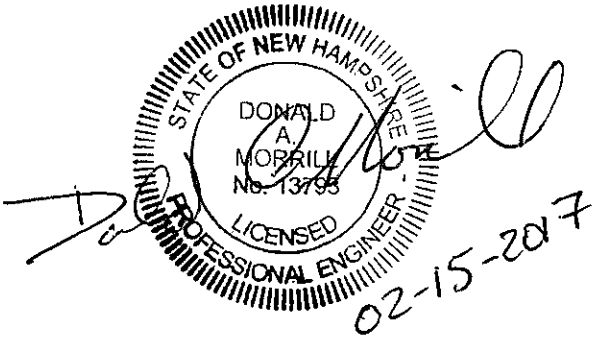
ADDENDUM NO. 3

TO

EXETER, NEW HAMPSHIRE

CONTRACT NO. 1 – WASTEWATER TREATMENT FACILITY UPGRADES

NHDES SRF PROJECT NO. CS-330130-15



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ADDENDUM NO. 3

EXETER, NEW HAMPSHIRE

CONTRACT NO. 1 – WASTEWATER TREATMENT FACILITY UPGRADES

As a point of clarification, it should be understood that the Contract Documents govern all aspects of the project. Informal discussions held over the telephone and/or during the pre-bid meeting are informational only. All official changes to the Contract Documents are made only by addenda. The following changes and additional information are hereby made a part of the Contract Documents. All Bidders shall acknowledge receipt and acceptance of this Addendum by signing and sending back the confirmation page. Bids submitted without acknowledgement of receipt of this addendum may be considered non-responsive.

SPECIFICATIONS

1. Table of Contents. **ADD** the following sections.
   03440 - Precast, Post-Tensioned Concrete Tanks

2. Section 03300 – Cast in Place Concrete.
   a. For Part 2.9.I.1, Pressure Relief Valves, **ADD** the following phrase to the end of the paragraph "Pressure relief valves shall be 6" diameter."
   b. For Part 3.4.G, Waterstops, **ADD** the following phrase to the end of the paragraph "Surface applied waterstops shall be installed in strict accordance within the manufacturer's recommended minimum distance from all concrete edges."

3. Section 03440 – Precast, Post-Tensioned Concrete Tanks. **ADD** this new specification in its entirety, which is attached to this Addendum.

4. Section 11205 – Perimeter Density Current Baffles.
   a. Part 2.1.A.4.a, **DELETE** the phrase "and 3/8" for Type B with encapsulated stainless steel stiffener supported baffles" and **REPLACE** with the phrase "and ¼" for Type B with encapsulated steel stiffener supported baffles".
   b. Part 2.1.C.7.b., **DELETE** in its entirety and **REPLACE** with the following "b. Type B: Integrally molded ¼" x 3" wide steel plate stiffeners with a 1" hole for securing to the wall with anchor bolts. Stiffener shall be sandwiched between two layers of 24 oz. woven roving 18" wide for the full length of the stiffener plus 6" past the end of the stiffener. Minimum laminate thickness on each side of the stiffener shall be 1/16" thick. Minimum laminate thickness for the remainder of the panel shall be ¼". Two stiffeners shall be provided per panel spaced equally around the perimeter approximately 4 feet apart. Maximum panel length is 8 feet."

5. Section 11215 – Line Shaft Vertical Turbine Pumps.
   a. Part 2.2.C.5, **DELETE** in its entirety.
   b. Part 2.2.C.6, **DELETE** "The seal housing shall be designed to accept a John Crane type 5610 XF551O58H." and **REPLACE** with "The seal housing shall be designed to accept and provided with a John Crane type 5610 XF551O58H."

6. Section 11223C – Compressed Air Mixing System.
   a. Part 1.1.D.7 – Ambient Conditions, Min Air Temperature, ºF: **DELETE** "0 ºF" and **REPLACE** with "40 ºF"
   b. Part 1.1.E – Performance Bond, **DELETE** Item 1 in its entirety and **REPLACE** with the following: "1. Manufacturer shall furnish a Performance Bond to the Owner in the amount of 100% of the value of the Compressed Air Mixing System for the full scope described in Section 11223C-1.1.A. The Performance Bond is separate and in addition to the Performance Bond supplied by the General Contractor. Manufacturer shall provide documentation from its Surety in the submittals. The Performance Bond shall be put in place

prior to the delivery of equipment to the site and shall remain in effect until successful completion of the Acceptance Test. No payment will be made until the Performance is put in place."

c. Part 1.5.B – **DELETE** the sentence "This extended warranty shall be in the name of the Owner and shall cover all equipment in the Dewatering Building, splitter structure, aeration tanks and sludge storage tanks" and **REPLACE** with "This extended warranty shall be in the name of the Owner and shall cover all equipment provided under this Section which is located in, on and adjacent to Splitter Structure No.2, Aeration Tanks and Sludge Storage Tanks, including receiver tanks and appurtenances.

d. Part 2.4.A.12 – **DELETE** the phrase "to a maximum of 85 decibels" and **REPLACE** with "to a maximum of 70 dBA".

e. Part 2.5.U, Air Pressure Regulator. **DELETE** Part 2.5.U in its entirety and **REPLACE** with "U. Air Throttling Valve. Each VP shall be equipped with a throttling valve to adjust the volume of air released to the ACVs and corresponding header supply piping. The throttling valve shall be pre-plumbed into the VP."

f. Part 2.5.V, Proportional Pressure Controller. **DELETE** Part 2.5.V in its entirety.

g. Part 2.6.D, Pressure Alarms. **DELETE** Part 2.6.D in its entirety and **REPLACE** with "D. Pressure Alarms. Each VP shall come equipped with a pressure transducer plumbed to the valve manifold. The pressure transducer shall transmit pressure anomalies to the controller. The controller shall interpret the pressures transmitted to provide a low system pressure alarm, a high system pressure alarm and to monitor ACV position.

h. Part 3.2.F, Acceptance Testing. **DELETE** Part 3.2.F.3 in its entirety and **REPLACE** with "3. Total suspended solids (TSS) testing shall be completed with a portable TSS probe, provided by the Manufacturer, and calibrated to the satisfaction of the Owner and Engineer prior to the testing. Alternatively, the Manufacturer may opt to collect TSS samples for independent laboratory analysis using "Standard Methods for the Examination of Water and Wastewater". If samples are sent for laboratory testing, the laboratory shall be selected by the Owner and the costs for the testing shall be paid by the Manufacturer. DO and ORP testing shall be completed with portable DO and ORP probes, provided by the Manufacturer, and calibrated on-site to the satisfaction of the Owner and Engineer prior to the testing.

