials for all equipment.

G. Provide calculations supporting shaft and impeller design criteria (stresses and critical speed).

H. Provide the total weight of the equipment, individual weights of the major components, and design loading information including torque load, bending load, vertical downward loads, and any other dead and live load information necessary to allow evaluation of structural impacts of loads and forces on the aerator platform and support columns.

I. Provide a list of spare parts supplied with the project, and a list of other manufacturer's recommended spare parts with the manufacturer's current price for each item. Provide location and contact information of nearest stocking distributor of spare parts.

J. Provide calculations and certification in writing that gear reducers are designed in accordance with AGMA standards. Provide certified gear and bearing life calculations based on actual experienced torque and bending moments, and demonstrating conformance of the bearing life requirements. Provide certified test reports verifying quality of gears in gear reduction units.

K. Provide certified motor test data, dimensional drawings, wiring diagrams, and data sheets for the motors, as described in Section 16220.

L. Provide schematic electrical wiring diagrams showing interconnection requirements to field mounted devices and other data as required by the Engineer.

M. Provide brake horsepower curves of the mechanical aerator at the various liquid levels and speeds, before the gear reducer. Provide water horsepower curves of the mechanical aerator at the various liquid levels and speeds. Clearly indicate specified conditions on the curves.

N. Provide information on shop prime and finish painting systems.

O. Manufacturer's Performance Testing

1. The aeration equipment manufacturer must provide performance test data and results, including performance curves and factory oxygen transfer test results from a full scale facility using similar surface aerators or similar dual-impeller (surface and submerged) aerators, including calculations of the oxygen transfer efficiency. Test reports must meet the following requirements.

   a. Submit oxygen transfer test reports from an aerator with a surface impeller of the same type and design (geometry, number of blades, etc.) proposed on this project, from a full scale clean water non-steady state oxygen transfer test in a full scale tank. Tests shall have been conducted in accordance with the ASCE Standard "Measurement of Oxygen Transfer in Clean Water" (ASCE/EWRI latest version). Test results must be in U.S. standard units of 1 atm, 20°C, alpha=1.0, beta=1.0, theta (temperature correction)=1.024, and DO=0 mg/L.

   b. Steady-state testing or mixed liquor endogenous test methods are not allowed to meet the requirements of this Section.

   c. Tests shall have been conducted in a tank with a minimum volume of 0.28 MG. Tests shall have been conducted at a variety of unique combinations of submergences and speeds.

2. Date of tests and test points and results are required. Include data demonstrating the power consumption for the equipment, as measured during the performance testing.

3. Provide test plans, procedures, and description of equipment, by which the performance testing was conducted.

4. Provide details regarding test tank geometry, impeller diameter, rotational speed, power, and oxygen transfer efficiency, and provide calculations and results of oxygen transfer correction factors to standard conditions, and demonstrating required oxygen transfer efficiency. The test results must show that the aerator units met the oxygenation capacity required for the performance test without exceeding the motor nameplate horsepower.

5. The test data shall include results from several clean water reaeration tests for the aerator units demonstrating performance over a range of submergence levels. The test results must show that the relationship between input horsepower and oxygen transferred is linear for the entire range between minimum and full submergence.

6. If the aerator manufacturer is unable to provide clean water reaeration test data for similar-sized mechanical aerators and impellers in accordance with this

section, additional shop testing will be required prior to acceptance of shop drawings and equipment manufacturing.

7. Any shop testing performed will not diminish the level of field testing specified in this section. Refer to Part 3 for Field Performance Testing requirements.

P. Equipment Functional Factory Testing

1. Provide results of functional factory testing conducted for each motor and gear reducer provided by the aeration equipment manufacturer. Average data for similarly sized equipment is not acceptable.

Q. Field Performance Testing

1. Provide report summarizing the results of the field mixing test demonstrating compliance with the minimum mixing requirements specified herein. The report shall be provided to the Engineer within three weeks of the test and shall include the certified results from the laboratory and calculations.

2. Provide certified clean water reaeration test report of the field performance tests conducted on mechanical surface aerators at the site. Report shall include test procedure, test data, and calculations of oxygenation capacity, demonstrating compliance with the performance requirements specified herein. Tests shall be witnessed and certified by an independent third-party (Stenstrom, Rosso, Redmon, or equal), and test reports shall be certified by same. Manufacturer self-certification is not allowed. The report shall be provided to the Engineer within three weeks of the test.

R. Manufacturer's Field Services

1. Provide qualifications of the manufacturer's representative that will be present on site as required during the installation, commissioning, startup, training, and testing of the equipment.

2. Provide written certification that the equipment is installed correctly and in accordance with the aeration equipment manufacturer's requirements, and that the complete installation will operate as expected.

3. Provide certified written field test / start-up report after completion of installation and testing, listing the results of the inspection, operation, adjustments, tests, and information per Section 11000.

S. Operation and Maintenance Manuals

1. Provide Operation and Maintenance Manuals and Equipment Start-up Reports in accordance with Section 01700.

2. Provide installation, operation, and start-up procedures, operating and maintenance instructions, list of spare parts, and lubrication requirements. Include aeration equipment manufacturer's recommendation of summer and winter grades of lubricants and alternative manufacturers of oil, complete with their reference numbers.

3. Provide bill of materials for all equipment with the O&M manual.

4. Provide name, address, and telephone number of the nearest competent service representative who can furnish parts and technical service.

5. Provide descriptive literature, including illustrations, covering the operational features of the equipment, specific for the particular installation, with all inapplicable information omitted or marked out.

6. Provide operating, maintenance, and troubleshooting information.

7. Provide complete connection, interconnecting, and assembly diagrams.

8. Provide copies of approved Shop Drawings.

T. In the event that it is impossible to conform to certain details of the specifications due to different manufacturing techniques, describe completely all non-conforming aspects.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Contractor and aeration equipment manufacturer shall coordinate delivery of the equipment to minimize the period of time the equipment is on site prior to installation.

B. All equipment shall be crated and delivered to protect against damage during shipment.

C. All parts shall be properly protected so that no damage or deterioration will occur from the time of shipment until installation is completed and the equipment is ready for operation.

D. Contractor shall store, temporarily support, and safeguard equipment, material, and spare parts prior to installation in accordance with manufacturer's recommendations and instructions. Protect all exposed surfaces.

E. Contractor shall protect the equipment from being contaminated by dust, dirt, vibration, and moisture. Store aeration equipment in weather-tight buildings, trailers, or storage sheds, which have a raised concrete or wooden floor, a roof, and fully closed walls on all sides. Tarps and any other coverings placed over the equipment shall be supported above the stored equipment to provide ventilation under the tarp or covering and to minimize condensation. Tarps or coverings shall be arranged to prevent ponding of water.

F. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer. Units shall be erected and lubricated in strict accordance with the manufacturer's instructions.

G. The finished surfaces of all exposed flanges shall be protected by wooden blank flanges, strongly built and securely bolted thereto.

1.5 QUALITY ASSURANCE

A. The mechanical aerators shall be furnished by a single manufacturer (the aeration equipment manufacturer) fully experienced, reputable, and qualified in the manufacture of the equipment specified. All equipment to be furnished shall be products of manufacturers regularly engaged in manufacturing mixing and aeration equipment in the United States for not less than 10 years.

B. The aeration equipment manufacturer shall demonstrate that a minimum of ten (10) installations have been in satisfactory operation for at least five (5) years within the United States, including a minimum of five (5) dual impeller installations and a minimum of five (5) installations in multi-stage rectangular tanks with surface aerators or with dual-impellers.

C. The manufacturer shall be responsible for satisfactory operation and performance of the mechanical aerators.

D. Wetted parts shall be designed, manufactured, and tested by the aeration equipment manufacturer. Gear reducers shall be furnished or designed/manufactured by the aeration equipment manufacturer, and shall be tested by the aeration equipment manufacturer.

1.6 WARRANTY

A. The aeration equipment manufacturer shall provide a full mechanical warranty for a period of one year from the date of Substantial Completion.

B. The Contractor shall be responsible for proper storage of the equipment so as to remain in "as shipped" condition. If the equipment remains in storage at the job site for longer than six (6) months before installation, the Contractor shall provide factory service personnel for a complete inspection of the equipment. Any work necessary to restore the equipment to "as shipped" condition shall be the responsibility of the Contractor.

1.7 PERFORMANCE GUARANTEE

A. The performance of the mechanical aerators as specified here-in shall be guaranteed for a period of one year from the date of Substantial Completion. During this period, the aeration equipment manufacturer guarantees the following:

1. The mechanical aerators meet or exceed the Performance Requirements in Paragraph 1.8 C. of this section for Mixing Requirements and Oxygen Transfer Efficiency Requirements.

