<u>Town of Branford</u> BRANFORD WPCF PROCESS SYSTEM UPGRADES Branford, Connecticut <u>Contract #052225</u> Addendum #2

Date: June 18, 2025

Submission Date: June 25, 2025, 1:30 pm (per Addendum #1)

Prospective bidders, and all those concerned, are hereby informed that the following is made a part of the bid documents, which should be amended as follows:

ATTACHMENTS*

- A. Revised Specification 01143 Coordination with Owner's Operations
- B. Revised Specification 11215 Plant Water Package Systems
- C. Revised Specification 11375 High Speed Turbo Compressors
- D. Revised Appendix A (Prevailing Wage Rates)
- E. Revised Appendix B (Figures)
- F. Pre-Bid Meeting Attendance List

*Note: Revisions to attachments are provided in red.

Questions asked at the Pre-Bid Meeting and/or Submitted by Bidders:

<u>General</u>

1. What is the project timeline? Are there liquidated damages for running beyond the project deadline?

The Work must be completed within 520 days after the date when the Contract Times commence to run, per Specification Section 00520, subsection 4.01. For information regarding liquidated damages, refer to Specification Section 00520, subsection 4.02.

2. What is the estimated cost of the project?

The cost estimate for the project equipment is approximately \$1 million. A cost estimate was not prepared for the installation of the equipment.

3. Do we need to include cost for building permit fees in our bid for the project?

Refer to Specification Section 02225, subsection 1.06.

The only permit fees required by the Branford Building Department applicable to this project are those associated with the submission of any hard copy plan sets, and the state education fee. The submission of electronic copy plan sets is preferred, as there are no fees associated with the submission of electronic copies.

4. Is there an area where material can be stored on site?

There is a laydown area located across from the Secondary Process Building that may be used by the Contractor. This laydown area was shown during the pre-bid meeting and will be shown to all other bidders during their visit to the site.

5. Are there any indoor storage areas where the new blowers can be stored before installation?

Yes, indoor storage areas for the new blowers and plant water pump skid will be provided by the Owner.

6. Will the Contractor's staff have access to bathrooms?

Yes, there are bathrooms available in the Secondary Process Building and the Main Building that will be available for use by Contractor's staff.

7. The rates that were distributed with the specification package are from 2021 and do not apply to this current package. Please remove and resend current prevailing wages associated to this year.

The 2025 prevailing wage rates are attached.

Mechanical, Equipment, & Finishes

8. Will the Contractor be expected to paint the floors.

Refer to the attached revised Specification Section 01143, subsection 1.01.

9. The existing discharge air blower pipes for all the existing blowers is covered with painted green pipe insulation. Do we need to match and install new insulation on any new discharge pipes we install to the new blowers?

Yes, any new discharge air piping shall be insulated and painted to match existing.

Take notice that inlet and discharge connections will vary by blower manufacturer, therefore, piping details must be included with the shop drawing submittals for the aeration blowers. See attached revised Specification Section 11375, subsection 1.04.B.4.

- 10. In specification section 01143 -6 (Coordination with owners operation) subsection 1.06 B C D:
 - a. For the Aeration system how many blowers do we need to keep in operation when we demo and install the new blower?

At least two blowers (one operating and one standby) must be available for operation at all times. (See revised Specification Section 01143, subsection 1.06.B.1, attached.)

b. Is there a time period of operation for the new blower before we move to the next blower?

Each time a new blower is installed, the new blower must be tested and successfully run for 48 continuous hours before construction on the next blower may begin. (See revised Specification Section 01143, subsection 1.06.B.1, attached.)

c. Can we do work on the aeration blowers at the same time we do work on the reaeration system and/or the WAS Blower?

Yes

d. For the Reaeration blower and the WAS Blower what is the max number of days the blowers can be offline?

Refer to the attached revised Specification Section 01143, subsections 1.06.C and 1.06.D.

11. How long can the plant water system be offline?

Refer to Specification Section 01143, subsection 1.06.A.1.a.

12. Are there requirements for temporary construction facilities for the project?

Refer to the attached revised Specification Section 01143, subsection 1.06.

Electrical & Controls

13. How will integration with the controls be executed?

The Town of Branford has a separate, on-call contract with Aaron Associates as their system integrator. The Contractor will provide the necessary information for the System Integrator to the Owner and Engineer during the submittal process. The Owner and/or Engineer will provide this information to System Integrator.

14. Please check the cable and conduit schedule for proper names for to and from?

Appendix B Figures have been revised to reference "CP4/5" in place of "CP5", for clarity. The revised Appendix B is attached.

15. Where would 12 Twisted Shielded pairs terminate on a harmonic filter or a blower?

Spare I/O in CP4/5, as required.

16. Please identify what NEMA Classification each room or area that pertains to the job on the drawings or a list.

There is no work in hazardous areas. NEMA 4X enclosures are required for all damp areas.

17. Why are there new disconnect switches shown adjacent to the aeration blowers? This seems redundant.

The fused disconnect switches are supplied by the blower manufacturer to protect their equipment.

18. Please provide the specifications for the new Blower Equipment to facilitate the VFD Drive Selection.

Blower specs included control panel with integral VFD.

19. Please provide wiring schematics for the Variable frequency Drives along with components integrated into the cabinet ie lights for run stopped fault etc?

See response to Question No. 18, above.

20. Please provide wiring schematics for the Local Control Panels as well as features that must be integrated?

See response to Question No. 18, above.

21. Can the VFD's have integral disconnects instead of purchasing separate units to save on space?

See response to Question No. 18, above.

22. We believe that for ease of installation as well as workable space that the fusible disconnect that are on your one line schematic should be integral to the VFD Enclosures. Please advise.

See response to Question No. 21, above.

23. Please look through electrical drawings and confirm what is to be VFD and what is to be LCP. What does the LCP have integral to it? You are not showing new VFD's for the Re Aeration Blower and WAS Blowers please advise.

See response to Question No. 18, above.

24. Please advise if all conduit should be demolished and re run as they will not be able to be utilized directly with the new units?

Refer to the attached revised Figure E0-02 (Appendix B of Specifications). For clarity, the line denoting where existing meets proposed has been shifted in this figure.

25. In order to tie in new leads into MCC-6, it will need to be taken offline, which will mean all equipment connected to that panel will also go offline. How may this impact the treatment process?

See response to Question No. 24, above.

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26. Are new buckets for the electrical gear to be provided? What size buckets for the MCCs coincide with the new VFDS for the drives?

No, the existing circuit breakers in the secondary switchboard (SSWBD), power panel (PP) 6, and motor control centers (MCCs) 6 and 7 will feed the new equipment, per Figure E0-01 (Appendix B of Specifications).

See response to Question No. 24, above.

27. Who is responsible for furnishing and programming the VFD's. Section 11 of the specifications makes it look like the equipment supplier is but section 16 makes reference as it is responsible for furnishing said VFD WAS, RAS, Aeration. Please advise.

Refer to Specification Section 11305, subsection 2.03.A.15.a, and Specification Section 11370, subsection 2.06.A.

Respectfully submitted,

Brian Devlin, Sanitation Superintendent Please acknowledge receipt of addendum below and submit with your bid submittal.

Signature:	Date:
Title:	
Company:	

ATTACHMENT A

Revised Specification 01143 Coordination with Owner's Operations

SECTION 01143

COORDINATION WITH OWNER'S OPERATIONS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Scope:
 - 1. This Section includes requirements for coordinating with Owner's operations during the Work and includes requirements for tie-ins and shutdowns necessary to complete the Work without impact on Owner's operations except as allowed in this Section.
 - 2. Contractor shall provide labor, materials, tools, equipment, and incidentals shown, specified and required to coordinate with Owner's operations during the Work.
- B. Coordination:
 - 1. Review installation procedures under other Specification sections and coordinate Work that must be performed with or before the Work specified in this Section.
- C. Related Sections:
 - 1. Section 01010, Summary of Work.
 - 2. Section 01700, Contract Closeout
- D. Except for shutdowns specified in this Section, perform the Work such that Owner's facility remains in continuous satisfactory operation during the Project. Schedule and conduct the Work such that the Work does not: impede Owner's production or processes, create potential hazards to operating equipment and personnel, reduce the quality of the facility's products or effluent, or cause odors or other nuisances.
- E. Work not specifically covered in this Section or in referenced Sections may, in general, be completed at any time during regular working hours in accordance with the General Conditions and Supplementary Conditions, subject to the requirements in this Section.
- F. Contractor has the option of providing additional temporary facilities that can eliminate or mitigate a constraint without additional cost to Owner, provided such additional temporary facilities: do not present hazards to the public, personnel, structures, and equipment; that such additional temporary facilities do not adversely affect Owner's ability to comply with Laws and Regulations, permits, and operating requirements; that such temporary facilities do not generate or foster the generation of odors and other nuisances; and that requirements of the Contract Documents are fulfilled.

- G. Coordinate shutdowns with Owner and Engineer. When possible, combine multiple tie-ins into a single shutdown to minimize impacts on Owner's operations and processes.
- H. Do not shut off or disconnect existing operating systems, unless accepted by Engineer in writing. Operation of existing equipment will be by Owner unless otherwise specified or indicated. Where necessary for the Work, Contractor shall seal or bulkhead Owner-operated gates and valves to prevent leakage that may affect the Work, Owner's operations, or both. Provide temporary watertight plugs, bulkheads, and line stops as required. After completing the Work, remove seals, plugs, bulkhead, and line stops to satisfaction of Engineer.
- I. Bypassing:
 - 1. Diversion of wastewater flows around treatment processes is not allowed.

1.02 SUBMITTALS

- A. Action Submittals: Submit the following:
 - 1. Substitute Sequence Submittal: When deviation from specified sequence is proposed, provide submittal explaining in detail the proposed sequence change and its effects, including evidence that Owner's operations will not be adversely affected by proposed change. List benefits of proposed sequence change, including benefits to Progress Schedule.
- B. Informational Submittals: Submit the following:
 - 1. Shutdown Planning Submittal:
 - a. For each shutdown, submit an inventory of labor and materials required to perform the shutdown and tie-in tasks, an estimate of time required to accomplish the complete shutdown including time for Owner to take down and start up existing equipment, systems, or conduits, and written description of steps required to complete the Work associated with the shutdown.
 - b. Furnish submittal to Engineer at least thirty days prior to proposed shutdown start date. Do not start shutdown until obtaining Engineer's acceptance of shutdown planning submittal.
 - 2. Shutdown Notification: After acceptance of shutdown planning submittal and prior to starting the shutdown, provide written notification to Owner and Engineer of date and time each shutdown is to start. Provide notification at least 72 hours in advance of each shutdown.