7. Section 11310 – Pumps General.
   a. Part 2.2.G.11.a, **DELETE** "VIT-CATM" and **REPLACE** with "VIT-CAFM".
   b. Part 2.2.G.11.b, **DELETE** "VIT-CFTM" and **REPLACE** with "VIT-CFFM".
   c. Part 2.2.H.11.a, **DELETE** "VIT-CATM" and **REPLACE** with "VIT-CAFM".

8. Section 11317A – Recessed Impeller Centrifugal Pumps. For Part 1.2.D.2 (Hayward Gordon), **ADD** the phrase "Model XR Series Taurus".

9. Section 11365C – Sludge Dewatering Equipment (Centrifuge).
   a. Part 2.1.E.2.e, **DELETE** "10 days" and **REPLACE** with "30 days".

10. Section 11378B – Fine Bubble Aeration System. For Part 2.1.B.3, **DELETE** the phrase "shall be 4.6 psig (maximum airflow rate)" and **REPLACE** with the phrase "shall be 7.7 psig (maximum airflow rate at maximum water surface)".

11. Section 13441 – Control Loop Descriptions. **ADD** the following paragraph immediately after paragraph 13441-3.3.F.2.b: "c. Gen Set Integration: Obtain system requirements from Gen Set manufacturer and fully integrate equipment to provide full functionality of monitoring and alarms local to the Gen Set at HMI/SCADA. The Gen Set Equipment is specified in Division 16. Provide all Alarms at HMI/SCADA. Provide all Monitoring and Control at HMI/SCADA."

12. Section 13445 – Communications Network.
    a. **ADD** the following paragraph immediately following paragraph 13445-2.5.D.1, "2. Provide the switch with a Self-Healing function. Configure all cables and software according to manufacturer's recommendation to support this function."
    b. **ADD** the following paragraph immediately following paragraph 13445-2.10:

3.11 PROTOCOL CONVERTER

A. General
   1. System Integrator shall provide a protocol converter that will integrate the ATS / Gen Set equipment into the PLC.
   2. Actual device required will depend on what is submitted under Division 16.
   3. Contractor shall coordinate Division 16 shop submittals with Division 13.
   4. Provide Ethernet/IP to required protocol (LonWorks, Modbus RTU, Modbus TCP, etc.) converter for communicating to the ATS / Gen Set equipment.

B. Power: Ten (10) to thirty (30) VDC (0.5 watts typical)

C. Environmental:
   1. Operating Temperature Range: -40 to 70 degrees Celsius.
   2. Storage Temperature Range: -40 to 85 degrees Celsius.
   3. Humidity: 5 to 95% non-condensing.

D. Physical Features:
   1. Ethernet: 10/100 RJ45
   2. Serial: RS-485 two wire (TD, RD, GND) 57,600 baud via Modbus RTU with 1200 VRMS isolation for one minute.

E. Accessories:
   1. Provide 100 feet of communication cable compatible with the Gen Set communications device.

F. Manufacturers
   1. Prosoft
   2. Anybus
   3. Red lion
   4. or equal

13. Section 13455 – Radio Network System.
   a. **DELETE** paragraph 13455-1.1.A.2 in its entirety and **REPLACE** with the following paragraph "2. Provide a new master radio for the new CBCP. Use the existing MTU and radio during sequencing efforts and turn the existing radio over to the Owner as a spare following startup."
   b. **ADD** the following paragraph immediately after paragraph 13455-2.1.E.:

F. Radio Modem
   1. The radio modem will be specifically designed for the transmission of data via radio communication. The radio modem shall be a single module containing both modem hardware and FM radio transceiver designed for data transmission.
   2. The radio modem shall accept blocks of data from a standard RJ-45 Ethernet 10/100 Base T port connected to the PLC (via Ethernet switch) and re-code the data into a "packet" for transmission. These "packets" are sent in one or more "bursts" of radio communication to another radio modem.
   3. Radio modem shall include the most current version of software used for modem configuration set-up, site specific setup, interference testing and diagnostics. This software shall be provided to the owner and the license transferred accordingly.
   4. Radio modems shall be powered from a 24 VDC power supply with UPS backup.
   5. Approvals: FCC, CSA
   6. Radio modems shall be rated for operation in an environment of -30 to +60 degrees C at 95% non-condensing.
   7. Programming cable: Cables and connectors shall be supplied to the owner to connect to the programming interface of the radio modem.
   8. Equivalent to equipment manufactured by:
      a. Viper SC+-200, VHF 215-240 MHz Wireless Router by CalAmp
      b. No equal to match owner's existing

14. Section 15050 – Pipe & Fittings-General. For Part 3.4 Pipe Schedule, in the Delegated PE Design of Pipe Supports column:
    a. For ATE/ATI piping, **DELETE** the phrase "YES" and **REPLACE** with "NO".
    b. For CA piping, **DELETE** the phrase "YES" and **REPLACE** with "YES, FOR ALL EXPOSED PIPING BETWEEN COMPRESSORS AND VALVE PANELS"
    c. For IR piping, **DELETE** the phrase "YES" and **REPLACE** with "NO".

15. Section 16620 – Diesel Standby Power. **ADD** the following immediately following section 2.1.D.7.

    "8. Generator Remote Monitoring System (GRMS)
    a. The generator set shall be provided with a remote monitoring and control system and necessary equipment. The system shall be capable of communication and control of the generator and automatic transfer switch. The system shall have TCP/IP/Ethernet as well as cellular communication capability. The system shall be supplied with connectivity options for automation protocols such as Modbus or LonWorks for integration with a control device such as a PLC.
    b. Access: Users shall have access to the remote monitoring device from any PC or Mac computer using a Microsoft Silverlight-enabled web browser; no additional software shall be required. Multiple users shall be capable of accessing the power system monitoring equipment simultaneously.
    c. Controls: Users shall have the ability to remotely start and stop generator sets; remotely start and stop transfer switch tests; and remotely reset and acknowledge warning type faults on generator sets and transfer switches. User can also remotely activate and deactivate output controls.
    d. Notification: When an event becomes active, the user shall have the ability to choose to receive notifications via SMTP (email), SMS (text) and SNMP traps.
    e. User Interface: The GRMS shall employ a straightforward, icon-based graphical interface for monitoring data and controlling devices.
    f. Data Logging: The GRMS data logs shall contain detailed device data such as alternator, engine, source and load values. The user shall have the ability to extend data log memory with either an SD memory card or a USB flash drive.
    g. Event Logs: The GRMS shall store system and device events, which include faults and warnings triggered on generator sets, transfer switches, and sensors. A user shall have the ability to export event logs and create and view device reports containing selected parameters over a specified time duration.
    h. Diagnostics: Users shall be able to remotely diagnose Modbus communication status, wireless status and system performance data.
    i. Security: The GRMS shall have enhanced security with 128-bit Secure Sockets Layer (SSL) encryption. The system shall also username and password protected. Users shall be assigned one of three access levels—Administrator, Operator, Read-Only—providing various operation and functionality at each access level.
    j. The system equipment shall be located and mounted within the SCADA Network Panel (SNP)

16. Appendix F, Permit Conditions of Approval. **ADD** the "Proposed Water System Upgrades – Approval", which is attached to this addendum.