B. Should the equipment fail to meet the required Performance Requirements, then the Performance Guarantee shall require that the aeration equipment manufacturer and the Contractor comply with the following:

1. Make changes to the equipment such that the performance as guaranteed is obtained at no additional cost.

2. If, after two attempts at implementing corrective measures, it cannot be demonstrated that the equipment can consistently meet the Performance Requirements, the Contractor and the manufacturer shall remove the defective equipment and replace it with equipment that shall meet the performance requirements at no additional cost.

1.8 DESIGN CRITERIA

A. A quantity of eight (8) low speed mechanical aerators with dual-impellers (surface and submerged) are required. The aeration equipment is intended to be capable of transferring atmospheric oxygen to the mixed liquor of the activated sludge process, maintaining the activated sludge solids in suspension by inducing a current of

sufficient velocity, and of adjusting the speed of the aerators to allow variation of the amount of atmospheric oxygen transferred and power consumed.

B. Impeller submergences shown on the drawings are based on anticipated water levels under current operating conditions and the submergence requirements of one manufacturer. Prior to fabrication, Contractor shall provide calculations certified by the manufacturer for different impeller submergences than those shown on the drawings, based on the anticipated water levels under current operating conditions.

C. Performance Requirements:

1. Aerators shall be designed for continuous 24 hour/day service under the normal and peak loading conditions in the basin geometry shown on the drawings.

2. The surface impeller of the dual-impeller aerator shall be capable of delivering an oxygen transfer efficiency of no less than 3.25 lbs Oxygen (as O_2) per horsepower-hour, based on motor output power at standard transfer conditions.

3. The submerged (lower) impeller must be capable of effectively mixing the basin during basin dewatering until the water level in the basin is reduced to a depth of a minimum of one lower impeller diameter. If this requirement cannot be met with the aeration equipment, submersible mixers must be included in the equipment manufacturer's scope of supply.

4. Aerators shall be designed to maintain biological solids of up to 3,500 mg/L in suspension, such that the mixed liquor suspended solids (MLSS) concentration at any point in the basin falls within plus or minus 10% of the mean concentration when operating at full power and speed, and within plus or minus 20% of the mean concentration when operating at 50% power.

5. Each mechanical aerator shall be driven by an A.C. adjustable frequency drive that will allow variation of the amount of oxygen transferred and power consumed.

D. Each aerator shall be designed in accordance with the following parameters:

Number of Basins/Aerators	8 basins, one aerator per basin
Aerator Configuration	Dual-impeller aerator: Surface impeller for oxygenation and mixing Submerged hydrofoil or pitched blade impeller for additional mixing, minimum of 60-inch diameter
Basin Dimensions	As shown in drawings
Minimum Side Water Depth	Varies by stage, as shown in drawings
Maximum Side Water Depth	Varies by stage, as shown in drawings
Minimum Motor Nameplate Horsepower	60 hp
Typical Design MLSS	1,000 – 3,500 mg/L
Actual Oxygen Requirements – lbs Oxygen (as O_2) / day	
Average at Current Conditions, Four Basins Online	4,700 (1,175 lbs/day per aerator)
Peak at Current Conditions, Four Basins Online	9,900 (2,475 lbs/day per aerator)
Average at Future Conditions, Eight Basins Online	8,500 (1,063 lbs/day per aerator)
Peak at Future Conditions, Eight Basins Online	18,000 (2,250 lbs/day per aerator)
Minimum / Average / Maximum Process Temperature	11 / 16 / 22 degrees Celsius
Operating DO Level	2 mg/L
Alpha	0.85
Beta	0.95
Site Elevation	130 ft (NGVD29)

E. Aerator Loads

1. The mechanical aerators that are currently installed have the following loading characteristics (per aerator):

	Units	Existing
Dead weight	lbs	7,090
Starting downward thrust	lbs	2,590
Running downward thrust	lbs	2,804
Starting load (dead wt. + thrust)	lbs	10,005
Running load (dead wt. + thrust)	lbs	10,219
Starting torque	ft-lbs	11,028
Running torque	ft-lbs	5,514

2. Actual loading characteristics (not including safety factors) of the replacement aerators shall not exceed the following:

   1) Vertical Downward load: 10,219 lbs

   2) Starting Torque: 11,028 ft-lbs

   3) Dynamic Moment: 12,055 ft-lbs

3. If these actual loads will be exceeded, the aeration equipment manufacturer shall be responsible for providing a design to modify the existing aerator platforms to support the new aerators. The design documents shall include stamped drawings and calculations by a Connecticut Licensed Professional Structural Engineer. Any cost associated with the design and construction of the structural modifications to the platforms shall be borne by the manufacturer

1.9 SPARE PARTS

A. Refer to Section 11010 for specific spare parts requirements for this equipment.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Mechanical aerators shall be manufactured by:

1. Ovivo USA, LLC (Salt Lake City, UT)

2. Philadelphia Mixing Solutions Limited (PMSL) (Palmyra, PA)

3. Or equal.

2.2 MOTORS

A. General

1. Motors shall meet the requirements of Section 16220.

2. Motors shall have sufficient capacity to operate the aerators throughout the operating range without exceeding the nameplate rating for current and power, unless otherwise is specifically allowed.

3. Aerators shall be driven at variable speeds and shall use standard squirrel cage induction motors suitable for driving the aerator continuously over the required speed range corresponding to the design flows.

4. The aeration equipment manufacturer shall coordinate with the manufacturer that is providing the AC Adjustable Frequency Drive under Section 16265 to assure a matched and working system.

5. Provide a visible nameplate on all motors, indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, Service Factor, Power Factor, efficiency, AFBMA bearing numbers, and manufacture date. Provide stainless steel nameplate attached with stainless steel pins.

B. Each aerator shall be driven by a variable speed, totally enclosed fan cooled, constant torque, premium efficiency, inverter duty motor wired for 460 volts, 60 Hz, 3 phase current, and suitable for VFD application with a 2:1 speed turndown. VFDs are to be provided under Section 16265.

C. The motors shall be rated at 40°C ambient with Class B or Class F insulation and shall have a Class B temperature rise at full load. The motor shall have a service factor of 1.15 on sine wave power and a 1.0 service factor on VFD supplied power and shall comply with the applicable provision of the Standards of NEMA. The minimum AFBMA B10 bearing life shall be 200,000 hours.

D. The motors shall be cast iron construction, “chemical processing” type, and shall flange mount to the gear reducer. They shall be mounted in either a vertical or right angle position to the gear reducer and furnished with a canopy cap (drip cover) and suitable lifting lugs. The motor to gear reducer connection shall be accomplished by the use of a flexible coupling.

E. All motors shall be equipped with a factory installed normally installed closed thermostatic heat protection device. This device shall protect the motor against damage from overheating caused by single phase, overload, high ambient temperature, abnormal voltage, locked rotor, frequent starts or ventilation failure. The protective device shall have normally closed contacts. Essential auxiliary relays and controls shall be mounted in the controller enclosure. Two detectors shall be furnished with each motor with one left as a spare. The device shall immediately stop the aerator drive motor in the event of excessive heat buildup. Electrical switches shall be wired to their respective aerator motor control center.

F. Motors shall be designed to prevent overheating caused by harmonic distortion of the supply voltage waveform when connected to the variable frequency drives.

G. All motors shall be furnished with a suitably sized space heater to keep condensation from forming when the motor is not running. Heaters shall be energized at all times during the storage and construction phases to prevent moisture accumulation. After permanent installation of the motors, the heaters shall be energized from a contact in the variable frequency drives when the motors are not operating.

H. Motors shall be suitable for operation in a moisture-laden atmosphere. The conduit boxes shall be gasketed with neoprene or equivalent material, so as to prevent moisture from entering the stator through the conduit box. Stainless steel condensation drains

shall be suitably positioned in the lower external surface, so that any accumulation of moisture can drain from the complete motor housing.

I. Ball bearings shall be supplied and shall be grease lubricated. Grease reservoirs shall be ample and provisions shall be made for re-greasing with a lubrication system where grease is flushed through the bearings. The winding end turns shall be dipped and baked with a non-hygroscopic varnish, the stator bores and rotor cores shall be coated with epoxy paint.

J. The entire enclosure shall be finish painted by the motor manufacturer at the factory with a corrosion-resistant paint to provide additional protection against moisture and contaminants.