1.03 GENERAL CONSTRAINTS

A. New equipment, materials, and systems may be used by Owner after the specified field quality controls and testing are successfully completed and the materials or equipment are Substantially Complete.

- B. The following constraints apply to coordination with Owner's operations:
 - 1. Operational Access: Owner's personnel shall have safe access to equipment and areas that remain in operation.
 - 2. Maintenance of Traffic:
 - a. Contractor shall maintain at least one roadway for the Owner to gain access to all existing facilities at all times.
 - b. Temporary Traffic Control Signage:
 - 1. Provide and operate traffic control and direction signal required to direct and maintain an orderly flow of traffic in all areas under Contractor's control or affected by Contractor's operations.
 - Provide traffic control and up to 6 directional signs, 2 feet by 4 feet in size, mounted on barricades or standard posts in locations necessary to control plant traffic and deliveries and as directed by the Engineer.
 - 3. Temporary Partitions and Enclosures: Contractor shall provide temporary partitions and enclosures necessary to maintain dust-free, heated, and ventilated spaces in areas that are adjacent to the Work and that must be kept operational.
 - 4. System Start-ups: Schedule and perform equipment and system start-ups for Tuesday through Thursday. Equipment and systems shall not be placed into operation on Friday, Saturday, Sunday and Monday without prior approval of Owner.
 - 5. Dead End Valves or Pipe: Provide blind flanges, watertight bulkheads, or valve at temporary and permanent terminuses of pipes and conduits. Blind flanges and bulkheads shall be suitable for the service and braced and blocked, as required, or otherwise restrained as directed by Engineer. Temporary valves shall be suitable for their associated service. Where valve is provided at permanent terminus of pipe or conduit, also provide on downstream side of valve a blind flange with drain/flushing connection.
 - 6. Dewatering and Cleaning of Plant Water Piping: Owner will assist Contractor in dewatering plant water piping for shutdowns by operating existing equipment to the extent of operating site equipment as applicable. Work area shall be maintained clean and dry by pumping and properly disposing of fluid that accumulates in work areas.
 - a. Contractor shall give Owner seven days' notice for draining of process piping. Draining will only be allowed by Owner depending on flow conditions at the plant.
 - b. Once work is complete, clean plant water piping in accordance with Section 15220.

1.04 SEQUENCE OF WORK

A. Introduction

- **1.** Construction of the proposed upgrades may disrupt the existing facility structures and operations. To minimize disruption, the construction must be sequenced appropriately.
- **B.** Detailed Schedule and Sequence of Work
 - 1. At least 14 days prior to the construction of any work or part hereof which will interfere with the existing systems, Contractor shall submit to the Engineer a detailed schedule and sequence of the proposed work.
 - 2. The detailed schedule and sequence shall include the time period and nature of the interference and what temporary measures or systems will be utilized to accomplish the work and minimize the interruption.
 - **3.** Descriptions shall be provided to confirm compliance with the requirements specified herein including type of equipment, controls, alarms, and provisions for standby units in the event of a failure of primary units and provisions in the event of a failure of primary power system. Contractor's detailed schedule and sequence of proposed work shall incorporate a written plan of the electrical and controls work.
 - 4. The Contractor shall include the cost of all temporary facilities required in the bid price. The cost shall include the cost for all labor, tools, equipment and materials necessary.
- **C.** Construction Restrictions
 - **1.** Contractor should note that any work requiring shutdown or modification of existing facilities requires prior written acceptance of the proposed schedule and sequence noted above.
 - 2. The schedules as accepted shall be adhered to except as deviations therefrom are expressly permitted by the Engineer. Schedules shall be updated and resubmitted as specified and as requested by the Engineer.
 - **3.** Contractor shall conduct work during daylight hours on Monday through Friday, and within the time between 7:00 a.m. and 3:30 p.m. No work is to be done on Owner's holidays, Saturdays, Sundays or outside of the work hours described above.
 - **4.** Prior to commencing work each day, Contractor must sign in at the WPCF Administration Building.
 - 5. Operation of heavy equipment, excessive backing, and demolition activities that produce substantial noise shall not commence before 8:00 a.m.
 - 6. The Owner reserves the right to schedule Contractor to construct at any locations within the project area. At the same time the Owner may schedule the suspension of construction at any location.

1.05 SHUTDOWNS

- A. General:
 - 1. Terminology: A "shutdown" is when a portion of the normal operation of Owner's facility, whether equipment, systems, piping, or conduit, has to be temporarily suspended or taken out of service to perform the Work.
 - 2. Work that may interrupt normal operations shall be accomplished at times convenient to Owner. The Contractor shall submit to the Owner a written plan, schedule. The plan and schedule shall be approved by the Owner at least 21 days in advance of requested shutdown. The plan shall include primary and back up dates for shutdown.
 - 3. Furnish at the Site, in close proximity to the shutdown work area, tools, equipment, spare parts and materials, both temporary and permanent, necessary to successfully complete the shutdown. Complete to the extent possible, prefabrication of piping and other assemblies prior to the associated shutdown. Demonstrate to Engineer's satisfaction that Contractor has complied with these requirements before commencing the shutdown.
 - 4. If Contractor's operations cause an unscheduled interruption of Owner's operations, immediately re-establish satisfactory operation for Owner.
 - 5. Unscheduled shutdowns or interruptions of continued safe and satisfactory operation of Owner's facilities that result in fines or penalties by authorities having jurisdiction shall be paid solely by Contractor if, in Engineer's opinion, Contractor did not conform to the requirements of the Contract Documents, or was negligent in the Work, or did not exercise proper precautions in conducting the Work.
- B. Shutdowns of Electrical Systems:
 - 1. All shutdowns shall be scheduled in advance during periods of dry weather at the discretion of the Owner. During the shutdown period, the work shall be executed in a continuous fashion with sufficient manpower so that the circuits become operational within the shortest time possible and not exceeding the shutdown times allocated. Shutdowns indicated in days shall be 24 consecutive hours with the use of overtime should it be necessary.
 - 2. During the shutdown period, the remaining circuits shall remain operational to the maximum extent possible. The work under the next shutdown shall not proceed until the previous work becomes operational. The work shall be considered operational when the modification is complete, has been proven, tested and accepted by the Owner.
 - 3. All shutdowns shall be at the discretion of the Owner. The Owner will review the Contractor's plan and select what will be taken out of service first and will establish the order of subsequent shutdowns. The shutdown schedule and sequential order established will be subject to revision by the Owner should conditions change or as may be required to satisfy operational aspects of the facility.

- 4. Shutdowns shall comply with all Laws and Regulations, including the National Electric Code.
- 5. Contractor shall lock out and tag circuit breakers and switches operated by Owner and shall verify that affected cables and wires are de-energized to ground potential before shutdown Work is started. Upon completion of shutdown Work, remove the locks and tags and notify Engineer that facilities are available for use.

1.06 WORK SEQUENCING AND CONSTRAINTS

- A. Plant Water System:
 - 1. Before the Owner will allow the Contractor to proceed with installation of the new plant water system, the following requirements must be met:
 - a. The existing plant water system may be offline for a maximum of 3 days due to sludge storage tank capacity constraints. If the work associated with this system will exceed the 3-day window, the Contractor shall implement a temporary bypass system to maintain gravity belt thickener (GBT) operations.
 - 2. Submit a Temporary Bypass Plan 14 days prior to work, including:
 - a. Piping/valve schematics and connection points (reference Appendix B Figures).
 - b. Pump specifications (electrically driven, compatible with existing infrastructure).
 - c. Cutover testing procedures.
 - 3. Performance Requirements
 - a. The temporary system must match the design flow of the existing plant water system to prevent GBT disruption.
 - b. Include backup pumps/connections to ensure continuous operation.
 - c. The Owner reserves the right to resume normal operations at any time if the bypass system fails or sludge storage limits are approached.
 - 4. The Owner will sequentially remove from service existing pumps 1, 2, and 3 to facilitate the connection of the temporary pumps to the existing electrical gear. Temporary pumps must be electrically driven and be compatible with the existing electrical infrastructure. The Owner will operate the temporary pumps and maintain the electrical gear.
 - 5. The Owner will allow the removal of all temporary pumps following substantial completion of the plant water system Work and 30 days of continuous trouble-free operation.

B. Aeration System

- 1. Before the Owner allows the Contractor to proceed with installation of the new process air blowers, the following requirements must be met:
 - a. All three process air blowers may be offline for a maximum of 4 hours days in the summer, up to 6 hours in the winter.<u>At least two blowers</u> (one operating and one standby) must be available for operation at all times. Each time a new blower is installed, the new blower must be tested and successfully run for 48 continuous hours before construction on the next blower may begin. Contractor shall coordinate the process air blower demolition and installation schedule with Owner.
- C. Reaeration System
 - 1. Contractor shall coordinate the reaeration system Work with the Owner, who will utilize the existing Reaeration Blower No. 1 for any DO needs during demolition and installation. The Reaeration Blower may be offline for a maximum of 1 week. If the work associated with this system will exceed the 1-week window, then the Contractor shall provide temporary aeration to the sludge holding tank that meets the Reaeration Blower capacity (delivered) design criteria provided under Section 11305, subsection 2.02.A.
- D. WAS Blower
 - 1. Contractor shall coordinate the WAS Blower installation with the owner, who will adjust tank levels prior to the demolition of the existing WAS Blower. The WAS Blower may be offline for a maximum of 3 days. If the work associated with this system will exceed the 3-day window, then the Contractor shall provide temporary aeration to the sludge holding tank that meets the WAS Blower capacity (delivered) design criteria provided under Section 11305, subsection 2.02.A.
- PART 2 PRODUCTS (NOT USED)
- PART 3 EXECUTION (NOT USED)

END OF SECTION

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ATTACHMENT B

Revised Specification 11215 Plant Water Package Systems

SECTION 11215

PLANT WATER PACKAGE SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Skid mounted packaged plant water system including <u>inline vertical multistage</u> pumps, motors, integrated motors/variable frequency drives, isolation valves, interconnecting piping, remote mounted motor control panel, vacuum prime system, pressure transmitters and indicators, flow meter, alarm network and internal wiring.
- B. Related Sections
 - 1. Section 01140 Work Restrictions
 - 2. Section 01730 Operation and Maintenance Manuals
 - 3. Section 01800 Start-up and Commissioning
 - 4. Section 09900 Painting
 - 5. Section 15220 Process Water Piping
 - 6. Section 15225 Plant Water Strainers
 - 7. Division 16 Electrical

1.02 SYSTEM DESCRIPTION

- A. The system shall be skid mounted on fabricated steel frames, completely factory assembled, and hydraulically and electrically tested by the manufacturer. The manufacturer shall also take into consideration access opening size of 3 feet 9 inches by 3 feet 9 inches. The system shall be designed so that, if necessary, it may be partially disassembled during installation. Manufacturer to provide information on disassembly/reassembly if pump skid specified is larger than access opening allows.
- B. The control panel shall be skid mounted.
- C. Variable Speed Systems
 - 1. The system shall include three (3) vertical multistage centrifugal pumps and motors using a dedicated variable frequency drive control logic system. The system and all accessories shall be prefabricated, pre-wired and skid mounted.
 - 2. The system shall be designed to deliver a total flow of 170 gpm at 65 psi with two duty pumps and one standby pump. Pump speed shall be infinitely variable to exactly match the flow requirements at a constant pressure level.
 - 3. The package shall utilize the existing Amtrol WX-452C 211-gallon hydropneumatic tank to maintain stored pressure in the tank during no/low flow periods.