DRAWINGS

1. Drawing C-23:
    a. For DMH-5, **DELETE** the reference to CB-17 (CB-17 does not exist).
    b. For pipe segment between DMH-5 and CB-10, ADD the phrase "30-inch SD".

2. Drawing C-25A:
    a. For pipe segment between west side of Control Building and existing CB-1848, **ADD** the phrase "6-inch RL".

3. Drawing C-28:
    a. For 30" SCE CO (cleanout) located southeast of Secondary Clarifier No. 2, **ADD** the following phrase: "PROVIDE 30"X30"X6" LATERAL WITH RESTRAINED 30" END PLUG. EXTEND 6" TO CLEANOUT. REFER TO DETAILS ON DWG C-38."
    b. For SMH-6, **ADD** the phrase "(6-FT DIAMETER MH)".
    c. For SMH-6, **DELETE** the phrase "DROP INLET" next to 30" INV IN.

4. Drawing A-25, Section 3. **ADD** call-out for Detail J/A-40 at First Floor FFE beneath the Detail G and Detail L callouts.

5. Drawing A-35, Door Schedules: For doors D101A, D101C, M101B and M101C, **DELETE** the phrase "SEE NOTE 5" in the Remarks column and **REPLACE** with the phrase "SEE NOTE 7".

6. Drawing A-40, Detail J. **DELETE** the phrase "A-14" in the Detail J circle. **ADD** the phrase "This detail is applicable to the Headworks, Dewatering and Pumping Buildings.

7. Drawing S-24, Aeration Tanks. **DELETE** the drawing and **REPLACE** with the attached version.

8. Drawing S-25, Aeration Tanks. **DELETE** the drawing and **REPLACE** with the attached version.

9. Drawing S-26, Aeration Tanks. **DELETE** the drawing and **REPLACE** with the attached version.

10. Drawing S-27, Aeration Tanks. **DELETE** the drawing and **REPLACE** with the attached version.

11. Drawing PR-23, Aeration Tanks – Lower Level.
    a. **REVISE** centerline dimension of the 16" IR to wall from 4'-8" to 4'-11".
    b. **REVISE** centerline dimension of AIR drop-legs to wall shall be revised from 3'-0" to 3'-3".

12. Drawing I-2: In Control Building Control Panel (CBCP), **DELETE** "Existing VHF Radio" and **REPLACE** with "New VHF Radio".

13. Drawing I-3A: In SCADA Network Panel, **ADD** square labeled Generator Remote Monitoring System Device, (Division 16), connected to Gen Set equipment (Division 16). In SCADA Network Panel, **ADD** square labeled Protocol Converter, connected to MES-SNP-1 and Generator Remote Monitoring System Device.

14. Drawing E-1, NEMA Classification for Electrical Equipment and Enclosures.
    a. For Sludge Storage Tanks 1 and 2, **ADD** the following phrase "(See Note 3)".
    b. **ADD** the following immediately after Note 2, "3. Items mounted to the exterior of the Sludge Storage Tanks and outside of the classified zone around vents and hatches, shall be NEMA 4X with appropriate electrical barrier and conduit seal fittings in place. The area around the hatches shall be Class 1/Division 2 for 3-feet around the outside dimensions of the hatch, to a height of 18-inches. The area around the vents shall be Class 1/Division1 for 3-feet radius and Class 1/Division 2 for 5-feet radius."

15. Drawing E-6, Ductbank Section C-C, Conduit C1: **CHANGE** Conduit C1 size from 1" to 1.5".

16. Drawing E-18, Septage Building.
    a. Equipment Legend, **ADD** new Balloon "36 IS-1"
    b. Plan View, **ADD** Balloon 36 directly adjacent to Balloon 27 (SBCP)

17. Drawing E-27, Pumping Building.
    a. Equipment Legend, **ADD** new Balloon "47 IS-PB"
    b. Plan View, **ADD** Balloon 47 directly adjacent to Balloon 17 (PBCP)

18. Drawing E-58, Conduit S514. **ADD** Conduit S514 from SWBD-1/ATS-1 to SNP. Refer to E-64 for conduit size and fill.

19. Drawing E-63, Conduit C1:
    a. Conduit Size: **CHANGE** Conduit C1 size from 1" to 1.5"
    b. Conductors: In addition to existing conductors (10#14), **ADD** a cable with 1-2PR#24SH.
    c. Remarks: Additional cable provided by Division 13 and installed by Division 16.

20. Drawing E-64, Conduit S514. **DELETE** "Not used" and REPLACE with the information listed below.

CONDUIT NO	CONDUIT SIZE	CONDUCTOR	FROM	TO	REMARKS
S514	1"	1-2PR#24SH	SWBD-1, ATS-1	SNP	CABLE PROVIDED BY DIV 13 AND INSTALLED BY DIV 16.

SIGNIFICANT QUESTIONS AND RESPONSES DURING THE BIDDING PERIOD

1. Q: Using precast post-tensioned concrete structures for the Exeter NH upgrade may help to lower the costs of the bid and help with scheduling on the project. Will precast, post-tensioned concrete structures be considered as an equivalent alternative to cast-in-place concrete for this project?
   R: Yes. Please refer to Specification 03440 - Precast, Post-Tensioned Concrete Tanks, as noted above.

2. Q: Are certified test reports acceptable for factory oxygen transfer performance test to meet the requirements of Section 11378B-1.3.B.5?
   R: This determination will not be made prior to bid opening. Bid the project per the specifications.