2.3 GEAR REDUCERS

A. The gear reducer shall be specifically designed for mixing and aeration service, with a shaft and bearing system suitable for the loadings imposed by the application. The gear drive shall be either a right angle type comprised of helical and spiral bevel gearing or of the helical gear type. Worm gear drives are not acceptable. Helical gears and spiral bevel gears shall be designed, manufactured, and assembled in accordance with, and meeting the requirements of, the latest AGMA standards. The use of an auxiliary reducer to achieve the required output speed will not be acceptable. Gear reducer shall be provided as three stage gear reduction design.

B. All gear reducer designs shall be based upon the hydraulic loadings, including both torques and bending moments, specific to this application.

C. The AGMA calculated drive horsepower rating shall be stamped on the drive nameplate.

D. General maintenance, specifically including motor changes, speed changes, replacement of all anti-friction bearings (except the bearing supporting the output shaft), and oil system maintenance, shall not require removal of the gear reducer housing from its foundation or mounting structure.

E. The gear reducers shall be designed for vertical input and output shaft operation, or right angle input and vertical top entry. The units shall be designed to AGMA Service Classification III.

F. The gear reducer shall be equipped with lifting lugs designed to enable lifting of the fully assembled gear drive, lower shaft, and impellers.

G. The gear reducer shall be mounted on a new support frame. Support frame shall be mounted on six jack studs inserted in the platform structure as shown on the drawings.

H. Drive input speed shall range from 0 rpm to full motor nameplate speed.

I. The full load operating noise level of each aerator drive shall meet current OSHA Standards and/or AGMA “Sound for Enclosed Helical, Herringbone and Spiral Bevel Gear Drives,” and shall not exceed 85 dBA at 3 feet from any part of the drive assembly.

J. Gear Reducers shall be:

1. Raven 3800 Series by Philadelphia Mixing Solutions Limited (PMSL)

2. Flender FSG Series by Siemens

3. MAXXDRIVE Series by NORD

4. Or equal.

K. Gear Reducer Rating

1. Drives shall be rated for continuous 24 hours per day operation in accordance with the latest applicable AGMA standards for enclosed gear drives. The thermal rating of the gear reducer shall exceed the design mechanical rating to eliminate the need for external coolers. External cooling devices are not acceptable.

2. All components of the gear reducer shall have a minimum AGMA service factor of 2.0 the full motor nameplate horsepower rating in accordance with AGMA standards when each unit is operating at full load motor horsepower. All gears shall meet the accuracy requirements for AGMA Quality 12 or better per the current applicable helical AGMA standard. Pitting resistance and bending fatigue resistance shall be rated in accordance with the latest ANSI/AGMA standards.

3. The efficiency shall not be less than 94 percent based on the gear reducer input horsepower. The gear reducer shall have an independent lower bearing. The bearing shall be external to the gear box housing to accommodate an oversized shaft/bearing assembly capable of handling external axial and radial forces associated with the longer overhung loads.

L. Gear Reducer Housing

1. Each drive unit shall include a heavy duty gear reducer in a high tensile strength grade 30 gray cast-iron housing, with provisions for the attachment of suitable lifting devices. The housing shall be stressed relieved prior to machining and reinforced. The housing shall be tested to preclude casting porosity or weld defects that could result in oil leakage. Housings not composed entirely of metal or fabricated housings will not be allowed.

2. The housing shall be constructed with integral dry well construction to eliminate oil leakage at the output shaft and prevent loss of lubrication in the event of a seal failure.

3. Lifting lugs shall be provided on the housing suitably located to enable safe removal of the combined electric motor and gear unit from the supporting platform. Removable inspection cover(s) or inspection port(s) shall be provided.

M. Gear Reducer Shafts, Gears, and Pinions

1. All shafts shall be supported on tapered roller or double spherical roller bearings.

2. The gear reducer output shaft shall be constructed and supported so that the shaft deflection caused by operating loads does not affect alignment of the anti-friction bearings or cause misalignment of gearing during mixer operation.

3. Gears and pinions shall be made of alloy steels. Shafting shall be made out of carbon steel. The gear teeth shall be through-hardened or carburized. Flame hardened gears will not be acceptable. All gears shall be made from alloy steels with sufficient hardenability to obtain case and core properties meeting the requirements for grade 2 material in accordance with the latest ANSI/AGMA standards. The steel alloy shall be selected, and the heat treatment shall be controlled, to obtain a microstructure that meets all the requirements for grade 2 material in accordance with the latest ANSI/AGMA standards.

4. Any portion of the gear reducer output shaft that is external to the gear reducer housing shall be painted using the same system used for the remainder of the gear reducer.

N. Bearings

1. All bearings shall be anti-friction type of ball, double spherical roller, or tapered roller design. Pressed on type or sliding, journal type bearings are not acceptable. Replacement of any gear drive anti-friction bearing, except the bearing supporting the output shaft, shall not require removal of the gear reducer housing from its foundation.

2. All gear reducer output shaft and independent mixer shaft support bearings shall have a minimum L-10 life of 100,000 hours as calculated by the latest ANSI/AFBMA standard, except those bearings attached directly to the output shaft which shall have a rating of 250,000 hours. Bearing life shall be rated in accordance with ANSI/AFBMA standards based on operating continuously at the rated full load horsepower and speed. Manufacturer must submit bearing life calculations that are based upon all loadings, including both torques and bending moments, and the resulting gearbox housing deflections as seen in this specific application.

3. The output shaft bearings shall be accessible from the mounting surface. No bearing may be located within 30 inches of the process liquid. Grease fittings serving the aerator and output shaft bearings are to be plainly marked and each grease fitting shall be protected with a removable neoprene cover.

O. Lubrication

1. Lubrication of the gear reducer shall conform to AGMA standards. A reliable lubrication system shall be provided for the gears and bearings.

2. Lubrication of each gear reducer shall be accomplished by bearings and gears being dipped and immersed in oil, or by a lubrication system relying wholly or in part upon an oil circulating pump. Lubrication systems shall be suitable for all-weather starting and operation.

3. All oil lubricated bearings shall have seals to retain the oil, and shall be located above the top of the main lubricant drain and sufficiently above the gear reducer oil sump as to prevent life shortening particulate matter and sludge from entering the bearings. No oil seals will be permitted below the operating oil level for rotating elements. A dip stick or sight glass shall be provided to measure oil levels for all systems.

4. Grease lubricated bearings are acceptable on the gear reducer output shaft, provided adequate sealing is provided to separate them from the oil bath and lubricated parts. All grease lubricated bearings shall have seals to retain the grease. Whenever the low-speed shaft has grease lubricated bearings, a dry well shall be provided to prevent oil leakage. The dry well shall be 100% maintenance free with no wearing parts and integral with the housing. The dry well shall be sealed by a non-contact double labyrinth seal with a return drain above. Additionally, the output end of the well shall include the upper and lower bearing seals and separate oil seal. All grease lubrication pressure lines shall be fed from fittings accessibly located above the platform supporting the mechanism.

5. Oil Immersion Systems

    a. Where lubrication of each gear reducer is accomplished by bearings and gears being dipped and immersed in oil, the gearbox shall include a suitable oil immersion-type heater for pre-heating the lubrication oil prior to startup after prolonged periods of shut-down in cold weather. The heaters shall have an automatic thermostatic control and shall operate on the control voltage.

6. Pumped Oil Systems

    a. Alternate pumped oil lubrication systems that require any lifting, or disassembly of the drive for oil pump or lubrication system maintenance are not acceptable. Pump systems shall provide an external oil filter on each gear drive to protect the pump and the gear drive from dirt and sludge. There shall be a gauge on the filter outlet indicating lubricant pressure. Protective devices to notify the plant operator and stop the drive motor in the event of pump failure, or low oil level or low pressure shall be provided with gear drives having pumped lubrication systems. Electrical switches shall be wired to their respective aerator motor control center.

7. Oil Drain

    a. Oil fill and drain lines shall be sufficient size to permit efficient functioning and shall be located on the gear unit in a position which is easily accessible from the bridge platform. The oil drain piping shall be installed so that a container may be placed under the drain discharge

    b. The Contractor shall supply the first charge of run in oil for the reducers, and if necessary due to run time, the change of oil. The Contractor shall purchase the oil in accordance with the information in the aeration equipment manufacturer's Operation & Maintenance manual, to assure lubricant compatibility.

    c. Instruction manuals shall include a list of acceptable lubricants, and recommended change intervals for low temperature continuous operation.