- a. 2" NPT Connection
- b. Maximum operating pressure 175 psig
- c. Maximum allowable temperature 240°F
- d. Minimum design metal temperature $-18^{\circ}F$
- 4. Pump suction shall be from the UV channel. The minimum water level elevation in the channel is approximately 101.49 feet and the elevation of the 8" plant water suction pipe is approximately 101.16 feet. The package system will be installed on an existing 4-inch-thick concrete pad at an elevation of 99.83 feet. Pumps shall be capable of pumping at design conditions without cavitation. To protect the equipment from damage, the pump motors and instrumentation should be located as high as possible, no lower than 101.67 feet.
- D. Refer to Section 01143 for work restrictions related to the plant water system.

1.03 SUBMITTALS

- A. Shop drawings showing details of fabrication, erection, and adjoining equipment interfaces for all equipment furnished under this Section.
- B. Manufacturers' rating curves showing pump characteristics of discharge, head, capacity, brake horsepower, efficiency, required net positive suction head, required minimum submergence and total pumping unit weight. This information shall be prepared specifically for the pumps proposed. Catalog sheets showing a family of curves will not be acceptable.
- C. Literature and drawings describing the equipment in sufficient detail, including parts list and materials of construction, to indicate full conformance with the Specifications.
- D. Certified dimensional drawings of each item of equipment and auxiliary apparatus to be furnished.
- E. Plant water support skid layout and anchor bolt plans and details. Contractor shall verify existing dimensions prior to submittal. Plant water skid layout and connection locations shall comply with the space and connection points available.
- F. Certified motor test data as described in Section 16421.
- G. Schematic electrical wiring diagrams and control panel drawings and other data as required by the Engineer.
- H. Certified factory test data including performance curves for each of the proposed pumps from shut off to maximum capacity, showing head capacity, efficiency, BHP, required NPSH and minimum submergence. Data of tests and test points and results are required.
- I. Provide operation and maintenance manuals in accordance with Section 01730.
- 1.04 QUALITY ASSURANCE
 - A. The packaged plant water pumping system shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the fabrication and supply of the

system components to be furnished. All equipment to be furnished shall be products of manufacturers regularly engaged in the production of such equipment.

- B. The system manufacturer shall demonstrate that at least 10 similar systems of equal size and complexity have been in satisfactory operation for at least 5 years within the United States.
- C. The system manufacturer shall be responsible for satisfactory operation and performance of the entire plant water pumping system.
- D. The manufacturer of electrical control panels and their mounting and installation shall be done in strict accordance with the requirements of UL Standard 508a and the National Electrical Code (NEC), NFPA 70 latest revision so as to afford a measure of security as to the ability of the eventual owner to safely operate the equipment.

1.05 EXTRA MATERIALS

A. Furnish with each pump and drive, the manufacturer's standard set of spare parts including at least the following:

1. Vertical Pumps (per pump)

 $2 \cdot 1$ One (1) set of all gaskets

- <u>3.2.</u> One (1) shaft sleeve
- 4.<u>3.</u> One (1) set of bearing rings
- 5.4. One (1) set of all motor bearings
- 6.5. One (1) set of set screws
- 7.<u>6.</u> One (1) mechanical seal
- 8.<u>7.</u>One (1) seal kit
- 9.8. One (1) stack kit
- B. All spare parts shall be furnished packed in suitable containers and clearly labeled designating the contents and the unit for which they are intended.
- C. Furnish all special tools required for the operation and maintenance of the equipment.
- D. Lubricants Prior to testing and acceptance, furnish a one year's supply of all lubricants recommended by the manufacturers of each component of the equipment furnished and installed.

PART 2 PRODUCTS

- 2.01 MANUFACTURERS
 - A. Grundfos
 - B. Syncroflo, Inc.
 - C. or equal.

2.02 EQUIPMENT

- A. General
 - 1. The water booster systems shall be as follows:
- B. Pumps
 - 1. The pumps shall be variable speed <u>inline</u> vertical multistage, end suction, split coupled pumps with the motor mounted directly to the top of the pump.
 - 2. Each pump shall be capable of pumping 85 gpm @ 150.2 TDH with an minimum hydraulic efficiency of 72.9%.
 - 2.3. Pump shutoff head shall be 200 ft minimum. Pump base shall be Cast iron, ASTM Class 25B.
 - <u>3.4.</u> Pump Suction/discharge base shall be made of 304 stainless steel.
 - 4.<u>5.</u> Pump Suction/discharge connections shall be <u>2-inch</u> ANSI Class 300 flanged connections.
 - 5.6. The outer pump casing shall be CF 8M stainless steel.
 - 6.7. Casing O-rings shall be EPDM.
 - 7.8. Pump chamber and impellers shall be 316 stainless steel.
 - 8.9. Pump shaft shall be 329 stainless steel (duplex stainless steel).
 - 9.10. Motor shaft shall be 329 stainless steel (duplex stainless steel).
 - 10.11. The mechanical seal shall have silicon carbide faces and EPDM elastomers.
 - 11.12. All exposed nuts or bolts shall be AISI type 316 stainless steel.
 - 12.13. Pump shall be connected to the drive motor by a rigid, axially split coupling capable of withstanding all torsional, radial and axial loads. The coupling design shall facilitate alignment of the motor and pump shaft. The coupling design shall also permit replacement of mechanical seal without requiring removal of the drive motor. The shaft seal shall be a balance o-ring cartridge type. Shaft seal replacement shall be possible without removal of any pump components other than the coupling guard, shaft coupling and motor. The entire cartridge shaft seal shall be removable as a one-piece component.
 - <u>13.14.</u> Pumps shall be capable of operating at continuous temperatures up to 240 degrees F and working pressures of 175 psi.
 - 14.15. Motor and variable frequency drive shall be an integrated unit. Maximum HP rating shall be 7.5 HP. Integrated variable frequency drive motor shall be rated for operation on 460 volt, 3 phase service. Pump motor shall be non-overloading for entire pump curve.
- C. Integrated Variable Frequency Drive Motors
 - 1. Each motor shall be of the Integrated Variable Frequency Drive design consisting of a motor and a Variable Frequency Drive (VFD) built and tested as one unit by the same manufacturer.

Rocky Hill, CT		Branford Water Pollution Control Facility Process System
	2.	The VFD shall be of the PWM (Pulse Width Modulation) design using current IGBT (Insulated Gate Bipolar Transistor) technology.
	3.	The VFD shall convert incoming fixed frequency three-phase AC power into a variable frequency and voltage for controlling the speed of motor. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for centrifugal pump control and to eliminate the need for motor de-rating.
	4.	The VFD shall utilize an energy optimization algorithm to minimize energy consumption. The output voltage shall be adjusted in response to the load, independent of speed.
	5.	The VFD shall automatically reduce the switching frequency and/or the output voltage and frequency to the motor during periods of sustained ambient temperatures that are higher than the normal operating range. The switching frequency shall be reduced before motor speed is reduced.
	6.	An integral RFI (Radio Frequency Interference) filter shall be standard in the VFD.
	7.	The VFD shall have a minimum of two skip frequency bands which can be field adjustable.
	8.	The VFD shall have internal solid-state overload protection designed to trip within the range of 125-150% of rated current.
	9.	The integrated VFD motor shall include protection against input transients, phase imbalance, loss of AC line phase, over-voltage, under-voltage, VFD over-temperature, and motor over-temperature. Three-phase integrated VFD motors shall be capable of providing full output voltage and frequency with a voltage imbalance of up to 10%.
	10.	The integrated VFD motor shall have, as a minimum, the following input/output capabilities:
		a. Speed Reference Signal: 0-10 VDC, 4-20mA
		b. Digital remote on/off
		c. Fault Signal Relay (NC or NO)
		d. Fieldbus communication port (RS485)
	11.	The motor shall be Totally Enclosed Fan Cooled (TEFC) with a standard NEMA C Face, Class F insulation with a temperature rise no higher than Class B.
	12.	The cooling design of the motor and VFD shall be such that a Class B motor temperature rise is not exceeded at full rated load and speed at a minimum switching frequency of 9.0 kHz.
	13.	Motor drive end bearings shall be adequately sized so that the minimum L10 bearing life is 17,500 hours at the minimum allowable continuous flow rate for the pump at full rated speed.
D.	Varia	ble Speed Control Panel
D.	Varia	ble Speed Control Panel

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- 1. The NEMA 4X 316 stainless steel control panel shall include, as a minimum:
 - a. a main disconnect interlocked with the door
 - b. circuit breakers (each pump)
 - c. electric current pump sequencing with adjustable set point, off delay timers
 - d. terminal strip connections for all external devices
 - e. 120 volt control transformer with fused primary and secondary circuits
 - f. power on lamp
 - g. run lamp and hand-off-auto switch for each pump
 - h. low suction pressure protection with warning lamp and alarm buzzer
 - i. Low system pressure indication and shut down.
 - j. High system pressure indication and shut down.
 - k. pump fault lamps for each pump
 - l. elapsed running time meters for each pump
 - m. 24-hour/7-day time clock for alternation
 - n. alarm silence
- 2. Provide the following remote indication/start dry contact sets
 - a. Common Fail Alarm
- 3. The controller shall automatically alternate which pump is lead, lag, or standby.
- 4. If suction pressure setpoint falls below preset minimum, alarm bell shall sound and alarm light shall light up and pumps shall shut down until adequate suction pressure is restored (auto reset). A silencing switch shall be located on panel cover.
- 5. The system pressure shall be accurately regulated to an operator adjusted setting on a combination pressure indicator and set point programmer located in the control panel. The control system shall adjust the number of pumps operating and the speed of those pumps (minimizing the power demand) to deliver the required pressure while matching the system flow rate requirements at any given time. The operating speed of the pumps shall be reduced to the minimum necessary to satisfy the system demand, and to reduce mechanical wear of the equipment.
- 6. A microprocessor based programmable controller shall be furnished to coordinate operational input signals including pressure set points, operator selectors, indicator lights, and alarms. Program language shall be modified basic. The program shall be factory installed and tested in the system and shall have provision for field reprogramming through the use of a portable computer.
- 7. Pressure transducer signals shall be received by a controller mounted in the control panel. The signal shall be compared to a set point and conditioned for

stable operation with internally adjustable rate, reset, and proportional band functions. An adjustable set-point shall be provided both above and below the set point for system sequencing. The operator adjustable set point shall serve to adjust the group of pressure operating points together with one adjustment to any desired operating pressure, within the system design range. The high and low set points shall adjust with the proportional set point, and shall be a function of the deviation from the adjustable proportional set point. The proportional output signal from the pressure controller shall operate with internally set reset and rate response when following a pressure deviation that is within the adjusted proportional band. When pressure deviates from the set point in proportion greater than the internally adjusted proportional band, the controller shall control rapidly by bypassing rate in order to follow the rapidly changing pressure. The pressure controller shall maintain the variable speed proportional band for each pump.