3. Q: Specification 11223C, section 2.5.N - The compressed gas mixing specification calls for Nema 4x enclosures on the three valve control panels. However, a note on Drawing E-1 calls out the valve control panel enclosure for the Sludge Storage Tanks to be Nema 7 (Class 1/Div 1). In our experience, it is much more cost effective to elevate the panel outside of the classified envelope than to provide panels rated for Class 1/Div 1 environments. In fact, the control panel can be located anywhere outdoors within reasonable vicinity of the Sludge Storage Tank at no added cost if a Nema 7 (Class 1/Div 1 Enclosure) is actually required, we request that it be further clarified in Section 11223C.
   R: Provided that the valve control panel enclosures are located out of the classified envelopes as defined above, NEMA 4X enclosures are acceptable.

4. Q: Specification 11223C, section 3.2.F - With regard to the Acceptance Testing requirements, a HACH LDO Model 2 has an accuracy of +/- 0.1 ppm in a range of less than 5 ppm with a repeatability of +/- 0.1ppm. How will this impact the requirements of Part 3.2.F.2?
   R: The accuracy and repeatability of the portable instrument utilized will be considered. The portable instrument selected shall be suitable for the desired testing range.

5. Q: In Specification 11378B-2.2.B.2 – Aquarius asks for acceptance that air distributors are not true Schedule 40. We can provide distributors with 0.237" wall thickness. Distributors are 4.215 O.D. pipe per ASTM D3915 & D3034. Also, we request that 4" manifolds be allowed to be same material as distributors.
   R: The requested changes will not be made to Section 11378B.

6. Q: In the Pumping Building it calls for PVC duct in the Chemical Room this duct drops into the Pump Room which calls for galvanized duct, we are going to figure transitioning from PVC to Galvanized just below the floor. Is this correct?
   R: Yes, that is correct.

7. Q: Please clarify Aluminum Ladder locations. The details seem to indicate they are at all hatches but I didn't find them on the Drawings.
   R: Aluminum ladders shall be installed only where shown on the plan views for each structure (e.g., Parshall Flume Structure, Flow Meter Vault, etc.).

8. Q: Please verify there is no horizontal insulation under slabs on grade except where shown at site pads. The details indicate it but I didn't see it anywhere on the Architectural plans.
   R: Below slab insulation is required at all site equipment pads and exterior stair landing pads as shown on S-51. There is no horizontal sub-slab insulation; however, there is vertical insulation on frost wall footings and below grade walls as shown on the Architectural drawings. Vapor barrier is required below all new building slabs as specified in Section 07190.

9. Q: Where is Type 2 coating used?
   R: There are no Type 2 coatings indicated on the Drawings at this time. Section 03930 included the criteria for Type 2 coatings in the event they are determined to be needed in the field.

10. Q: HVAC Specification 15841 FRP Ductwork & Fittings seemingly task the HVAC contractor to provide and install this type of duct. Yet this type of duct is not shown on the M series drawings. Please advise if this type of duct is required to be provided and installed by the HVAC contractor.
    R: The FRP ductwork is shown on the PR drawings. The General Contractor shall determine who provides the ductwork.

11. Q: HVAC Specification 15891 seemingly tasks the HVAC contractor to provide closed cell foam duct liner to custom fabricated PVC ductwork located in the Pumping Building Chemical Room. After speaking directly with the PVC duct manufacturer, they informed me that they have never applied duct liner to PVC duct and would not recommend it. Please advise if this specification should be amended.
    R: Section 15891 calls for closed cell foam duct wrap to be provided in the Pumping Building Pump Room; the PVC ductwork is located in the Pumping Building Chemical Room above. The PVC ductwork does not require insulation.

12. Q: Can you verify that insulation thickness for section 15188 shall follow the table in 15180?
    R: Exterior insulation thickness shall be minimum R value of 4, and for heat traced pipe the thickness shall be coordinated with the design of heat trace systems per 15185.

13. Q: What is the size of the hose required for the HBW and HBF stations?
    R: Nominal hose size shall match nominal pipe size specified in Section 15200 (3/4" for HBW and 1-1/2" for HBF).

14. Q: Will steel trusses be required to meet AIS?
    R: Yes, steel trusses must meet AIS.

15. Q: Addendum No. 2 states that the Disinfection Structure is not intended to be pre-engineered, but I don't see any connection details for the steel erection that show bolt pattern, size, gussets, etc. Who is going to take design and cost responsibility for the structural details of this steel structure?
    R: Please refer to Specification 05120 section 3.2.A.

16. Q: Please confirm that items manufactured out of steel like grit hopper from Section 14902 don't fall within the AIS scope because they aren't on the list in Section 00800. Looking for clarification that not everything made of iron and steel is by extension required to be AIS compliant.
    R: The grit cart specified in Section 14092 must meet AIS as it is permanently incorporated into the work and is not mechanical equipment. This item could potentially be incorporated in the deminimus list.

17. Q: Pipe support design is only required for the IR line in the AER and the 2" AC lines that run from the

compressors in the Dewatering Building to the AC system receivers at the AER and the SST. From the AC receivers to the diffusers, the piping is supported as detailed on PR-43 and no design is required. The other pipelines carrying a "YES" note on the 15050 table are the ATI and ATE lines, which are buried and exempt from pipe support design.

R: Refer to revisions to Section 15050 above. Contractor shall provide delegated design of pipe supports for all exposed 2" diameter compressed air piping between the compressors and the valve panels (i.e., not buried).

18. Q: Pipe support design includes selection and layout of pipe supports with calculations and other info in Section 15050-1.5.B, C, D to show adequate restraint for the forces listed therein. The design shall be stamped. Will the Engineer provide the system pressure values to be used in this design?

R: The information needed to complete the design are provided in the Bidding Documents, including duty flow rates, pressures and temperatures (Section 11223C) and delta operating pressure and temperature (Section 15050). If supplemental information is needed, the Engineer will provide the information during the construction phase.

19. Q: Where pipelines are tagged with a "NO" or "NA" label, or are not tagged with a "YES" label, in the Section 15050 Pipe Schedule, is the submittal requirement is limited to a cut sheet showing the premanufactured support and info indicated in Section 15094-1.5.C.3 and 4?

R: No, the submittal requirements identified in Section 15094-1.5.A, C and E are applicable for all piping systems. The submittal requirements identified in Section 15094-1.5.B and D are applicable to those piping systems which require a Pipe Support Design Engineer.

20. Q: Seeing that this is, basically a new plant for the Town, why is WP standardizing on Foxboro mag meters in Non-Classified areas and allowing others to be used is classified areas.