2.4 AERATOR IMPELLERS, SHAFTS, AND COUPLINGS

A. Impellers - General

1. The dual-impeller assembly shall be designed to optimize oxygen transfer efficiency and mixing intensity.

    a. The surface impeller shall provide oxygenation and mixing in the basin, and shall present a minimum amount of edge perpendicular to the flow to prevent any attachment of solid materials.

    b. The submerged impeller shall provide additional mixing at the bottom of the basin. If a submerged impeller is not used, submersible mixers shall be provided.

2. Impellers whose power consumption, side load, and pumping characteristics have not been fully documented by the aeration equipment manufacturer will not be acceptable. Such impeller data shall include the effects of liquid level variation on power investment, basin hydraulic stability, blade loading, and process performance.

3. The impellers shall be of such design, and operate at such rotational speed, that dynamic balancing is not required to prevent damaging vibration. Impellers shall operate at a maximum output speed of 47 RPM.

4. All structural steel used in the fabrication of the aerator, including shafts and impellers, shall meet the requirements of ASTM A36 carbon steel or AISI 316 stainless steel. All shop welding shall conform to the latest standards of the American Welding Society (AWS). Fabricated assemblies shall be shipped in convenient sections as permitted by carrier installations.

B. Surface Impellers

1. Surface impellers shall be of the rim-blade type with ten, (10) equally spaced blades and constructed of 1/4" minimum steel plate, or of the a four (4) bladed surface impeller type with a blade thickness of 0.63 inches and impeller blades bolted to the impeller hub.

2. Impellers shall be removable from the shaft by means of a detachable impeller hub or a flange type coupling connection.

3. When a detachable impeller hub is used, the impeller blades shall be bolted to the impeller hub. The impeller hub shall be connected to the shaft by means of a hook key, designed to transmit full motor torque and to support the impeller assembly on the shaft and prevent the impeller from slipping. An extended keyway shall be provided of sufficient length to permit adjustment of the axial position up or down from the design location.

4. When a flanged coupling and rim-blade type impeller is used, the drive will be provided with a means of changing the elevation of the impeller from the mounting platform. The rim plate shall be submerged at all operating conditions, except during basin draining operations, to reduce the effects of variable loading on the aerator support structure and deck. This shall be clearly shown on the submittal drawings. The impeller blades and disc shall be an integral, shop welded unit requiring no field assembly or welding.

C. Submerged (Lower) Impellers

1. Submerged impellers shall consist of up-pumping hydrofoil-style blades or pitched blade impeller, and hub that shall be an integral, shop-welded unit requiring no field assembly or welding.

2. Submerged impellers shall draw no more than 15% of the aerator nameplate horsepower at full speed and immersion.

3. Submerged impellers shall have a minimum diameter of 60 inches.

D. Impeller Shaft and Couplings

1. The aerator shaft shall be attached to the gear reducer by a rigid flanged coupling. A retainer plate shall be provided for mounting to the end of the gear reducer output shaft to provide protection against disengagement of the coupling from the gear reducer output shaft. The flanges and flange-type coupling shall be assembled with A325 high strength bolts only. Stainless steel fasteners are not acceptable. A shaft arrangement which does not include a separate gear reducer output shaft and a flange style coupling located below the gear reducer shall not be acceptable.

2. The output shaft shall be of overhung design - the use of submerged steady bearings is not permitted. All loads, including torques and bending moments, are to be constrained by the gear drive output bearings.

3. Shafts shall be manufactured to a minimum straightness such that they are straight to within 1/8″ per 10′ of length.

4. Separation of the shaft supporting the impellers from the gear reducer shall not require disassembly or other disturbance of the gear reducer internal gearing.

E. Critical Speed

1. The shaft-impeller system design shall be such that its operating speed shall not exceed 75% of its first lateral critical speed. The use of stabilizing rings or fins will not change this limitation.

2.5 SURFACE PREPARATION AND PAINTING

A. For the aerator surfaces, unless otherwise noted, all non-galvanized fabricated iron and steel surfaces shall receive a shop-cleaned surface preparation equivalent to SSPC-SP-10 immediately prior to shop-priming. Shop-priming shall consist of the aeration equipment manufacturer's standard primer. Finish painting by the Contractor shall be as specified in 09900.

B. Motors and gear reducers shall receive a minimum shop-cleaned surface preparation equivalent to SSPC-SP-1 immediately prior to shop-priming and finish coating. Shop-priming and finish painting shall consist of a coating that is compatible with a high quality finish coating that is specifically resistant to chemical, solvent, salt water, and acid environmental conditions.

C. The Contractor shall provide touch-up painting of all equipment furnished under this section.

PART 3 EXECUTION

3.1 GENERAL

A. The Contractor shall unload and thoroughly inspect the equipment upon arrival at the project site and report observed damage immediately to the aeration equipment manufacturer and to the Engineer in writing. The manufacturer shall repair to as-new condition or replace damaged equipment at no additional cost. Any repair work shall be approved by the Engineer and performed by the aeration equipment manufacturer's factory-trained technician.

B. The Contractor shall install the aerators in accordance with the aeration equipment manufacturer's printed instructions, shop drawings, and recommendations, and in accordance with the contract specifications and drawings.

C. Anchor bolts shall be designed by the aeration equipment manufacturer, then furnished and installed by the Contractor.

D. The Contractor shall provide finish painting of items with a shop prime coat and touch-up painting of those areas damaged during installation.

E. The aeration equipment manufacturer shall provide a representative to inspect and verify in writing that the installation of the aeration equipment is in accordance with the manufacturer's shop drawings, instructions and recommendations. The aeration equipment manufacturer shall report deviations to the Contractor and to the Engineer in writing. The Contractor shall coordinate the schedule of this inspection with the aeration equipment manufacturer so that the inspection and needed corrective actions are completed prior to proceeding with testing activities.

F. The Contractor shall provide and coordinate the on-site assistance and coordination necessary for the aeration equipment manufacturer to complete the various inspections and various testing requirements specified in this section and make adjustments, repairs, or replacements required to make the system pass all testing requirements.

G. Until such time as the installation of the equipment is complete and performance testing of the installed equipment is successfully completed, the responsibility of costs associated with operating the equipment shall be borne by the Contractor.

H. Protection devices supplied by the aeration equipment manufacturer, including but not limited to motor thermal overloads, gear reducer pressure switches, and moisture sensors, must be wired directly to the motor control device for that aerator, to shut down the equipment upon alarm. Devices must be wired for fail-safe operation (open contact at fault).

I. Refer to the Work Restrictions in this section for additional requirements regarding installation, start-up, and testing.

3.2 MANUFACTURER'S FACTORY AND PERFORMANCE TESTS

A. In accordance with Part 1 of this specification, provide performance test data and results, including performance curves and factory oxygen transfer test results from a full scale facility using similar surface aerators or similar dual-impeller (surface and submerged) aerators, including calculations of the oxygen transfer efficiency.

B. Equipment Functional Factory Testing

1. Each motor and gear reducer provided by the aeration equipment manufacturer shall be performance tested to confirm performance with these specifications. Average data for similarly sized equipment is not acceptable.

2. The motor and gear reducer assembly shall be trial fit at the factory and match marked for ease of onsite installation. The high speed coupling halves shall be factory mounted and aligned. The Contractor shall be responsible for assuring proper alignment and gap tolerance as set forth in the installation instructions.

3. Perform a no load spin test of every gear reducer to be furnished under this specification. Perform no load spin test with a polarizing, rust-inhibiting oil at the manufacturer's facility prior to shipment. The gear reducers shall be run under no load conditions at full speed until the oil temperature has stabilized. The overall lubricant temperature and pressure shall be recorded during steady-state operation. The test shall verify that the gear reducers are correctly manufactured and assembled, and are free of oil leaks.

4. After successful completion of the shop test and while the gear reducer is at operating temperature, the lubricant shall be drained and the gear reducer shall be flushed with filtered oil. The flushing oil shall be drained and the gear reducer shall be prepared for shipment.

3.3 MANUFACTURER'S FIELD SERVICES AND PERFORMANCE TESTING

A. Installation, Commissioning, and Start-Up

1. Provide the services of a trained full-time employee of the aeration equipment manufacturer on the project site as the manufacturer's representative as required during installation, commissioning, startup, training, and performance testing. The representative shall have complete knowledge of the equipment provided, including its proper installation, adjustment, operation and maintenance. The representative shall be regularly engaged in overseeing equipment installations.

2. Provide manufacturer's services as necessary to inspect the installation, and to supervise the commissioning and startup of the System, but this shall be no less than:

   a. The manufacturer shall furnish a minimum of four separate trips and 8 days of total on-site service, for installation and start-up of 8 aeration units in two segments (one segment for four units simultaneously followed by a second segment for the remaining four units).