- 8. Adjustments shall be provided for low suction pressure shut down, low system pressure alarm, and high system pressure alarm. The system shall operate completely unattended and shall have a common failure contact for connection to the plant SCADA system. A low system (discharge) pressure condition that is not satisfied by a pump within 30 seconds shall signal an alarm. A low suction pressure condition shall shut down the system until adequate pressure is restored.
- 9. The lead pump shall operate at varying rates of speed as required to maintain system pressure. Before flow demand exceeds the capacity of the lead pump, lag pump(s) shall turn on and operate each as required, until pressure and flow have been satisfied for an adjustable period of time. The controller will transfer the lead position among all three motors, alternating the lead pump as programmed in the sequence of operation.
- 10. The controller shall have sufficient I/O to provide the specified functionality and a field service connection to PC for advanced programming and data logging
- 11. The controller shall have the ability to communicate common field-bus protocols, (BACnet, Modbus, Profibus, and LON), via optional communication expansion card installed inside controller.
- 12. The controller shall have Ethernet connection with a built in server allowing for connection to a network with read/write access to controller via web browser and internet.
- 13. The system controller shall be capable of stopping pumps during periods of lowflow or zero-flow without wasting water or adding unwanted heat to the liquid. Temperature based no flow shut-down methods that have the potential to waste water and add unwanted temperature rise to the pumping fluid are not acceptable and shall not be used.

Standard Low Flow Stop and Energy Saving Mode

If a low or no flow shut-down is required (periods of low or zero demand) the existing hydropneumatic tank

shall be utilized. The tank shall be piped to the discharge manifold or system piping downstream of the pump system. When only one pump is in operation the system controller shall be capable of detecting low flow (less than 10% of pump nominal flow) without the use of additional flow sensing devices. When a low flow is detected, the system controller shall increase pump speed until the discharge pressure reaches the stop pressure (system set-point plus 50% of programmed on/off band, adjustable). The pump shall remain off until the discharge pressure reaches the start pressure (system set-point minus 50% of programmed on/off band, adjustable). Upon low flow shut-down a pump shall be restarted in one of the following two ways:

Low Flow Restart: If the low flow condition still exists, the pump shall start and the speed shall again be increased until the stop pressure is reached and the pump shall again be switched off.

Normal Flow Restart: If the pump system controller determines a low flow condition no longer exists the pump shall start and the speed shall be increased until the system pressure reaches the system set-point.

- E. System Skid, Piping, Valves and Accessories
 - 1. Suction and discharge manifold construction shall be in way that ensures minimal pressure drops, minimize potential for corrosion, and prevents bacteria growth at intersection of piping into the manifold. Manifold construction that includes sharp edge transitions or interconnecting piping protruding into manifold is not acceptable. Manifold construction shall be such that water stagnation can not exist in manifold during operation to prevent bacteria growth inside manifold.
 - 2. The suction and discharge manifolds material shall be 316 stainless steel. Manifold connection sizes shall be 6" with ANSI Class 150 flanges.
 - 3. Pump Isolation valves shall be provided on the suction and discharge of each pump. Isolation valve sizes 2 inches and smaller shall be nickel plated brass full port ball valves. Isolation valve sizes 3 inches and larger shall be a full lug style butterfly valve. The valve disk shall be of stainless steel. The valve seat material shall be EPDM and the body shall be cast iron, coated internally and externally with fusion-bonded epoxy.
 - 4. A spring-loaded non-slam type check valve shall be installed on the discharge of each pump. The valve shall be a wafer style type fitted between two flanges. The head loss through the check valve shall not exceed 5 psi at the pump design capacity. Check valves 1-1/2" and smaller shall have a POM composite body and poppet, a stainless steel spring with EPDM or NBR seats. Check valves 2" and larger shall have a body material of stainless steel or epoxy coated iron

(fusion bonded) with an EPDM or NBR resilient seat. Spring material shall be stainless steel. Disk shall be of stainless steel or leadless bronze.

- 5. A pressure transducer shall be factory installed on the suction and discharge manifolds. Systems with positive inlet gauge pressure shall have a factory installed pressure transducer on the suction manifold for water shortage protection. Pressure transducers shall be made of 316 stainless steel. Transducer accuracy shall be /- 1.0% full scale with hysteresis and repeatability of no greater than 0.1% full scale. The output signal shall be 4-20 mA with a supply voltage range of 9-32 VDC.
- 6. A bourdon tube pressure gauge, 2.5 inch diameter, shall be placed on the suction and discharge manifolds. The gauge shall be liquid filled and have copper alloy internal parts in a stainless steel case. Gauge accuracy shall be 2/1/2 %. The gauge shall be capable of a pressure of 30% above its maximum span without requiring recalibration.
- 7. The base frame shall be constructed of corrosion resistant 304 stainless steel. Rubber vibration dampers shall be fitted between each pump and base frame to minimize vibration.
- 8. The control panel shall be skid mounted.
- F. Existing Hydro-Accumulator Tank and Lead Pump Shutdown Controls
 - 1. Utilize the existing 211-gallon, 175 psig full acceptance bladder tank rated for maximum suction pressure plus pump shutoff pressure. Connect the hydro-accumulator tank to the triplex pumping system.
 - 2. The tank shall be located with the pumps and the feedline connections from the tank shall be between the pump check valves to assure constant system pressure and prevent leaks back to suction.
 - 3. The pump controller shall be configured to allow the lead pump to shut-down during periods of low or no flow. The following conditions shall be met before shutting-down the lead pump:
 - a. Lead pump pressure switch signals high pressure.
 - b. Low flow setpoint reached.
 - c. System pressure is not low.
 - d. Lag pump is not running.
 - e. Lead pump minimum run time has expired. If these conditions remain for 15 seconds continuously, the lead pump shall shut down. Once the lead pump is shut down, the Energy Saving Mode light shall turn on. When the lead pump is required to run again, it shall start on low system pressure after a 2 second delay.

2.03 FACTORY TESTING

- A. The entire pump station shall be factory tested for functionality. Functionality testing shall include the following parameters: Dry Run Protection, Minimum Pressure and Maximum Pressure alarms, Setpoint Operation, and Motor Rotation.
- B. The full system shall undergo a factory hydrostatic test at the end of the production cycle and prior to shipment. The system shall be filled with water and pressurized to 1.5 times the nameplate maximum pressure.
- C. The system shall be completely factory assembled, hydraulically and electrically tested at the factory prior to shipment. Control devices shall be pre-set to suit actual job conditions.

2.04 SURFACE PREPARATION AND PAINTING

- A. Before exposure to weather and prior to shop painting all surfaces shall be thoroughly cleaned, dry and free from all mill-scale, rust, grease, dirt and other foreign matter.
- B. Surface preparation and prime painting is provided under this Section. Surface preparation shall be SSPC-SP6, commercial blast. Prime paint shall conform to the requirements as that provided under Section 09900.
- C. All metal surfaces other than stainless steel or brass, shall be protected in accordance with the pump manufacturer's recommendations. Prime and finish paint shall conform to the requirements as provided under Section 09900. At a minimum, the base shall have a three-part epoxy coating.
- D. All nameplates shall be properly protected during painting.

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

- A. Equipment shall be crated and delivered to protect against damage during shipment.
- B. Parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the equipment is ready for operation.
- C. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer.
- D. The finished surfaces of exposed flanges shall be protected by wooden blank flanges, strongly built and securely bolted thereto.

3.02 INSTALLATION

- A. The equipment shall be installed in accordance with the instructions of the manufacturer and as shown on the Contract Documents.
- B. Field tests shall not be conducted until such time that the entire installation is complete and ready for testing.

C. Submit a certificate from the equipment manufacturer stating that the installation of their equipment is satisfactory, that the equipment is ready for operation, and that the operating personnel have been suitably instructed in the operation, lubrication and care of each unit.

3.03 FIELD QUALITY CONTROL

- A. The manufacturer's technician shall prepare a written report specifying that the equipment is installed according to the manufacturer's recommendations and is ready for permanent operation. The report shall also confirm that nothing in the installation will render the manufacturer's warranty null and void.
- B. The manufacturer shall provide the services of a factory-trained technician to train the Owner on the operation and maintenance of equipment supplied under this Section in accordance with the requirements of Section 01800.
- C. The manufacturer shall submit Operations and Maintenance Manuals in accordance with the requirements of Section 01730.
- D. All adjustments necessary to place the equipment in satisfactory working order shall be made at the time of the above tests.

3.04 EQUIPMENT TESTING

- A. After the complete packaged water booster pumping system and appurtenant equipment have been installed, and the units have been inspected, preliminarily tested, adjusted and placed in proper operating condition under the supervision of the system manufacturer's representative, the entire system shall be field tested in the presence of the Engineer. The tests shall demonstrate fitness for the service specified and the ability of the pumping units to operate without vibration or overheating when operated to meet the performance requirements specified. Each pumping unit shall be tested and the results recorded of head, capacity and motor input at a minimum of three points on the curve including shutoff head, maximum capacity and mid-point on curve.
- B. The results of all tests, including plots of the pump performance curves (specifically showing the test points) depicting head, capacity, brake horsepower and pump efficiency shall be submitted to the Engineer for approval.
- C. All adjustments necessary to place the equipment in satisfactory working order shall be made at the time of the above tests.