R: The Town already has an existing standard at multiple town facilities using Foxboro and has approval to sole source from NHDES. The Foxboro manufacturer's representative stated they could not meet the FM approved Class 1 Division 1 rating, thus other manufacturers are allowed for those space ratings.

21. Q: Is a spool piece required for the magnetic flow meters?

R: Yes, spool pieces are required per Section 13440-2.1.C.1.d.i.

22. Q: We cannot find design intent for the SCADA Network Panel shown on I-3A. Please clarify what WP is looking for. NEMA 12 control panel rack mount system, etc.

R: Provide the SCADA Network Panel the same as a Control Panel aesthetic and function, but without a PLC. Equipment may be DIN rail mounted, rack mounted, combination, and/or custom shelves.

23. Q: Reference I-3B, Site Cellular Phone Signal Boosters. Is the intent to put all of the Cell Booster Equipment in one panel or two separate enclosures as show. Note panel tag numbers are the same.

R: Two separate enclosures, the panel tag numbers would be corrected during construction.

24. Q: Please clarify how existing Viper SC radio is to communicate to SCADA system. 13455, 1.1. 2.a. makes reference to ML1400 PLC. An ML1400 is not shown on I-2.

R: Refer to changes made in this addendum. The existing MTU has an antenna at the existing Control Building. There is a repeater station between the MTU and the remotes. The existing radio and antenna will be replaced. The System Integrator would be responsible for setting up basic functionality and confirming communication to the system per 13455-1.1. The ML1400 PLC is the PLC commonly used at the nine remote pump stations. Paragraph 13455-1.1.B.2., which mentions the ML1400, is work provided by the Application Engineering Services Supplier (AESS), not the Division 13 System Integrator.

25. Q: We cannot find HGRP-20 or HGRP-21 shown on the electrical drawings.

R: HGRP-20 is located on E-20, the Headworks Second Floor Power Plan (balloon 16). HGRP-21 is located on E-18, the Septage Building First Floor Electrical Modifications Plan (balloon 30)

26. Q: We cannot find IS-HB, IS-PB, IS-DB, IS-1 on the electrical drawings.
    R: Mount each IS box adjacent to the associated control panel as called on the Instrumentation drawings (see I-1, Note 11). IS-HB see E-20, Headworks First Floor Power Plan (Balloon 26). IS-PB, see E-27, Pumping Building – First Floor Power Plan (new Balloon 47). IS-DB see E-25, Dewatering Building – Second Floor Power Plan (Balloon 30). IS-1 see E-18, Septage Building – First Floor Electrical Modification Plan (new Balloon 36).

27. Q: Please clarify where the ISB for the Lagoon Structure Level are to be located. Refer to I-10.
    R: IS-DS see E-34, Disinfection Structure – Upper Level Power Plan (balloon 40)

28. Q: Reference 13442 contained in Addendum #2, NEMA rating of Industrial Panel PC. Specifications indicate NEMA 4X. The panels where the HMIs are to be installed are NEMA 12. Is the associated cost of NEMA 4X rated HMI required?
    R: It is acceptable to match the NEMA rating of the Industrial Panel PCs to the required rating of the associated control panel.

29. Q: Please review Class 1 Div. 1 specifications for magnetic flow meters. Please provide list of manufacturers that manufacturer a Class 1 Div. 1 magnetic flow meter with a remote mount transmitter. Our experience is that for the manufacturer to receive the approval, the sensor and transmitter must be integral.
    R: If the manufacturers previously listed for Class 1 Div 1 magnetic flow meters do not offer a remote transmitter option, the integral units would be acceptable.

30. Q: Since per the contract Agreement, the Contractor and Owner recognize that time is of the essence, how much time is WP expecting to take to review shop drawings.
    R: The Engineer will provide timely review of shop drawings in accordance with Section 00700 – General Conditions, 7.16. The Contractor shall provide adequate time in the schedule for submittals and resubmittals.

31. Q: Is Pulsair considered an "acceptable equivalent" for specification 11223C – Compressed Air Mixing System?
    R: Yes, assuming that the equipment provided is consistent with the layout information included in the Bidding Documents.

32. Q: Wastewater pumped to lagoon 1. From SSL is there a level of TSS that cannot be exceeded?
    R: No.

33. Q: Wastewater pumped to lagoon 1: From SSL is there a gpm rate that cannot be exeeded?
    R: No.

34. Q: The use of amendments will be required for some of the SSL stored sludge to meet Paint Filter Test for landfill criteria. How is the contractor to be compensated?
    R: The cost for amendments, if needed, should be included in the Bid Item.

35. Q: The use of amendments will be required for SSL sludge to bind metals to pass TCLP. How is the contractor to be compensated?
    R: The cost for amendments, if needed, should be included in the Bid Item.

36. Q: During dredging of a lagoon will the Solar Bees be moved from dredge path as need by the client? If not can a SOP of how the Solar Bees can be reposition be provided?
    R: Yes, the Owner will coordinate having the Solar Bees moved from the dredge path as needed.

37. Q: It is stated 130,000 gallons in-situ will need to be pumped from Lagoon 2 & 3 to Lagoon 1 to remove

1,030 BDT. Could this calculation be revisited if were using 4.0 % dry solids in-situ and a density of 1.05 it would require an estimated 6.1 million gallons to be removed yielding 1,030 BDT. As pumping systems would have a dilution rate of 3:1 it's intended that 18 million gallons would need to be pumped to remove 1,030 BDT.

R: Since it is required for the contractor to track and record the sludge transferred to Lagoon 1 using an inline flow meter and TSS analyzer, per specification 02001: Removal, Disposal and Transfer of Lagoon sludge section 3.1.E.2 the calculation will be based on dry tons transferred.

38. Q: The matrix of sludge pumping is from Lagoon 3 to Lagoon 2 to Lagoon 1. Is the pay basis on bone dry tons based on only when pumping from Lagoon 2 to Lagoon 1?

R: Sludge shall be pumped from Lagoon 2 directly to Lagoon 1 and from Lagoon 3 directly to Lagoon 1 and the basis of pay is based on total dry tons pumped.

39. Q: Are lagoons 2 &3 lined and if so what is the design of the liner?

R: Lagoons 2 and 3 have clay liners in the embankments, but are unlined on the bottom. If additional information for the lagoons is desired please contact the owner to setup an appointment to review the existing drawings dated May 1988, prepared by Hoyle, Tanner & Associated, Inc., Consulting Engineers, Bedford, New Hampshire, entitled: "Town of Exeter, New Hampshire, Wastewater Treatment Facility, Contract No. 10", consisting of 85 drawings, for additional information on the lagoons if desired.