3. The Contractor shall make all electrical and process connections to the aeration equipment prior to the arrival of the manufacturer's representative.

4. The manufacturer's representative shall inspect the installation and oversee any required modifications, additions, or other changes required to allow the manufacturer to certify that the complete installation is appropriate and will operate as expected. Manufacturer's authorized representative shall verify proper installation, electrical connections, and equipment alignment prior to start-up.

5. Field tests shall not be conducted until such time that the entire installation is complete and ready for testing and the aeration equipment manufacturer has

certified the installation of their equipment is satisfactory and is ready for operation.

B. Training

1. Training shall be scheduled after copies of operation and maintenance manuals have been delivered. Training shall be scheduled at least 10 days in advance with the Owner.

2. The manufacturer shall provide the services of a factory-trained technician to train the Owner on the operation, calibration, and maintenance of the equipment supplied under this Section in accordance with the requirements of Section 11000.

3. The instruction shall include field training on mechanical aeration technology and the specific installation, and on proper operation and maintenance procedures, along with complete demonstrations of same. The Owner may videotape the classroom training at their own expense for future viewing.

C. Performance Testing

1. The manufacturer's representative shall oversee and supervise the performance testing of the equipment.

D. The actual number of days on site shall be increased above the minimum specified as necessary, without additional cost to the Owner, as necessary to comply with this specification.

3.4 COMMISSIONING REQUIREMENTS

A. Commissioning Team: The commissioning team shall consist of the Engineer, the Contractor, and the aeration equipment manufacturer personnel capable of testing and adjusting electrical, mechanical, instrumentation, and controls equipment and systems.

B. The startup testing and Field Performance Tests shall be aborted if any system deficiency prevents the successful completion of the test. Pre-commissioning check, and commissioning shall be aborted if a required commissioning team member is not present for the test.

C. Pre-Commissioning: Test and verify the installation of the aeration equipment and ancillary systems prior to startup. Correct deficiencies discovered during these checks and re-test until commissioning is complete. The tests shall include, but not necessarily be limited to:

1. General: Inspect the installed equipment for proper alignment, correct operation, proper connection, and satisfactory function of all components, including ground fault circuit interrupters and a safety inspection of wet cable connectors. Approve the installation and provide a written certification that the system components have been installed correctly and are ready for operation.

2. Rotation: Test rotation of motors and impellers to confirm they operate in accordance with design. Verify surface aerator directional rotation is in accordance with the contract drawings.

3. Vibration: Operate rotating equipment and demonstrate it does not vibrate in excess of manufacturers' recommendations.

4. Control System: Confirm electrical continuity between field instruments, equipment, and control system and confirm inputs and outputs are correctly wired. Coordinate with the Contractor and provide loop test sheets to document that each physical signal in accordance with the P&IDs and Electrical Drawings has been correctly landed and each control loop is tested as being programmed in accordance with the requirements herein.

5. SCADA Coordination: Contractor to prove the Ethernet interface with monitoring and control functions between the aerator control panel and the plant control system. Coordinate with the Plant Control System Programmer (PCSP) during the interface test.

6. Electrical: Contractor to verify continuity in accordance with Division 16 – Electrical.

D. Commissioning

1. After the equipment installation has been verified, the equipment shall be placed into operation by a factory-trained, experienced manufacturer's technician in the presence of the Engineer.

2. The commissioning activities shall verify the system operation, control functions, and demonstrate the system's fitness for the service specified and, to the extent possible, the ability of the units to meet the specified performance requirements.

3. At completion of commissioning, provide manufacturer's certificate indicating the equipment is properly installed and fully functional.

E. Start-Up Testing

1. After commissioning has been completed, the manufacturer's recommendations for initial start-up shall be implemented and the performance testing shall be conducted.

2. Start-up shall be completed after all components operate without alarms of shut downs, except as intended, for the durations specified in the performance testing, to confirm mechanical and electrical operation.

3. In the event of improper installation, the Contractor and the manufacturer shall be responsible for supervising the correction of the work and subsequent test runs until the defects are corrected. All adjustments necessary to place the equipment in satisfactory working order shall be made at the time of the above tests, at no additional expense.

4. During start-up, operate the equipment through the design performance range. Adjust, balance, and calibrate, and verify that the equipment operates within the design conditions.

3.5 FIELD PERFORMANCE TESTING

A. Field performance testing shall be conducted in the presence of the Owner, the Contractor, and the Engineer. A minimum of 7-days notification is required prior to each performance testing.

B. The performance tests described below shall be conducted to confirm that the aerators as designed are capable of achieving the Performance Requirements.

C. Oxygen Transfer Field Performance Tests

1. The manufacturer shall conduct the field performance test on one aeration tank to determine its oxygenation capacity. Tests shall be witnessed and certified by an independent third-party (Stenstrom, Rosso, Redmon, or equal), and test reports shall be certified by same. Manufacturer self-certification is not allowed.

2. The aeration tank to be tested shall be as selected by the Engineer. Tests shall be performed in one aeration basin at the project construction site (Southington WPCF) in one of the existing nitrification reactor basins.

3. The tests shall be full scale clean water non-steady state oxygen transfer tests, conducted in full accordance with the ASCE Standard "Measurement of Oxygen Transfer in Clean Water" (ASCE/EWRI latest version). Tests shall be performed using clean water having a temperature as near 20°C as practicable and not less than 15°C.

4. The test shall be to determine the rate of oxygenation and transfer efficiency at full electrical input horsepower.

5. Samples shall be drawn from a minimum of three unique submergences at two selected locations in the basin, on opposite sides of the tank, at 1/4 tank length from center line of tank, and the other at 3/4 tank length from center line. As the dissolved oxygen rises in the tank, six samples, one for each depth at each location, shall be drawn at 1 to 5 minute intervals. Intervals should be selected to get at least six sets of samples between 10 and 80 percent saturation.

6. The Contractor shall provide all necessary labor, electrical power, laboratory analysis, and materials and supplies necessary to conduct the oxygen transfer performance tests. The aerator manufacturer shall conduct the test program and associated data analysis.

7. An original and copy of all measurements and data shall be made and each sheet initialed by the representative of the manufacturer and the Engineer. The copy shall be given to the Engineer.

D. Mixing Tests and Mechanical Performance Tests

1. Mechanical Performance Tests: The manufacturer shall conduct field mechanical performance tests on all eight (8) aerators in the aeration tanks at the project construction site to confirm that the equipment operates within acceptable normal running noise, vibration, speed, and direction.

2. Mixing Tests: The manufacturer shall conduct field mixing tests on one (1) of the eight (8) installed aerators in the aeration tank at the project construction

site to verify that the equipment can meet the Mixing Performance Requirements in Paragraph 1.8 of this section. The Mixing Test shall be conducted on one (1) of the first four (4) aerators installed, during the first installation segment.

3. The Contractor shall provide all necessary labor, electrical power, laboratory analysis, and materials and supplies necessary to conduct the mixing and mechanical performance tests. The aerator manufacturer shall conduct the test program and associated data analysis.

4. These tests shall be conducted after the aerators are installed and the basins have been placed in service (flow-through operation) for a minimum of 48 hours, with a mixture of intermediate clarifier effluent and return activated sludge provided by the Owner.

5. Mechanical performance test runs on the aerators shall confirm acceptable normal running noise, vibration, speed and direction.

6. After the units have been installed and aligned, and the manufacturer's recommendations for initial startup have been implemented, each unit shall be run to demonstrate its ability to operate without overheating, jamming or excessive vibration during normal operation. The aerators shall be run at full speed and full load for a minimum of two hours after the oil temperature has stabilized. The gear reducer housing and shaft seals shall be checked for leakage of lubricant. Any leaks shall be corrected and the temperature rise of the lubricant in the oil sump of the gear reducer shall not exceed 100°F above ambient.

7. The mechanical aerators shall be designed to thoroughly mix the entire tank to maintain the mixed liquor solids in suspension without transferring tank contents outside the tank or onto any of the tank walkways or platforms. Suspension is defined as maintaining a minimum velocity so that the suspended solids concentration varies no more than +/-10% from the average solids concentration in the tank when operating at full power and speed, and no more than +/-20% of the average solids concentration when operating at half power.