3.05 FINAL ACCEPTANCE AND WARRANTY

A. Final acceptance of all equipment 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 24 months after final testing and acceptance or Substantial Completion, whichever occurs later from date of installation, not to exceed 30 months from date of shipment.

END OF SECTION

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ATTACHMENT C

Revised Specification 11375 High Speed Turbo Compressors

SECTION 11215

PLANT WATER PACKAGE SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Skid mounted packaged plant water system including <u>inline vertical multistage</u> pumps, motors, integrated motors/variable frequency drives, isolation valves, interconnecting piping, remote mounted motor control panel, vacuum prime system, pressure transmitters and indicators, flow meter, alarm network and internal wiring.
- B. Related Sections
 - 1. Section 01140 Work Restrictions
 - 2. Section 01730 Operation and Maintenance Manuals
 - 3. Section 01800 Start-up and Commissioning
 - 4. Section 09900 Painting
 - 5. Section 15220 Process Water Piping
 - 6. Section 15225 Plant Water Strainers
 - 7. Division 16 Electrical

1.02 SYSTEM DESCRIPTION

- A. The system shall be skid mounted on fabricated steel frames, completely factory assembled, and hydraulically and electrically tested by the manufacturer. The manufacturer shall also take into consideration access opening size of 3 feet 9 inches by 3 feet 9 inches. The system shall be designed so that, if necessary, it may be partially disassembled during installation. Manufacturer to provide information on disassembly/reassembly if pump skid specified is larger than access opening allows.
- B. The control panel shall be skid mounted.
- C. Variable Speed Systems
 - 1. The system shall include three (3) vertical multistage centrifugal pumps and motors using a dedicated variable frequency drive control logic system. The system and all accessories shall be prefabricated, pre-wired and skid mounted.
 - 2. The system shall be designed to deliver a total flow of 170 gpm at 65 psi with two duty pumps and one standby pump. Pump speed shall be infinitely variable to exactly match the flow requirements at a constant pressure level.
 - 3. The package shall utilize the existing Amtrol WX-452C 211-gallon hydropneumatic tank to maintain stored pressure in the tank during no/low flow periods.

- a. 2" NPT Connection
- b. Maximum operating pressure 175 psig
- c. Maximum allowable temperature 240°F
- d. Minimum design metal temperature $-18^{\circ}F$
- 4. Pump suction shall be from the UV channel. The minimum water level elevation in the channel is approximately 101.49 feet and the elevation of the 8" plant water suction pipe is approximately 101.16 feet. The package system will be installed on an existing 4-inch-thick concrete pad at an elevation of 99.83 feet. Pumps shall be capable of pumping at design conditions without cavitation. To protect the equipment from damage, the pump motors and instrumentation should be located as high as possible, no lower than 101.67 feet.
- D. Refer to Section 01143 for work restrictions related to the plant water system.

1.03 SUBMITTALS

- A. Shop drawings showing details of fabrication, erection, and adjoining equipment interfaces for all equipment furnished under this Section.
- B. Manufacturers' rating curves showing pump characteristics of discharge, head, capacity, brake horsepower, efficiency, required net positive suction head, required minimum submergence and total pumping unit weight. This information shall be prepared specifically for the pumps proposed. Catalog sheets showing a family of curves will not be acceptable.
- C. Literature and drawings describing the equipment in sufficient detail, including parts list and materials of construction, to indicate full conformance with the Specifications.
- D. Certified dimensional drawings of each item of equipment and auxiliary apparatus to be furnished.
- E. Plant water support skid layout and anchor bolt plans and details. Contractor shall verify existing dimensions prior to submittal. Plant water skid layout and connection locations shall comply with the space and connection points available.
- F. Certified motor test data as described in Section 16421.
- G. Schematic electrical wiring diagrams and control panel drawings and other data as required by the Engineer.
- H. Certified factory test data including performance curves for each of the proposed pumps from shut off to maximum capacity, showing head capacity, efficiency, BHP, required NPSH and minimum submergence. Data of tests and test points and results are required.
- I. Provide operation and maintenance manuals in accordance with Section 01730.
- 1.04 QUALITY ASSURANCE
 - A. The packaged plant water pumping system shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the fabrication and supply of the

system components to be furnished. All equipment to be furnished shall be products of manufacturers regularly engaged in the production of such equipment.

- B. The system manufacturer shall demonstrate that at least 10 similar systems of equal size and complexity have been in satisfactory operation for at least 5 years within the United States.
- C. The system manufacturer shall be responsible for satisfactory operation and performance of the entire plant water pumping system.
- D. The manufacturer of electrical control panels and their mounting and installation shall be done in strict accordance with the requirements of UL Standard 508a and the National Electrical Code (NEC), NFPA 70 latest revision so as to afford a measure of security as to the ability of the eventual owner to safely operate the equipment.

1.05 EXTRA MATERIALS

A. Furnish with each pump and drive, the manufacturer's standard set of spare parts including at least the following:

1. Vertical Pumps (per pump)

 $2 \cdot 1$ One (1) set of all gaskets

- <u>3.2.</u> One (1) shaft sleeve
- 4.<u>3.</u> One (1) set of bearing rings
- 5.4. One (1) set of all motor bearings
- 6.5. One (1) set of set screws
- 7.<u>6.</u> One (1) mechanical seal
- 8.<u>7.</u>One (1) seal kit
- 9.8. One (1) stack kit
- B. All spare parts shall be furnished packed in suitable containers and clearly labeled designating the contents and the unit for which they are intended.
- C. Furnish all special tools required for the operation and maintenance of the equipment.
- D. Lubricants Prior to testing and acceptance, furnish a one year's supply of all lubricants recommended by the manufacturers of each component of the equipment furnished and installed.

PART 2 PRODUCTS

- 2.01 MANUFACTURERS
 - A. Grundfos
 - B. Syncroflo, Inc.
 - C. or equal.

2.02 EQUIPMENT

- A. General
 - 1. The water booster systems shall be as follows:
- B. Pumps
 - 1. The pumps shall be variable speed <u>inline</u> vertical multistage, end suction, split coupled pumps with the motor mounted directly to the top of the pump.
 - 2. Each pump shall be capable of pumping 85 gpm @ 150.2 TDH with an minimum hydraulic efficiency of 72.9%.
 - 2.3. Pump shutoff head shall be 200 ft minimum. Pump base shall be Cast iron, ASTM Class 25B.
 - <u>3.4.</u> Pump Suction/discharge base shall be made of 304 stainless steel.
 - 4.<u>5.</u> Pump Suction/discharge connections shall be <u>2-inch</u> ANSI Class 300 flanged connections.
 - 5.6. The outer pump casing shall be CF 8M stainless steel.
 - 6.7. Casing O-rings shall be EPDM.
 - 7.8. Pump chamber and impellers shall be 316 stainless steel.
 - 8.9. Pump shaft shall be 329 stainless steel (duplex stainless steel).
 - 9.10. Motor shaft shall be 329 stainless steel (duplex stainless steel).
 - 10.11. The mechanical seal shall have silicon carbide faces and EPDM elastomers.
 - 11.12. All exposed nuts or bolts shall be AISI type 316 stainless steel.
 - 12.13. Pump shall be connected to the drive motor by a rigid, axially split coupling capable of withstanding all torsional, radial and axial loads. The coupling design shall facilitate alignment of the motor and pump shaft. The coupling design shall also permit replacement of mechanical seal without requiring removal of the drive motor. The shaft seal shall be a balance o-ring cartridge type. Shaft seal replacement shall be possible without removal of any pump components other than the coupling guard, shaft coupling and motor. The entire cartridge shaft seal shall be removable as a one-piece component.
 - <u>13.14.</u> Pumps shall be capable of operating at continuous temperatures up to 240 degrees F and working pressures of 175 psi.
 - 14.15. Motor and variable frequency drive shall be an integrated unit. Maximum HP rating shall be 7.5 HP. Integrated variable frequency drive motor shall be rated for operation on 460 volt, 3 phase service. Pump motor shall be non-overloading for entire pump curve.
- C. Integrated Variable Frequency Drive Motors
 - 1. Each motor shall be of the Integrated Variable Frequency Drive design consisting of a motor and a Variable Frequency Drive (VFD) built and tested as one unit by the same manufacturer.

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	2.	The VFD shall be of the PWM (Pulse Width Modulation) design using current IGBT (Insulated Gate Bipolar Transistor) technology.
	3.	The VFD shall convert incoming fixed frequency three-phase AC power into a variable frequency and voltage for controlling the speed of motor. The motor current shall closely approximate a sine wave. Motor voltage shall be varied with frequency to maintain desired motor magnetization current suitable for centrifugal pump control and to eliminate the need for motor de-rating.
	4.	The VFD shall utilize an energy optimization algorithm to minimize energy consumption. The output voltage shall be adjusted in response to the load, independent of speed.
	5.	The VFD shall automatically reduce the switching frequency and/or the output voltage and frequency to the motor during periods of sustained ambient temperatures that are higher than the normal operating range. The switching frequency shall be reduced before motor speed is reduced.
	6.	An integral RFI (Radio Frequency Interference) filter shall be standard in the VFD.
	7.	The VFD shall have a minimum of two skip frequency bands which can be field adjustable.
	8.	The VFD shall have internal solid-state overload protection designed to trip within the range of 125-150% of rated current.
	9.	The integrated VFD motor shall include protection against input transients, phase imbalance, loss of AC line phase, over-voltage, under-voltage, VFD over-temperature, and motor over-temperature. Three-phase integrated VFD motors shall be capable of providing full output voltage and frequency with a voltage imbalance of up to 10%.
	10.	The integrated VFD motor shall have, as a minimum, the following input/output capabilities:
		a. Speed Reference Signal: 0-10 VDC, 4-20mA
		b. Digital remote on/off
		c. Fault Signal Relay (NC or NO)
		d. Fieldbus communication port (RS485)
	11.	The motor shall be Totally Enclosed Fan Cooled (TEFC) with a standard NEMA C Face, Class F insulation with a temperature rise no higher than Class B.
	12.	The cooling design of the motor and VFD shall be such that a Class B motor temperature rise is not exceeded at full rated load and speed at a minimum switching frequency of 9.0 kHz.
	13.	Motor drive end bearings shall be adequately sized so that the minimum L10 bearing life is 17,500 hours at the minimum allowable continuous flow rate for the pump at full rated speed.
D.	Varia	ble Speed Control Panel
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- 1. The NEMA 4X 316 stainless steel control panel shall include, as a minimum:
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 - b. circuit breakers (each pump)
 - c. electric current pump sequencing with adjustable set point, off delay timers
 - d. terminal strip connections for all external devices
 - e. 120 volt control transformer with fused primary and secondary circuits
 - f. power on lamp
 - g. run lamp and hand-off-auto switch for each pump
 - h. low suction pressure protection with warning lamp and alarm buzzer
 - i. Low system pressure indication and shut down.
 - j. High system pressure indication and shut down.
 - k. pump fault lamps for each pump
 - l. elapsed running time meters for each pump
 - m. 24-hour/7-day time clock for alternation
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- 2. Provide the following remote indication/start dry contact sets
 - a. Common Fail Alarm
- 3. The controller shall automatically alternate which pump is lead, lag, or standby.
- 4. If suction pressure setpoint falls below preset minimum, alarm bell shall sound and alarm light shall light up and pumps shall shut down until adequate suction pressure is restored (auto reset). A silencing switch shall be located on panel cover.
- 5. The system pressure shall be accurately regulated to an operator adjusted setting on a combination pressure indicator and set point programmer located in the control panel. The control system shall adjust the number of pumps operating and the speed of those pumps (minimizing the power demand) to deliver the required pressure while matching the system flow rate requirements at any given time. The operating speed of the pumps shall be reduced to the minimum necessary to satisfy the system demand, and to reduce mechanical wear of the equipment.
- 6. A microprocessor based programmable controller shall be furnished to coordinate operational input signals including pressure set points, operator selectors, indicator lights, and alarms. Program language shall be modified basic. The program shall be factory installed and tested in the system and shall have provision for field reprogramming through the use of a portable computer.
- 7. Pressure transducer signals shall be received by a controller mounted in the control panel. The signal shall be compared to a set point and conditioned for