40. Q: Do the lagoons 2 & 3 have any submerged obstructions?

R: The only submerged obstructions in Lagoons 2 and 3 are the inlet and outlet structures as well as the drain sumps.

41. Q: Are there any three phase 480 power sources near Lagoon 2 & 3 for pump operations?

R: Yes, however, arrangements for temporary power shall be coordinated with the Contractor.

42. Q: Bid Item 11 states 1030 dry tons. Is this an estimated combined dry tons in place or is it a number being used solely for bidding purposes?

R: The asterisk at the end of 1,030 DT indicates that "Indeterminate quantities assumed for comparison of bids. Quantities are not guaranteed. Payment will be based on actual quantities."

43. Q: Bid Item 11: If the actual dry tons transferred from lagoons 2 and 3 are above or below the bid calculation form, will payment be made on actual dry tons removed?

R: Yes, as described in Section 01150A.

44. Q: What is the estimated dry tons in place for lagoons 2 and 3?

R: Refer to Attachment C – Aerated Lagoon Survey of Appendix E – Lagoon Closure Plan in the specifications.

45. Q: Were the estimated dry tons in lagoon 2 and 3 based on an engineer's survey?

R: Yes.

46. Q: If lagoons 2 and 3 are to remain in service until plant meets performance requirements, how will the dry ton volumes be re-calculated to determine the estimated volume in place during time of sludge transfer?

R: It is not the intention to transfer all of the sludge from Lagoons 2 and 3 to Lagoon 1, but only a portion, therefore, no re-calculation will be required.

47. Q: In order to use a dredge, the lagoons must maintain a certain water level. Is there any objection to using other pumping equipment for the transfer of sludge that would allow for lagoons 2 and 3 to be drained during sludge transfer operations?

R: Lagoons 2 and 3 will not be allowed to be drained.

48. Q: Specification 11365C, section 1.7 - Warranty (call for 72 hrs. if bearing need replaced). Alfa Laval will

respond immediately upon request for service. It is likely that the response time will be more than 72 hours to complete a bearing replacement.

R: Noted as acceptable.

49. Q: Specification 11365C, section 2.1.E.9 – Pressure Loss. The pressure loss needs to be increased to 10 psi or higher please.

R: The specified feed tube pressure loss was based on the specific basis of design manufacturer (5 psi). The specified Sludge Feed Pumps can compensate for the requested additional pressure loss requirements of +5 psi. The centrifuge manufacturer should note this pressure loss requirement as an exception during the submittal process for the Engineer to confirm with the submitted Sludge Feed Pumps.

50. Q: Specification 11365C, section 2.1.E.10.a.iii – Feed Zone. To the best of our knowledge, Alfa Laval is the only manufacturer that can provide fully field replaceable tungsten carbide feed zone protection. Will substitutions be allowed for not supplying this technology? Flame sprayed feed zone accelerator protection is not repairable in our experience.

R: Other manufacturers have confirmed that feed port abrasion components are field replaceable. This specification requirement will be enforced.

SECTION 03440

PRECAST POST-TENSIONED CONCRETE TANKS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. As an equivalent alternative to cast-in-place concrete, precast post-tensioned concrete tanks and associated appurtenances may be utilized for the following structures:
   1. Aeration Tanks Nos. 1 and 2, Splitter Structure No. 2 and Effluent Box
   2. Secondary Clarifiers Nos. 1, 2 and 3
   3. Sludge Storage Tanks Nos. 1 and 2

B. All work associated with the precast post-tensioned concrete tanks and appurtenances, including leak testing.

1.2 RELATED SECTIONS

A. Section 01340 - Submittals
B. Section 02200 - Earthwork
C. Section 03300 – Cast-In-Place Concrete
D. Section 03364 – Concrete Finishing, Curing and Repairs
E. Section 03604 - Non-Shrink Grout
F. Section 03930 - Concrete Coatings
G. Section 05500 - Metal Fabrications
H. Section 08305 - Special Doors
I. Section 15092 - Pipe Sleeves and Seals

1.3 PRODUCTS INSTALLED BUT FURNISHED IN OTHER SECTIONS

A. Pressure Relief Valves – Section 03300 Cast-In-Place Concrete
B. Pipe Sleeves - Section 15092 - Pipe Sleeves and Seals
C. Sluice Gate Frames – Section 15126 Sluice Gates
D. Conduit – Section 16050 Basic Materials And Methods

1.4 REFERENCES

A. This section contains references that are applicable to this Specification Section. The applicable edition of the indicated references shall be the version that was the most current at the time of the Advertisement of Bids. If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, whether or not the document has been superseded by a version with a later date, discontinued, or replaced.
B. ACI 301 Specifications for Structural Concrete
C. ACI 350 Code Requirements for Environmental Engineering Concrete Structures
D. ACI 350.3 Seismic Design of Liquid Containing Concrete Structures and Commentary

E. ACI 355.2 – Qualifications of Post-Installed Mechanical Anchors in Concrete
F. ACI 355.4 – Qualifications of Post-Installed Adhesive Anchors in Concrete
G. ACI 423.7 - Specification for Unbonded Single-Strand Tendon Materials and Commentary
H. ACI ITG -7 – Specification For Tolerances for Precast Concrete
I. ASTM A108 - Specification for Steel Bar, Carbon and Alloy, Cold-Finished
J. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
K. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
L. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
M. ASTM A666 - Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
N. ASTM A706/A706M – Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement
O. ASTM A780/A780M - Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
P. ASTM A1064/A1064M – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain or Deformed, for Concrete
Q. ASTM C33/C33M - Specification for Concrete Aggregates
R. ASTM C40/C40M – Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
S. ASTM C42/C42M - Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
T. ASTM C88/C88M – Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
U. ASTM C131/C131M – Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Abrasion Machine
V. ASTM C150/C150M - Specification for Portland Cement
W. ASTM C171/C171M - Standard Specification for Sheet Materials for Curing Concrete
X. ASTM C260/C260M - Specification for Air Entraining Admixtures for Concrete
A. ASTM C309/C309M – Standard Specification for Liquid Membrane - Forming Compounds for Curing Concrete
Y. ASTM C494/C494M - Specification for Chemical Admixtures for Concrete
Z. ASTM C535/C535M – Standard Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Abrasion Machine
AA. ASTM C595/C595M - Specification for Blended Hydraulic Cements
BB. ASTM C618/C618M - Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
CC. ASTM C881/C881M - Specification for Epoxy-Resin-Base Bonding Systems for Concrete
DD. ASTM C923/C923M - Standard Specification for Resilient Connectors Between