8. The following test procedures shall be followed for the mixing test:

    a. The aerator shall be tested and operated under two conditions for the mixing performance test: at full power and speed, and at half power.

    b. The mixed liquor concentration shall be representative of typical operating conditions between 1,200 and 3,500 mg/L as determined by the Owner and Engineer for the full duration of the performance test.

    c. Suspended solids samples shall be collected under both testing conditions: with aerator operating at full power and speed and aerator operating at half power. Suspended solids shall be measured at a minimum of eight determination points: at four operating depths of 1-ft, 4-ft, 8-ft, and 12-ft above the basin floor and at two selected locations in the basin, on opposite sides of the tank, one at 8.5-ft from the edge of the tank, and the other at 15-ft from the edge of the tank (the tank is of square

dimensions as shown on the drawings). Samples shall be taken with sampling equipment intended for discrete sampling of wastewater.

d. Following collection of samples, the Contractor shall contract with an environmental laboratory certified by the State of Connecticut to analyze the total suspended solids concentration in each sample utilizing standard methods for wastewater analysis.

e. The results of the field mixing test shall be assembled by the Contractor in a report that demonstrates compliance with the minimum mixing requirements specified herein. The report shall be provided to the Engineer within three weeks of the test and shall include the certified results from the laboratory and calculations.

E. If the aerators do not pass the performance testing, the Contractor and the manufacturer shall meet the Performance Guarantee requirements in Paragraph 1.7 of this section. Performance Testing shall be repeated until successful. The Contractor and manufacturer shall be responsible for all costs associated with necessary modifications and laboratory costs associated with sampling and analyses of initial and any subsequent tests.

END OF SECTION

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SECTION 15830

NEGATIVE PRESSURE RELIEF DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes

1. Stainless steel, negative pressure relief doors designed to relieve pressure and prevent structural damage to ductwork or plenums in HVAC systems Work of the Contract is shown and described in Drawings and Project Manual entitled:

1.2 RELATED SECTIONS

1. Section 13228 – Odor Control System
2. Section 15825 – FRP Duct, Dampers and Airflow Measurement (Odor Control)
3. Section 15950 – Testing, Adjusting and Balancing

1.3 SUBMITTALS

A. AMCA 500 - Test Methods for Louvers, Dampers and Shutters

1.4 SUBMITTALS

A. Comply with requirements of Section 01330 - Submittal Procedures.

B. Informational Submittals

1. Include leakage, relief volume, and maximum pressure data.
2. Indicate materials, construction, dimensions, and installation details.
3. Verify door leakage ratings based on tests and procedures performed in accordance with AMCA 500.

1.5 QUALITY ASSURANCE

A. Capacity: Demonstrate capacity of pressure relief door to operate according to Odor Control system operating conditions.

1. Negative Pressure Relief Settings: 10 inches w.g. (2.5 kPa).
2. Relief Airflow: Maximum air volume of 7,500 cubic feet per minute.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to Odor Control System Manufacturer’s facility in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.

B. Storage: Store materials in a dry area indoors, protected from damage and in accordance with manufacturer's instructions.

C. Handling: Handle and lift pressure relief doors in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product /Manufacturer/Distributors: Named Manufacturers/Distributors are not relieved from conforming to the specification requirements. Any alternative products submitted or named products / manufacturers listed below must conform to the specification without exception.

1. Ruskin Manufacturing, 3900 Dr. Greaves Road, Kansas City, Missouri 64030. Phone (816) 761-7476.

2. KEES, Incorporated, 400 S. Industrial Drive, Elkhart Lake, Wisconsin 53020. Phone (920) 876-3391

3. Or equal.

2.2 NEGATIVE PRESSURE RELIEF DOORS

A. Fabrication:

1. Model:

a. Ruskin Manufacturing: Model NRD18

b. KEES: Model BI

2. Negative Pressure Relief Setting: 10 inches w.g. (2.5 kPa).

3. Size: 18 x 18 inches.

4. Frame: Minimum 12 gage (2.8 mm) stainless steel, Z-shaped.

5. Door:

a. Style: Single-piece, steel hinge on 1 side.

b. Material: Minimum 12 gage (2.8 mm) stainless steel.

6. Springs: Stainless steel negator springs.

7. Polyurethane foam around door perimeter.

8. Pressure Relief Mechanism: Exposed on face of door.

9. Mounting: Vertical.

10. Finish: Stainless steel.

B. Performance Data:

1. Temperature Rating: Withstand maximum 250 degrees F (121 degrees C).

2. Capacity: Demonstrate capacity of pressure relief door to operate according to Odor Control system operating conditions.

2.3 ACCESSORIES

A. Duct Saddle: Transition for round duct application as required per Odor Control System Manufacturer's Requirements.

2.4 SOURCE QUALITY CONTROL

A. Factory Tests: Factory calibrate and test to assure proper operation.

PART 3 EXECUTION – NOT USED

3.1 INSTALLATION

A. Install negative pressure relief doors at locations indicated on the drawings and in accordance with manufacturer's installation instructions.

B. Install pressure relief doors square and free from racking in a vertical position.

C. Do not compress or stretch door frame into duct or opening.

D. Handle door using frame. Do not lift door using relief mechanism.

END OF SECTION

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POSSIBLE STOCKPILE AREA FOR AREA 3 SOILS

EXISTING STOCKPILE (<2PPM PCBs) TO BE RELOCATED TO AREA 3 STOCKPILE

CONEX STORAGE CONTAINERS

PROJECT LIMIT LINE (TYP)

INSTALL ORANGE DEMARCATION LAYER AT EXCAVATION LIMIT

APPROXIMATE LIMIT OF SOIL EXCAVATION INCLUDING LATERAL BUFFER

INTERNAL EXCAVATION BUFFER ZONE (3-FT)

LAGOON

AREA 1

AREA 2

AREA 3

AREA 2A

AREA SW

PHASE 4 AREA

PHOSPHORUS REMOVAL BUILDING

NITRIFICATION SETTLING TANK NO.2

INTERMEDIATE SETTLING TANK NO.2

STAGE 4

STAGE 1

DENITRIFICATION FILTER BUILDING

GEN BLDG

FUEL OIL TANK ON CONC

TANK STRUCTURE

LOADING PAD

TRANSFORMER

CONC STEP

BOLLARDS

MH TF=131.85

TRAV@24 MAG NAIL ON PAVEMENT N: 767324.99 E: 963900.36 EL.=129.37

F.F.=140.73

F.F.=129.94

8"WATER

METHANE LEAK DETECTION MH TF=129.93

METAL FENCE

EXISTING FENCE TO BE RELOCATED FOR STOCKPILE

POSSIBLE STOCKPILE AREA FOR AREA 3 SOILS

PROJECT LIMIT LINE (TYP)

INSTALL ORANGE DEMARCATION LAYER AT EXCAVATION LIMIT

INTERNAL EXCAVATION BUFFER ZONE (3-FT)

AIR RELEASE BASIN TOP CONC. EL=132.50 BOTT EL=120.24

TOP COMB. EL=129.69

100-YEAR FLOOD LINE BASED ON FEMA MAP

UPLAND REVIEW AREA

APPROXIMATE PROPERTY LINE

SWALE

PAVED DRIVE

BIT. WALK

CONC. WALK

MW-101 MW-102 TB9 TB10 TB11 TB12 TB13 TB21 TB22 TB23 TB24

GZ-1 GZ-3 GZ-4 GZ-14 GZ-17 GZ-20

GP32 GP34 GP36 GP44

B-1 B-2

WF#1 WF#2 WF#3 WF#4 WF#5 WF#6 WF#7 WF#8 WF#9 WF#10 WF#34 WF#35 WF#36 WF#37

AREA SW	
PCB'S	<3ppm
SOIL EXCAVATION DEPTH	~3 FT
SOIL VOLUME	~250 CY

LAGOON	
PCB'S	ND-<50ppm
SOIL EXCAVATION DEPTH	~6 FT
SOIL VOLUME	~740 CY

AREA 1	
PCB'S	1-10ppm
SOIL EXCAVATION DEPTH	~6-13 FT
SOIL VOLUME	~1,500 CY

AREA 3	
PCB'S	ND-<1ppm
SOIL EXCAVATION DEPTH	~3-14 FT
SOIL VOLUME	~4,500 CY

NOTE:
SEE SHEET C-024 THRU C-026 FOR SECTION CUTS

LEGEND:

- PROPOSED BUILDING
- PROPOSED SITE DRIVE
- PROPOSED APRON/ LANDING

CROSS-SECTION SUBSURFACE LOCATIONS

- GP1 GEOPROBE SOIL BORING - SEPT 2015
- AK1 AIR KNIFE SOIL BORING - SEPT 2015
- TB1 GEOTECHNICAL SOIL BORING - SEPT/OCT 2015
- B-1 SOIL BORING (M&E) - OCT 2006
- GZ-1 SOIL BORING (GZA) - APRIL 2007
- MW-1 MONITORING WELL