stable operation with internally adjustable rate, reset, and proportional band functions. An adjustable set-point shall be provided both above and below the set point for system sequencing. The operator adjustable set point shall serve to adjust the group of pressure operating points together with one adjustment to any desired operating pressure, within the system design range. The high and low set points shall adjust with the proportional set point, and shall be a function of the deviation from the adjustable proportional set point. The proportional output signal from the pressure controller shall operate with internally set reset and rate response when following a pressure deviation that is within the adjusted proportional band. When pressure deviates from the set point in proportion greater than the internally adjusted proportional band, the controller shall control rapidly by bypassing rate in order to follow the rapidly changing pressure. The pressure controller shall maintain the variable speed proportional band for each pump.

- 8. Adjustments shall be provided for low suction pressure shut down, low system pressure alarm, and high system pressure alarm. The system shall operate completely unattended and shall have a common failure contact for connection to the plant SCADA system. A low system (discharge) pressure condition that is not satisfied by a pump within 30 seconds shall signal an alarm. A low suction pressure condition shall shut down the system until adequate pressure is restored.
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- 10. The controller shall have sufficient I/O to provide the specified functionality and a field service connection to PC for advanced programming and data logging
- 11. The controller shall have the ability to communicate common field-bus protocols, (BACnet, Modbus, Profibus, and LON), via optional communication expansion card installed inside controller.
- 12. The controller shall have Ethernet connection with a built in server allowing for connection to a network with read/write access to controller via web browser and internet.
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shall be utilized. The tank shall be piped to the discharge manifold or system piping downstream of the pump system. When only one pump is in operation the system controller shall be capable of detecting low flow (less than 10% of pump nominal flow) without the use of additional flow sensing devices. When a low flow is detected, the system controller shall increase pump speed until the discharge pressure reaches the stop pressure (system set-point plus 50% of programmed on/off band, adjustable). The pump shall remain off until the discharge pressure reaches the start pressure (system set-point minus 50% of programmed on/off band, adjustable). Upon low flow shut-down a pump shall be restarted in one of the following two ways:

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 - 2. The suction and discharge manifolds material shall be 316 stainless steel. Manifold connection sizes shall be 6" with ANSI Class 150 flanges.
 - 3. Pump Isolation valves shall be provided on the suction and discharge of each pump. Isolation valve sizes 2 inches and smaller shall be nickel plated brass full port ball valves. Isolation valve sizes 3 inches and larger shall be a full lug style butterfly valve. The valve disk shall be of stainless steel. The valve seat material shall be EPDM and the body shall be cast iron, coated internally and externally with fusion-bonded epoxy.
 - 4. A spring-loaded non-slam type check valve shall be installed on the discharge of each pump. The valve shall be a wafer style type fitted between two flanges. The head loss through the check valve shall not exceed 5 psi at the pump design capacity. Check valves 1-1/2" and smaller shall have a POM composite body and poppet, a stainless steel spring with EPDM or NBR seats. Check valves 2" and larger shall have a body material of stainless steel or epoxy coated iron

(fusion bonded) with an EPDM or NBR resilient seat. Spring material shall be stainless steel. Disk shall be of stainless steel or leadless bronze.

- 5. A pressure transducer shall be factory installed on the suction and discharge manifolds. Systems with positive inlet gauge pressure shall have a factory installed pressure transducer on the suction manifold for water shortage protection. Pressure transducers shall be made of 316 stainless steel. Transducer accuracy shall be /- 1.0% full scale with hysteresis and repeatability of no greater than 0.1% full scale. The output signal shall be 4-20 mA with a supply voltage range of 9-32 VDC.
- 6. A bourdon tube pressure gauge, 2.5 inch diameter, shall be placed on the suction and discharge manifolds. The gauge shall be liquid filled and have copper alloy internal parts in a stainless steel case. Gauge accuracy shall be 2/1/2 %. The gauge shall be capable of a pressure of 30% above its maximum span without requiring recalibration.
- 7. The base frame shall be constructed of corrosion resistant 304 stainless steel. Rubber vibration dampers shall be fitted between each pump and base frame to minimize vibration.
- 8. The control panel shall be skid mounted.
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 - 2. The tank shall be located with the pumps and the feedline connections from the tank shall be between the pump check valves to assure constant system pressure and prevent leaks back to suction.
 - 3. The pump controller shall be configured to allow the lead pump to shut-down during periods of low or no flow. The following conditions shall be met before shutting-down the lead pump:
 - a. Lead pump pressure switch signals high pressure.
 - b. Low flow setpoint reached.
 - c. System pressure is not low.
 - d. Lag pump is not running.
 - e. Lead pump minimum run time has expired. If these conditions remain for 15 seconds continuously, the lead pump shall shut down. Once the lead pump is shut down, the Energy Saving Mode light shall turn on. When the lead pump is required to run again, it shall start on low system pressure after a 2 second delay.

2.03 FACTORY TESTING

- A. The entire pump station shall be factory tested for functionality. Functionality testing shall include the following parameters: Dry Run Protection, Minimum Pressure and Maximum Pressure alarms, Setpoint Operation, and Motor Rotation.
- B. The full system shall undergo a factory hydrostatic test at the end of the production cycle and prior to shipment. The system shall be filled with water and pressurized to 1.5 times the nameplate maximum pressure.
- C. The system shall be completely factory assembled, hydraulically and electrically tested at the factory prior to shipment. Control devices shall be pre-set to suit actual job conditions.

2.04 SURFACE PREPARATION AND PAINTING

- A. Before exposure to weather and prior to shop painting all surfaces shall be thoroughly cleaned, dry and free from all mill-scale, rust, grease, dirt and other foreign matter.
- B. Surface preparation and prime painting is provided under this Section. Surface preparation shall be SSPC-SP6, commercial blast. Prime paint shall conform to the requirements as that provided under Section 09900.
- C. All metal surfaces other than stainless steel or brass, shall be protected in accordance with the pump manufacturer's recommendations. Prime and finish paint shall conform to the requirements as provided under Section 09900. At a minimum, the base shall have a three-part epoxy coating.
- D. All nameplates shall be properly protected during painting.

PART 3 EXECUTION

3.01 DELIVERY AND STORAGE

- A. Equipment shall be crated and delivered to protect against damage during shipment.
- B. Parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the equipment is ready for operation.
- C. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer.
- D. The finished surfaces of exposed flanges shall be protected by wooden blank flanges, strongly built and securely bolted thereto.

3.02 INSTALLATION

- A. The equipment shall be installed in accordance with the instructions of the manufacturer and as shown on the Contract Documents.
- B. Field tests shall not be conducted until such time that the entire installation is complete and ready for testing.

C. Submit a certificate from the equipment manufacturer stating that the installation of their equipment is satisfactory, that the equipment is ready for operation, and that the operating personnel have been suitably instructed in the operation, lubrication and care of each unit.

3.03 FIELD QUALITY CONTROL

- A. The manufacturer's technician shall prepare a written report specifying that the equipment is installed according to the manufacturer's recommendations and is ready for permanent operation. The report shall also confirm that nothing in the installation will render the manufacturer's warranty null and void.
- B. The manufacturer shall provide the services of a factory-trained technician to train the Owner on the operation and maintenance of equipment supplied under this Section in accordance with the requirements of Section 01800.
- C. The manufacturer shall submit Operations and Maintenance Manuals in accordance with the requirements of Section 01730.
- D. All adjustments necessary to place the equipment in satisfactory working order shall be made at the time of the above tests.

3.04 EQUIPMENT TESTING

- A. After the complete packaged water booster pumping system and appurtenant equipment have been installed, and the units have been inspected, preliminarily tested, adjusted and placed in proper operating condition under the supervision of the system manufacturer's representative, the entire system shall be field tested in the presence of the Engineer. The tests shall demonstrate fitness for the service specified and the ability of the pumping units to operate without vibration or overheating when operated to meet the performance requirements specified. Each pumping unit shall be tested and the results recorded of head, capacity and motor input at a minimum of three points on the curve including shutoff head, maximum capacity and mid-point on curve.
- B. The results of all tests, including plots of the pump performance curves (specifically showing the test points) depicting head, capacity, brake horsepower and pump efficiency shall be submitted to the Engineer for approval.
- C. All adjustments necessary to place the equipment in satisfactory working order shall be made at the time of the above tests.

3.05 FINAL ACCEPTANCE AND WARRANTY

A. Final acceptance of all equipment 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 24 months after final testing and acceptance or Substantial Completion, whichever occurs later from date of installation, not to exceed 30 months from date of shipment.

END OF SECTION

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ATTACHMENT D

Revised Appendix A (Prevailing Wage Rates)

Minimum Rates and Classifications for Building Construction

ID#: 25-6236

Connecticut Department of Labor Wage and Workplace Standards Division

By virtue of the authority vested in the Labor Commissioner under provisions of Section 31-53 of the General Statutes of Connecticut, as amended, the following are declared to be the prevailing rates and welfare payments and will apply only where the contract is advertised for bid within 20 days of the date on which the rates are established. Any contractor or subcontractor not obligated by agreement to pay to the welfare and pension fund shall pay this amount to each employee as part of his/her hourly wages.