Reinforced Concrete Manhole Structures, Pipes, and Laterals

EE. ASTM C989/C989M - Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars

FF. ASTM C1240/C1240M - Specification for Silica Fume Used in Cementitious Mixtures

GG. ASTM C1260/C1260M – Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

HH. ASTM C1293/C1293M – Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction

II. ASTM C1567/C1567M – Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar Bar Method)

JJ. ASTM C1611/C1611M - Test Method for Slump Flow of Self-Consolidating Concrete

KK. ASTM C1712 - Test Method for Rapid Assessment of Static Segregation Resistance of Self-Consolidating Concrete Using Penetration Test

LL. ASTM D412 - Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

MM. ASTM D2240 - Test Method for Rubber Property—Durometer Hardness

NN. ASTM E329/E329M – Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

OO. ASTM F593 - Specification for Stainless Steel Bolts, Hex Cap Screws and Studs

PP. ASTM F594 - Specification for Stainless Steel Nuts

QQ. AWS D1.1/D1.1M Structural Welding Code - Steel - American Welding Society

RR. Concrete Reinforcing Steel Institute 10MSP, Manual of Standard Practice

SS. Concrete Reinforcing Steel Institute - Placing Reinforcing Bars

TT. AASHTO M251 - Specification for Plain and Laminated Elastomeric Bridge Bearings

UU. Precast/Prestressed Concrete Institute (PCI) – Manual for Quality Control For Plants and Production of Structural Precast Concrete Products (MNL-116)

VV. Precast/Prestressed Concrete Institute (PCI) – PCI Design Handbook - Precast and Prestressed Concrete (MNL-120)

WW. Precast/Prestressed Concrete Institute (PCI) – Tolerance Manual for Precast and Prestressed Concrete Construction (MNL-135)

XX. CSA Group – A23.4 Precast Concrete – Materials and Construction

YY. Post Tensioning Institute (PTI) PTI-CRT20 G1-1215 “Manual for Certification of Plants Producing Unbonded Single Strand Tendons”

ZZ. Post Tensioning Institute (PTI) PTI-M10.3 “Field Procedures Manual for Unbonded Single Strand Tendons”

1.5 DEFINITIONS

A. Precast Concrete Tank Supplier – The company that is responsible for the design of the precast concrete tanks, plant fabrication of the precast concrete components and erection of the precast concrete tanks.

B. Precast Concrete Tank Supplier Design Engineer – Professional Engineer registered in the State of New Hampshire who is responsible for the design of the precast concrete tanks.
C. Engineer – Engineer-of-Record (Wright-Pierce) or Engineer-of Records Resident Project Representative (RPR).

1.6 PERFORMANCE AND DESIGN REQUIREMENTS

A. Provide complete precast, post-tensioned, concrete tanks capable of withstanding the indicated design loads within the limits and conditions specified herein.
B. Basis of Design: The precast, post-tensioned concrete tanks shall consist of the following:
    1. Base slab - The base slab shall consist of cast-in-place reinforced concrete. All control joints as indicated on the Contract Drawings shall be maintained.
    2. Walls – The walls shall consist of factory fabricated precast concrete units assembled in the field with post-tensioned reinforced steel tendons
    3. Top of wall beams/walkways:
        a. All top of wall beams (which may serve as access walkways) added by the Precast Concrete Tank Supplier for wall support, shall be coordinated with the walkways shown on the Contract Drawings for the Aeration Tanks.
        b. Additional walkway beams added to top of walls that were not shown on the Contract Drawings shall be provided with aluminum handrail guards on both sides in accordance with the guard details shown on Contract Drawing S-53.
        c. The two walkways shown on the Contract Drawings have significant amounts of embedded conduit (refer to Electrical Drawings) within them. The Precast Concrete Tank Supplier shall either match this embedded conduit or shall coordinate with the General Contractor to have all electrical conduits hung on the underside of the walkways. General Contractor shall also coordinate required changes in the pipe and pipe support layouts accordingly.
    4. Vertical wall joints shall be filled solid with non-shrink grout
    5. Horizontal joints between the wall and base slab shall be a grouted pockets
C. Design shall comply with ACI 350 and utilize the "Strength Design Method" (Normal Environmental Exposure Condition). Design shall also comply with PCI MNL-120
D. The tank walls shall be post-tensioned in accordance with ACI 350.
    1. Tank walls shall have horizontal post-tensioned tendons to provide residual compression stress.
    2. Minimum residual compression shall be 125 psi after allowance for all prestress losses.
    3. Circumferential prestressing tendons used in circular tanks shall be bonded tendons.
E. Structural design of precast concrete tank walls shall include the following loading conditions and design loads:
    1. Empty precast structure with all external loads at maximum groundwater elevation (duty condition of completed tank if out of service)

a. Lateral soil pressures (walls):
   i. 95 pcf/vf below the groundwater table
   ii. 65 pcf/vf above the groundwater table
   iii. Uniform live load lateral surcharge of 100 psf applied horizontally to the sides of the precast structure for the full height.
   iv. Seismic total lateral load = $0.1*Ss*Fa*\gamma*H^2$ (full height inverted triangle loading diagram):
      · Ss = Maximum considered earthquake spectral response acceleration factor for short periods
      · Fa = Seismic Site Coefficient for short periods
      · γ = Unit weight of soil (assume weights of 130 pcf shall be used)
      · H = Height of soil
      · Required seismic parameters are indicated on Contract Drawing S-1

b. Hydrostatic uplift (base slabs) - Net hydrostatic uplift while the tank is empty during high groundwater conditions

c. Bearing pressure (base slabs):
   i. Allowable bearing capacity as indicated on Contract Drawing S-1
   ii. Subgrade Modulus:
      · Glacial till or weathered bedrock subgrade: 200 lb/ft3
      · Bedrock subgrade: 400 lb/ft3

d. Minimum reinforcement in each orthogonal direction of base slabs shall be in accordance with ACI 350.

2. Precast structure full of liquid with no backfill (leak test condition for tanks):
   a. Design for the tank to be filled to the elevations indicated on the Structural Drawings. Liquid density shall be assumed to be 63 pcf/vf
   b. Seismic loads in accordance with ACI 350.3
3. Handling, transportation, and erection loads.