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE

FILENAME: J:\S\S1928 SOUTHINGTON\09 - WPCP IMPROVEMENTS AND PHOSPHORUS UPGRADE\DRAWINGS\C-017.DWG
SAVE DATE: 9/20/2018 9:37 AM
PLOT DATE: 9/20/2018 9:43 AM

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STATE OF CONNECTICUT
CHRISTOPHER T. BONE
No. 25850
LICENSED PROFESSIONAL ENGINEER
9/20/18

Water Pollution Control Plant Phosphorus Upgrade Project

Town of Southington, Connecticut

VERIFY SCALE
BAR IS 1 INCH ON ORIGINAL DRAWING
0 1 INCH
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

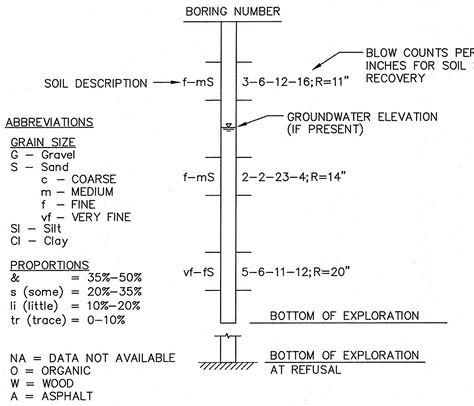
Mark	Date	Description
1	9/20/18	ADDENDUM NO. 3
0	7/18	ISSUED FOR CONSTRUCTION

PROJECT NO:	S-1928/09
FILE:	C-017.dwg
DRAWN BY:	MDS, MS
CHECKED:	NG
APPROVED BY:	CCB, SES

SOIL MANAGEMENT SITE PLAN

SCALE: 1" = 20'

C-017
SHEET 26 OF 304



BORING LOG PROFILE LEGEND

PREDOMINANT GRAIN SIZE FROM BORING LOGS. REFER TO SOIL BORING LOGS CONTAINED IN THE BIDDING DOCUMENTS FOR ADDITIONAL DETAILS.

NOTES:

1. EXISTING FILL WHICH CONTAINS ORGANIC MATTER IS NOT SUITABLE FOR FOUNDATION SUPPORT AND SHALL BE OVER-EXCAVATED FROM FOUNDATION BEARING ZONE AND REPLACED. THE FOUNDATION BEARING ZONE IS DEFINED BY A 1H:1V PLANE EXTENDING DOWNWARD AND OUTWARD FROM ONE FOOT BEYOND THE EDGE OF THE FOUNDATION.
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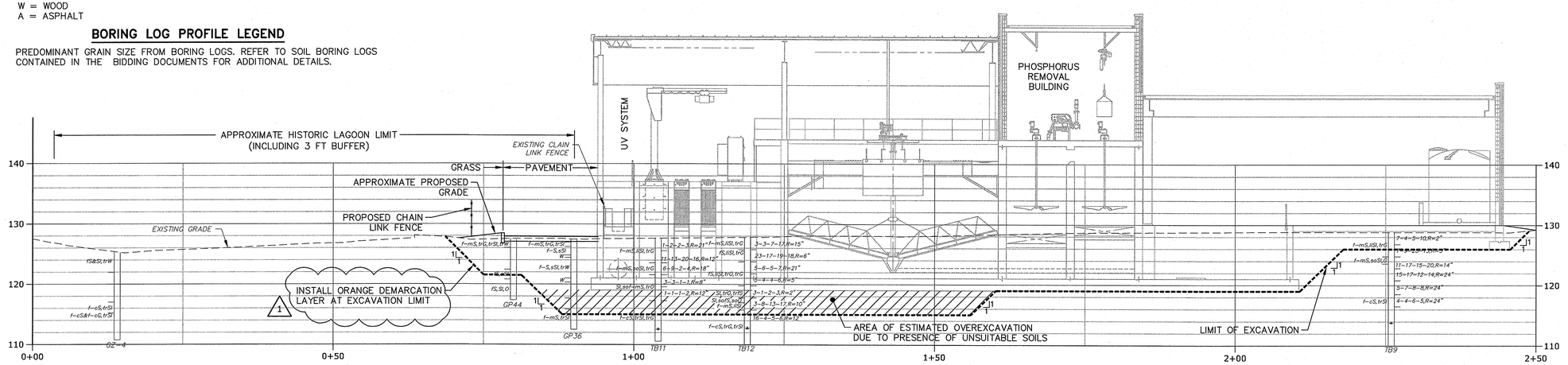
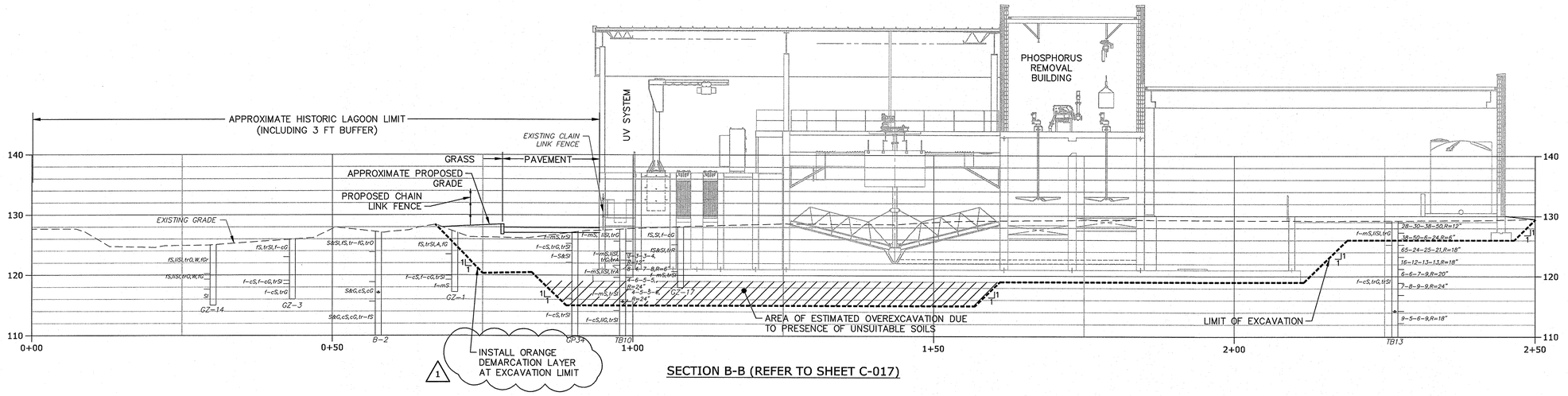
5. ONLY CRUSHED STONE NEEDS TO BE WRAPPED IN FILTER FABRIC FOR THE PURPOSE OF KEEPING SOILS FROM MIGRATING INTO THE VOIDS WITHIN THE CRUSHED STONE.



SECTION A-A (REFER TO SHEET C-017)



SECTION B-B (REFER TO SHEET C-017)

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PROJECT NO:	S-1928/09
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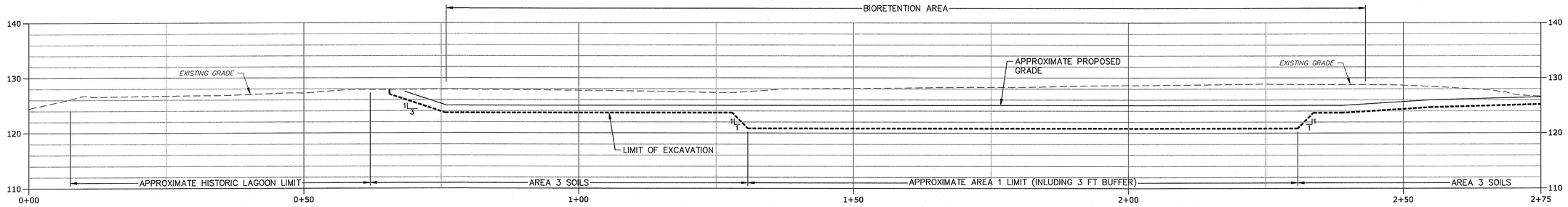
APPROVED BY:	CCB, SES