Project Number:	052225	Project Town:	Branford
State#:		FAP#:	

Project: Branford Water Pollution Control Facility: Process System Upgrades

CLASSIFICATION	Hourly Rate	Benefits
1b) Asbestos/Toxic Waste Removal Laborers: Asbestos removal and encapsulation (except its removal from mechanical systems which are not to be scrapped), toxic waste removers, blasters.**See Laborers Group 7**		
1c) Asbestos Worker/Heat and Frost Insulator	48.81	34.05
2) Boilermaker	48.21	30.01
3a) Bricklayer, Cement Mason, Concrete Finisher (including caulking), Stone Masons	42.61	34.89 + a
3b) Tile Setter	40.0	32.75
3c) Tile and Stone Finishers	33.0	27.43
3d) Marble & Terrazzo Finishers	34.2	26.23
3e) Plasterer	44.52	29.63

3f) Terrazzo Mechanics & Marble Setters	40.6	34.93
LABORERS		
4) Group 1: General laborers, carpenter tenders, concrete specialists, wrecking laborers and fire watchers.	35.7	28.85
4) Group 1a: Acetylene Burners (Hours worked with a torch)	36.7	28.85
4a) Group 2: Mortar mixers, plaster tender, power buggy operators, powdermen, fireproofer/mixer/nozzleman (Person running mixer and spraying fireproof only).	35.95	28.85
4b) Group 3: Jackhammer operators/pavement breaker, mason tender (brick), mason tender (cement/concrete), forklift operators and forklift operators (masonry).	36.2	28.85
4c) **Group 4: Pipelayers (Installation of water, storm drainage or sewage lines outside of the building line with P6, P7 license) (the pipelayer rate shall apply only to one or two employees of the total crew who primary task is to actually perform the mating of pipe sections) P6 and P7 rate is \$26.80.	36.7	28.85
4d) Group 5: Air track operator, sand blaster and hydraulic drills.	36.45	28.85
4e) Group 6: Blasters, nuclear and toxic waste removal.	38.7	28.85
4f) Group 7: Asbestos/lead removal and encapsulation (except it's removal from mechanical systems which are not to be scrapped).	38.7	28.85
4g) Group 8: Bottom men on open air caisson, cylindrical work and boring crew.	36.2	28.85

4h) Group 9: Top men on open air caisson, cylindrical work and boring crew.	35.7	28.85
4i) Group 10: Traffic Control Signalman	21.42	28.85
4j) Group 11: Toxic Waste Removers A or B With PPE	38.7	28.85
5) Carpenter, Acoustical Ceiling Installation, Soft Floor/Carpet Laying, Metal Stud Installation, Form Work and Scaffold Building, Drywall Hanging, Modular-Furniture Systems Installers, Lathers, Piledrivers, Resilient Floor Layers.	42.03	29.19
5a) Millwrights	43.25	29.13
5b) Carpenter - Welder	42.53	29.19
5c) Carpenter: Working with creosote lumber or acid	43.03	29.19
6) Electrical Worker (including low voltage wiring) (Trade License required: E1,2 L-5,6 C-5,6 T-1,2 L-1,2 V-1,2,7,8,9)	46.4	36.66+3% of gross wage
7a) Elevator Mechanic (Trade License required: R-1,2,5,6)	66.72	38.435+a+b
OUTSIDE LINE CONSTRUCTION		
Groundman	30.87	13.91
Linemen/Cable Splicer	56.12	32.85
8) Glazier (Trade License required: FG-1,2)	43.13	26.50+ a

9) Ironworker, Ornamental, Reinforcing, Structural, and Precast Concrete Erection	45.25	43.62 + a
OPERATORS		
Group 1: Crane Handling or Erecting Structural Steel or Stone; Hoisting Engineer (2 drums or over). (Trade License Required)	58.19	29.80 + a
Group 1a: Front End Loader (7 cubic yards or over); Work Boat 26 ft. and Over	53.33	29.80 + a
Group 2: Cranes (100 ton rate capacity and over); Bauer Drill/Caisson. (Trade License Required)	57.78	29.80 + a
Group 2a: Cranes (under 100 ton rated capacity).	56.79	29.80 + a
Group 2b: Excavator over 2 cubic yards; Pile Driver (\$3.00 premium when operator controls hammer)	52.92	29.80 + a
Group 3: Excavator; Gradall; Master Mechanic; Hoisting Engineer (all types of equipment where a drum and cable are used to hoist or drag material regardless of motive power of operation), Rubber Tire Excavator (Drott-1085 or similar);Grader Operator; Bulldozer Finegrade. (slopes, shaping, laser or GPS, etc.). (Trade License Required)	51.92	29.80 + a
Group 4: Trenching Machines; Lighter Derrick; CMI Machine or Similar; Koehring Loader (Skooper); Goldhofer.	51.42	29.80 + a
Group 5: Specialty Railroad Equipment; Asphalt Spreader, Asphalt Reclaiming Machine; Line Grinder; Concrete Pumps; Drills with Self Contained Power Units; Boring Machine; Post Hole Digger; Auger; Pounder; Well Digger; Milling Machine (over 24 mandrel).	50.63	29.80 + a
Group 5 continued: Side Boom; Combination Hoe and Loader; Directional Driller.	50.63	29.80 + a

As of: June 18, 2025

Group 6: Front End Loader (3 up to 7 cubic yards); Bulldozer (rough grade dozer).	50.22	29.80 + a
Group 7: Asphalt Roller; Concrete Saws and Cutters (ride on types); Vermeer Concrete Cutter; Stump Grinder; Scraper; Snooper; Skidder; Milling Machine (24" and under mandrel).	49.77	29.80 + a
Group 8: Mechanic; Grease Truck Operator; Hydroblaster; Barrier Mover; Power Stone Spreader; Welding; Work Boat Under 26 ft.; Transfer Machine; Rigger Foreman.	49.25	29.80 + a
Group 9: Front End Loader (under 3 cubic yards); Skid Steer Loader regardless of attachments; (Bobcat or Similar); Forklift, Power Chipper; Landscape Equipment (including Hydroseeder); Vacuum Excavation Truck and Hydrovac Excavation Truck (27 HG pressure or greater).	48.67	29.80 + a
Group 10: Vibratory hammer; ice machine; diesel and air, hammer, etc.	45.96	29.80 + a
Group 11: Conveyor, earth roller, power pavement breaker (whiphammer), robot demolition equipment.	45.96	29.80 + a
Group 12: Wellpoint Operator.	45.87	29.80 + a
Group 13: Compressor Battery Operator.	45.12	29.80 + a
Group 14: Elevator Operator; Tow Motor Operator (solid tire no rough terrain).	43.6	29.80 + a
Group 15: Generator Operator; Compressor Operator; Pump Operator; Welding Machine Operator; Heater Operator.	43.06	29.80 + a
Group 16: Maintenance Engineer.	42.2	29.80 + a

Group 17: Portable Asphalt Plant Operator; Portable Crusher Plant Operator; Portable Concrete Plant Operator; Portable Grout Plant Operator; Portable Water Filtration Plant Operator.	47.91	29.80 + a
Group 18: Power Safety Boat; Vacuum Truck; Zim Mixer; Sweeper; (Minimum for any job requiring a CDL license); Rigger; Signalman.	44.7	29.80 + a
Surveyor: Chief of Party	48.16	29.80 + a
Surveyor: Assistant Chief of Party	44.41	29.80 + a
Surveyor: Instrument Man	42.73	29.80 + a
Surveyor: Rodman or Chainman	36.78	29.80 + a
PAINTERS (Including Drywall Finishing)		
10a) Brush and Roller	39.57	26.50
10b) Taping Only/Drywall Finishing	40.32	26.50
10c) Paperhanger and Red Label	40.07	26.50
10d) Spray	42.57	26.50
10e) Spray Helper	40.57	26.50
10f) Blast	44.57	26.50

10g) Blast Helper	40.57	26.50
11) Plumber (excluding HVAC pipe installation) (Trade License required: P- 1,2,6,7,8,9 J-1,2,3,4 SP-1,2)	50.58	36.30
12) Well Digger, Pile Testing Machine	37.26	24.05 + a
Roofer: Cole Tar Pitch	46.0	24.74 + a
Roofer: Slate, Tile, Composition, Shingles, Singly Ply and Damp/Waterproofing	44.5	24.74 + a
15) Sheetmetal Worker (Trade License required for HVAC and Ductwork: SM-1,SM-2,SM-3,SM-4,SM-5,SM-6)	43.89	42.90
16) Pipefitter (Including HVAC work) (Trade License required: S-1,2,3,4,5,6,7,8 B-1,2,3,4 D-1,2,3,4, G-1, G-2, G-8 & G- 9)	50.58	36.30
TRUCK DRIVERS		
17) Block Truck	37.48	32.68 + a
17a) 2 Axle	36.16	32.68 + a
17ab) Helpers	34.66	32.68 + a
17b) 3 Axle, 2 Axle Ready Mix	36.27	32.68 + a

17c) 3 Axle Ready Mix	36.33	32.68 + a
17d) 4 Axle	36.39	32.68 + a
17e) 4 Axle Ready Mix	37.19	32.68 + a
17ef) 5 Axle	36.39	32.68 + a
17eg) 5 Axle Mixer	37.19	32.68 + a
17f) Heavy Duty Trailer (40 Tons and Over)	38.66	32.68 + a
17g) Euclids and Semi-Trailer	36.44	32.68 + a
17h) Heavy Duty Trailer up to 40 tons	37.39	32.68 + a
17i) Snorkle Truck	36.54	32.68 + a
17j) Swivel Dump and Tack Truck	36.39	32.68 + a
18) Sprinkler Fitter (Trade License required: F-1,2,3,4)	53.76	33.44 + a
19) Theatrical Stage Journeyman	25.76	7.34
Welders: Rate for craft to which welding is incidental.		

Surveyors: Hazardous material removal: \$3.00 per hour premium.

*Note: Hazardous waste removal work receives additional \$1.25 per hour for truck drivers.

**Note: Hazardous waste premium \$3.00 per hour over classified rate

Crane with 150 ft. boom (including jib) - \$1.50 extra Crane with 200 ft. boom (including jib) - \$2.50 extra Crane with 250 ft. boom (including jib) - \$5.00 extra Crane with 300 ft. boom (including jib) - \$7.00 extra Crane with 400 ft. boom (including jib) - \$10.00 extra

All classifications that indicate a percentage of the fringe benefits must be calculated at the percentage rate times the "base hourly rate".

Apprentices duly registered under the Commissioner of Labor's regulations on "Work Training Standards for Apprenticeship and Training Programs" Section 31-51-d-1 to 12, are allowed to be paid the appropriate percentage of the prevailing journeymen hourly base and the full fringe benefit rate, providing the work site ratio shall not be less than one full-time journeyperson instructing and supervising the work of each apprentice in a specific trade.

The Prevailing wage rates applicable to this project are subject to annual adjustments each July 1st for the duration of the project.

Each contractor shall pay the annual adjusted prevailing wage rate that is in effect each July 1st, as posted by the Department of Labor.

It is the contractor's responsibility to obtain the annual adjusted prevailing wage rate increases directly from the Department of Labor's website.

The annual adjustments will be posted on the Department of Labor's Web page:

www.ct.gov/dol. For those without internet access, please contact the division listed below.

The Department of Labor will continue to issue the initial prevailing wage rate schedule to the Contracting Agency for the project.

All subsequent annual adjustments will be posted on our Web Site for contractor access.

Contracting Agencies are under no obligation pursuant to State labor law to pay any increase due to the annual adjustment provision.

Effective October 1, 2005 - Public Act 05-50: any person performing the work of any mechanic, laborer, or worker shall be paid prevailing wage

All Person who perform work ON SITE must be paid prevailing wage for the appropriate mechanic, laborer, or worker classification.

All certified payrolls must list the hours worked and wages paid to All Persons who perform work ON SITE regardless of their ownership i.e.: (Owners, Corporate Officers, LLC Members, Independent Contractors, et. al)

Reporting and payment of wages is required regardless of any contractual relationship alleged to exist between the contractor and such person.

~~Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clause (29 CFR 5.5 (a) (1) (ii)).

Please direct any questions which you may have pertaining to classification of work and payment of prevailing wages to the Wage and Workplace Standards Division, telephone (860)263-6790.

ATTACHMENT E

Revised Appendix B (Figures)



FIRST FLOOR PLAN – SECONDARY PROCESS BUILDING SCALE: NTS



SECTION VIEW A-A SCALE: NTS

SCALE: NTS



SCALE: NTS

DEMOLISH AND REMOVE EXISTING AERATION BLOWERS PER SPEC 02225 (TYP. OF 3). FURNISH AND INSTALL PROPOSED AERATION BLOWERS PER SPEC 11375 (TYP. OF 3).

FURNISH AND INSTALL PROPOSED INLET FILTERS PER SPEC

FURNISH AND INSTALL NEW INLET AND DISCHARGE AIR PROCESS PIPING PER SPEC 15210 AS REQUIRED TO CONNECT PROPOSED AERATION BLOWERS. DEMOLISH AND REMOVE EXISTING AIR PROCESS PIPING THAT CONFLICTS

FURNISH AND INSTALL NEW EXPANSION COUPLINGS FOR BOTH AIR INLET AND DISCHARGE PIPING PER SPEC 15210

CONNECT TO EXISTING COOLING SUPPLY AND EXHAUST DUCTWORK, SUPPLY ADDITIONAL DUCTWORK IN KIND, AS

ANY DAMAGE TO EXISTING CONCRETE PAD SHALL BE REPAIRED IN ACCORDANCE WITH SPEC 03300.



AERATION BLOWER EXHAUST DUCTWORK







BASEMENT PLAN – SECONDARY PROCESS BUILDING SCALE: NTS





11215.

PLANT WATER PIPING.

FURNISH AND INSTALL NEW IN-KIND PLANT WATER BASKET STRAINER AND ASSOCIATED PIPING PER SPECS 15225 AND 15220, RESPECTIVELY.

03300.

DEMOLISH AND REMOVE EXISTING PLANT WATER PUMP SKID PER SPEC 02225. FURNISH AND INSTALL PROPOSED PLANT WATER PUMP SKID PER SPEC

FURNISH AND INSTALL NEW SUCTION AND DISCHARGE PLANT WATER PIPING PER SPEC 15220 AS REQUIRED TO CONNECT PROPOSED PLANT WATER SYSTEM. DEMOLISH AND REMOVE EXISTING PLANT WATER PIPING THAT CONFLICTS WITH NEW

MODIFY EXISTING CONCRETE PAD TO ACCOMMODATE THE NEW SKID MOUNTED PLANT WATER PUMP SYSTEM. THIS MAY INCLUDE REMOVAL OF THE EXISTING CONCRETE PAD AND INSTALLATION OF A NEW CONCRETE PAD PER SPEC

ANY DAMAGE TO EXISTING CONCRETE PAD SHALL BE REPAIRED IN ACCORDANCE WITH SPEC 03300.







CONDUIT	CONDUIT SIZE	CABLE	FROM	то	REMARKS
C101	3	3-500MCM + #3 G	Secondary Switchboard	Disconnect Switch	Connect existing Wiring to r
C101A	2	3-#2/0 + #6 G	Disconnect Switch	Aeration Blower #1	
C101B	2	3-#2/0 + #6 G	Harmonic Filter	Aeration Blower #1	
C101A	1 ½	12-#18 TSP	Harmonic Filter	Aeration Blower #1	
C102	3	3-500MCM + #3 G	Secondary Switchboard	Disconnect Switch	Connect existing Wiring to r
C102A	2	3-#2/0 + #6 G	Disconnect Switch	Aeration Blower #2	
C102B	2	3-#2/0 + #6 G	Harmonic Filter	Aeration Blower #2	
C102C	1 ½	12-#18 TSP	Harmonic Filter	Aeration Blower #2	
C103	3	3-500MCM + #3 G	Secondary Switchboard	Disconnect Switch	Connect existing Wiring to r
C103A	2	3-#2/0 + #6 G	Disconnect Switch	Aeration Blower #3	
C103B	2	3-#2/0 + #6 G	Harmonic Filter	Aeration Blower #3	
C103C	1 ½	12-#18 TSP	Harmonic Filter	Aeration Blower #3	
C104	1	4-#4 & #8 G	6PP	Disconnect Switch	Connect existing Wiring to r
C104A	1	4-#4 & #8 G	Disconnect Switch	Local Control Panel	
C104B	1	4-#4 & #8 G	Local Control Panel	Reaeration Blower #2	Drive Rated Cable
C104C	1 ½	12-#18 TSP	Re-aeration Blower #2 Local Control Panel	CP4/5	
C105	1	3 #4 & #10 G	MCC 6	Junction Box	Connect existing Wiring to r
C105A	1	3 #4 & #10 G	Junction Box	Plant Water System	
C106	2 1⁄2	3 -250MCM + #4 G	MCC 7	Disconnect Switch	Connect existing Wiring to r
C106A	2	3-#2/0 + #6 G	Disconnect Switch	Local Control Panel	
C106B	2	3-#2/0 + #6 G	Local Control Panel	WAS Blower	Drive Rated Cable
C106C	1 ½	12-#18 TSP	WAS Blower Local Control Panel	CP4/5	
C111	3⁄4	Cat 6	Aeration Blower #1	CP4/5	
C112	3⁄4	Cat 6	Aeration Blower #2	CP4/5	
C113	3⁄4	Cat 6	Aeration Blower #3	CP4/5	
C114	3⁄4	Cat 6	Re-aeration Blower #2	CP4/5	
C115	3⁄4	Cat 6	Plant Water System	CP4/5	
C116	3⁄4	Cat 6	WAS Blower VFD	CP2	



NOTES:

- (1.) DEMOLISH AND REMOVE EXISTING AERATION BLOWER (TYP. OF 3) FILTER (IF NEEDED) IN PLACE OF EXISTING VFD. (2.) CONNECT SECONDARY SWITCHBOARD POWER FROM EXISTING VFD TO PROPOSED DISCONNECT SWITCH AND ROUTE TO NEW BLOWER DRIVES (TYP. OF 3).
- PLANEL CP4/5 TYP. OF 3).
- (4.) REFER TO SHEET M0-01.

FIRST FLOOR PLAN – SECONDARY PROCESS BUILDING SCALE: NTS



INSTALL PROPOSED DISCONNECT SWITCH AND EXTERNAL HARMONIC 🖵

(3.) CONNECT SIGNALS FROM PROPOSED AERATION BLOWER TO CONTROL

FIRST FLOOR PLAN - SECONDARY PROCESS BUILDING SCALE: NTS

DEMOLISH AND REMOVE EXISTING REAERATION BLOWER VFD. REFER TO SHEET M1-01 FOR LOCATION. FURNISH AND INSTALL PROPOSED LOCAL CONTROL PANEL (LCP) DISCONNECT

CONNECT PANEL 6PP POWER FROM EXISTING VFD TO PROPOSED VFD AND DISCONNECT SWITCH AND ROUTE TO NEW

CONNECT SIGNALS FROM PROPOSED REAERATION BLOWER

BASEMENT PLAN – SECONDARY PROCESS BUILDING SCALE: NTS

NOTES:

- (1.)**EXISTING LOCAL CONTROL PANEL**
- (2.) PUMP DRIVES. DISCONNECT SWITCH SHALL BE MOUNTED TO THE WALL. LOCATION SHOWN IS APPROXIMATE.
- (3.) SHALL BE MOUNTED TO THE WALL. LOCATION SHOWN IS APPROXIMATE.
- (4.) REFER TO SHEET M2-01.
- (5.) HATCH TO SECONDARY PROCESS BUILDING BASEMENT.

FIRST FLOOR PLAN – SOLIDS PROCESSING BUILDING SCALE: NTS

NOTES:

- 1.) DEMOLISH AND REMOVE EXISTING WAS BLOWER VFD.
- 2. FURNISH AND INSTALL PROPOSED LOCAL CONTROL PANEL (LCP) AND DISCONNECT SWITCH. LCP SHALL BE MOUNTED TO THE WALL. LOCATION SHOWN IS APPROXIMATE.
- (3.) CONNECT MCC NO. 7 POWER TO PROPOSED DISCONNECT SWITCH AND TO NEW WAS BLOWER LCP.
- (4.) CONNECT SIGNALS FROM PROPOSED WAS BLOWER LCP TO CONTROL PLANEL CP2.
- (5.) REFER TO SHEET M3-01.
- (6.) INSTALL CONDUIT FOR ELECTRICAL AND CONTROLS WIRING.

BASEMENT PLAN – SOLIDS PROCESSING BUILDING SCALE: NTS

ATTACHMENT F

Pre-Bid Meeting Attendance List