SOIL EXCAVATION PROFILES - 1

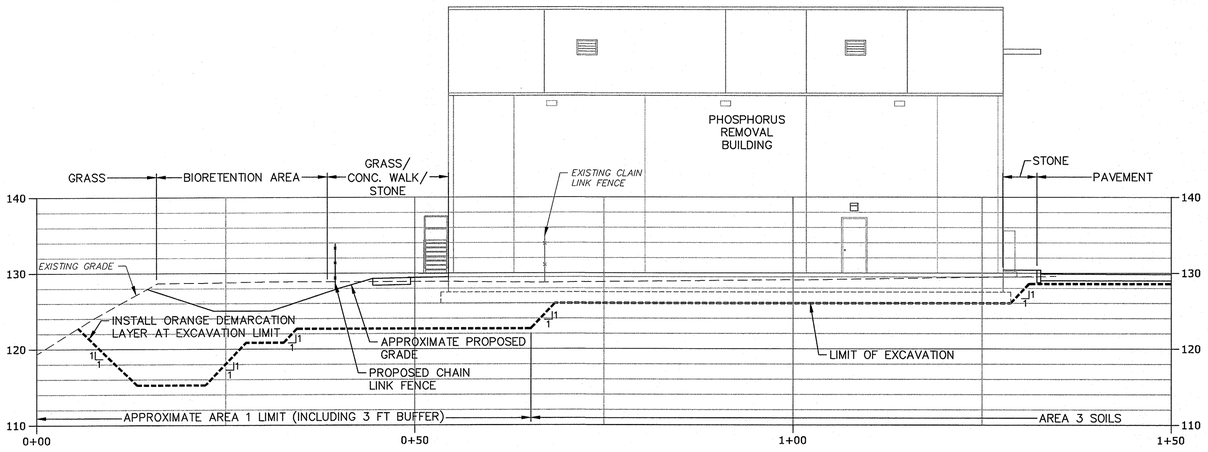
SCALE: 1"=10' HORIZ 1"=4' VERT.

C-024
SHEET 33 OF 304

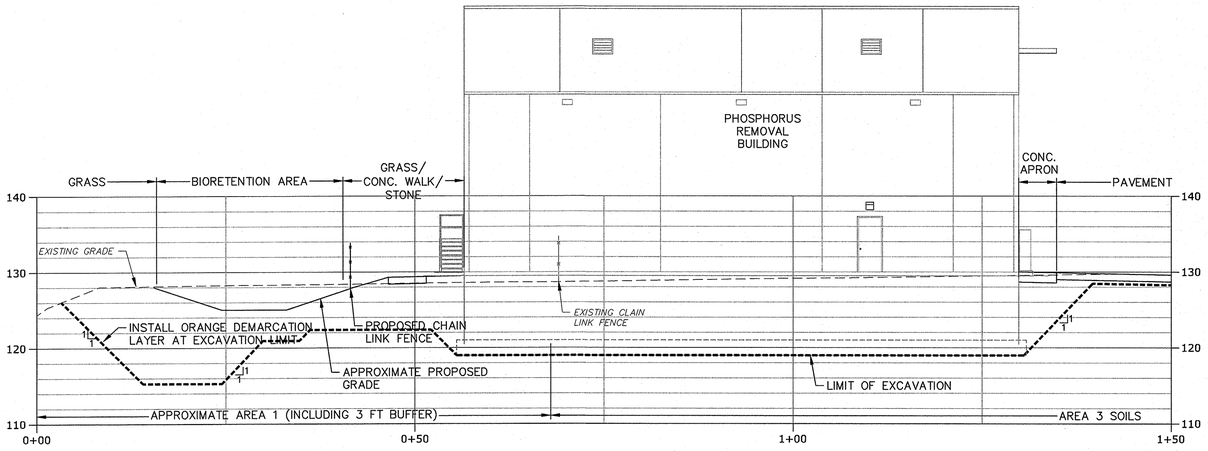
FILENAME: J:\S\S1928 SOUTHINGTON\09 - WPCP IMPROVEMENTS AND PHOSPHORUS UPGRADE\DRAWINGS\C-024.DWG
SAVE DATE: 9/20/2018 9:32 AM
PLOT DATE: 9/20/2018 9:44 AM



SECTION C-C (REFER TO SHEET C-017)



SECTION D-D (REFER TO SHEET C-017)



SECTION E-E (REFER TO SHEET C-017)

NOTES:

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CHECKED:	NG
APPROVED BY:	CCB, SES

SOIL EXCAVATION PROFILES - 2

SCALE: 1"=10' HORIZ 1"=4' VERT.

C-025
SHEET 33A OF 304

FILENAME: J:\S\S1928 SOUTHINGTON\09 - WPCP IMPROVEMENTS AND PHOSPHORUS UPGRADE\DRAWINGS\C-024.DWG
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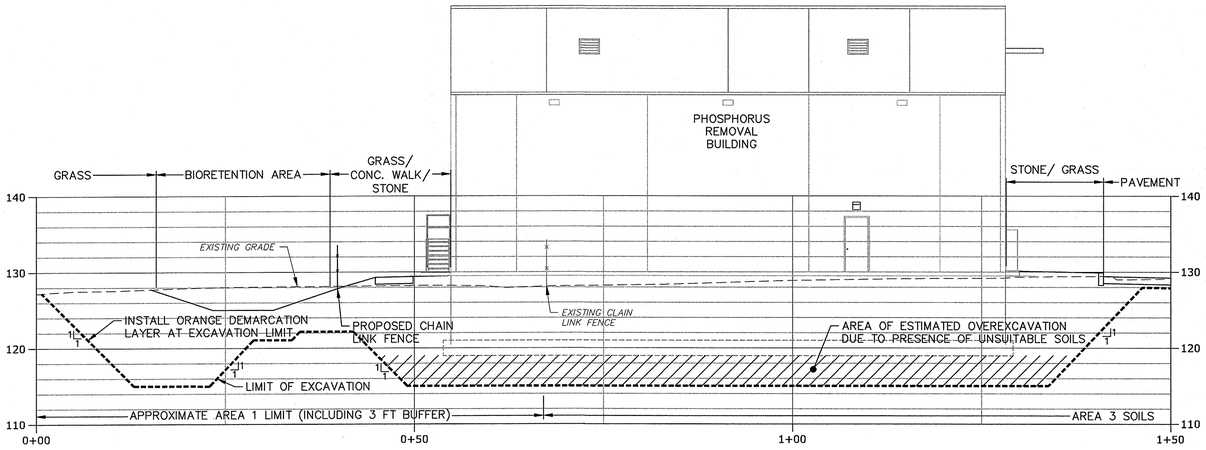
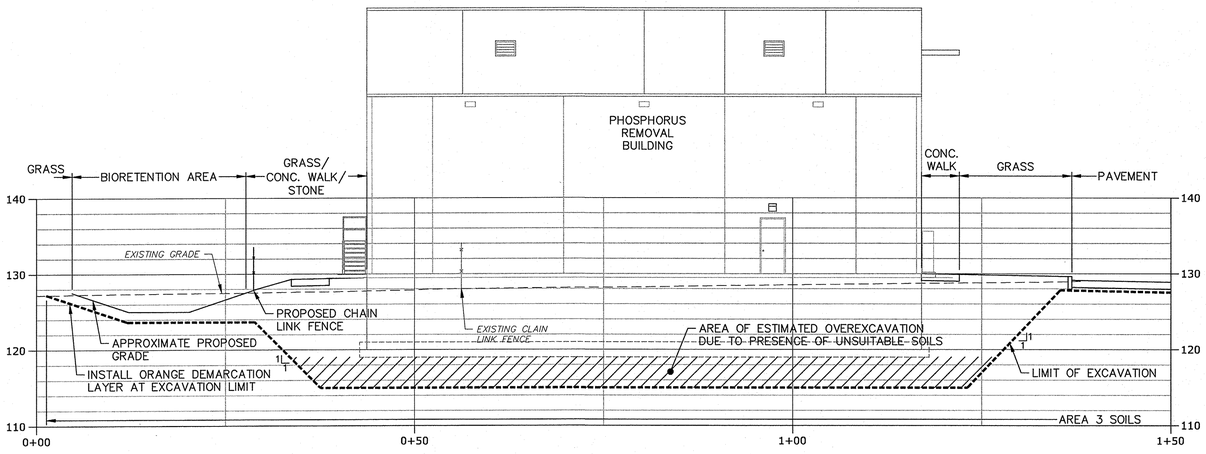


SECTION F-F (REFER TO SHEET C-017)



SECTION G-G (REFER TO SHEET C-017)

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APPROVED BY:	CCB, SES

SOIL EXCAVATION PROFILES - 3

SCALE: 1"=10' HORIZ 1"=4' VERT.

C-026

SHEET 33B OF 304

FILENAME: J:\S\1928 SOUTHINGTON\09 - WPCP IMPROVEMENTS AND PHOSPHORUS UPGRADE\DRAWINGS\C-024.DWG
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