F. The precast concrete structure shall be designed to resist flotation:
1. A factor of safety of 1.25 shall be used against flotation based on weights of empty structure and soil directly over footing extensions and above the top slab (if any).
2. The maximum design groundwater elevation is indicated on Contract Drawing S-1.
3. The following shall be used to resist flotation:
   a. Dead weight of tank.
   b. Soil directly over the base slab extension beyond the walls (the resistance due to wedge action of the soil shall not be used)
   c. Pressure relief valves installed in the walls at the elevations shown on the Drawings. Pressure relief valves may be lowered to a minimum centerline elevation 7.30’ in the Secondary Clarifiers if General Contractor confirms there is no conflict with the submitted clarifier mechanism (that has been reviewed with no exceptions taken by the Engineer). Pressure relief valves may be set at elevation 7.80’ in the Aeration tanks. Pressure relief valves

shall not be installed in the base slab. Design shall assume 1 foot of head above the centerline of the valve will be required to activate the valve'

4. Frictional resistance of the surrounding soil shall not be utilized for resistance to flotation.
5. The buoyant force acting on an object is equal to the weight of the volume of water that is displaced by the object. The actual weight of the same volume determines whether or not the object is buoyant.

G. Precast concrete:
1. Minimum 28 day compressive strength: fc' = 5,000 psi.
2. Maximum water-cement ratio = 0.40

H. Reinforcing Steel:
1. ASTM A615/A615M grade 60 deformed bars or ASTM A1064/A1064M welded wire fabric.
2. Minimum reinforcing steel in all concrete sections shall be no less than 0.003 times the gross area of the concrete section.

I. Concrete cover on reinforcing steel: 2 inches minimum.

J. The interior dimensions of the precast concrete structures shall be as shown on the Drawings.

1.7 SUBMITTALS

A. Manufacturer's Data:
1. Submit manufacturer's specifications and instructions for all manufactured materials and products including pressure relief valves, hatches, sealants, pipe sleeves, guards, electrical conduit, anchorage hardware and other items. Include manufacturer's certifications and laboratory test reports as required.

B. Shop Drawings:
1. Submit shop drawings, prepared and stamped by a Professional Engineer registered in the State of New Hampshire, showing complete information for the fabrication and installation of the reinforced concrete and precast concrete walls units. Information shall include:
a. Reinforced cast-in-place concrete base slabs:
i. Configuration, thickness, dimensions and details of base slab.
ii. Size, spacing and details of all necessary base slab reinforcing.
b. Precast post-tensioned concrete tank walls
i. Plan views, elevations, sections, and details necessary to install the tank.
ii. Locations of all post-tensioned tendons.
iii. Tendon stressing sequence and force, and theoretical elongations for all post-tensioned tendons.
iv. Layout, dimensions, and identification of each precast unit corresponding to the sequence and procedure of installation. Provide details for all inserts, connections, and joints.
v. Size, location and type of all pipe penetrations. All openings shall be cast-in-place at the manufacturing plant. Field coring of pipe penetrations shall not be allowed.
vi. Size, location and type of all pressure relief valves.

vii. Size and location of all other required penetrations and openings.
viii. Location of each precast concrete wall member by same identification mark placed on unit.
ix. Relationship of structural precast concrete members to adjacent materials.
x. Locations and details of all vertical and horizontal joints.
xi. Shim sizes and grout requirements.
xii. Joints to be grouted and any critical grouting sequences.
xiii. Bearing pad sizes and materials.
xiv. Process equipment locations, sizes and interface details with the tank structure as coordinated with the General Contractor.
xv. Sizes and locations of all electrical conduit

2. Submit structural design calculations and buoyancy analysis demonstrating the structural integrity of all precast concrete units. Calculations and Drawings shall be prepared and stamped by a Professional Engineer registered in the State of New Hampshire.
3. Submit Concrete Mix designs including test data that meets the criteria specified in ACI 301, Section 4. Mix design shall include:
   a. Proportions for all ingredients, 28-day design compressive strength, water to cementitious materials ratio, admixture dosages, slump, and air content.
   b. Cement Manufacturer's Certificates of conformance with ASTM C150/C150M taken during the last 90 days.
   c. Supplementary Cementitious Materials: Source and test reports with certificates of conformance with ASTM C618/C618M for fly ash and ASTM C989/C989M for ground granulated blast furnace slag for actual material to be used in the Work taken during the last 90 days
   d. Aggregate: data not older than 90 days, except test data for soundness, abrasion, alkali reactivity – not older than 12 months. Fine and coarse aggregate data shall include:
      i. Sources
      ii. Specific Gravity
      iii. Sieve analyses per ASTM C33/C33M, including fineness modulus of fine aggregate
      iv. Organic impurities for fine aggregate per ASTM C40/C40M
      v. Potential alkali reactivity (except not required if a cement containing less than 0.60% alkalis is used, per ASTM C33/C33M), per ASTM C1260/C1260M, ASTM C1293/C1293M, or ASTM C1567/C1567M
      vi. Soundness per ASTM C88/C88M
      vii. Abrasion for coarse aggregate per ASTM C131/C131M and ASTM C535/C535M
   e. Product data and material safety data sheets for concrete admixtures.
   f. Test reports by testing agencies meeting ASTM E329/E329M:
      i. Test data used to determine the standard deviation used for establishing the required average design strength, and test data documenting that the proposed concrete proportions will produce an

average compressive strength equal or greater than the required average compressive strength, shall be from within the previous 12 months.

ii. Laboratory trial batch data shall be from with the previous 24 months.

4. Submit certification stating that all wall panels have been fabricated in accordance with the Contract Documents and shop drawings.
5. Submit 12 inch square mock up panel of the required finish for walls requiring form liners. Mock up panel shall represent the general appearance of the precast finish including the required color and texture.
6. Submit past Project list including:
   a. Project name and location
   b. Sizes of tanks
   c. Owner contact information
   d. Engineer-of-Record contact information (address and phone number)
7. Submit documentation of American Iron and Steel compliance including reinforcing steel, post-tensioning cables, etc. Refer to Section 00800 SC-20, Attachment D-7.

1.8 QUALITY ASSURANCE

A. The Precast Concrete Tank Supplier shall be experienced in producing circular and rectangular precast, post-tensioned, concrete tanks and exhibit satisfactory performance on five (5) projects of similar magnitude under similar or equal service conditions for a period not less than five (5) years.

B. Precast Concrete Tank Supplier shall assume responsibility for designing the precast, post-tensioned, concrete tanks to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

C. Prestressed Concrete Institute (PCI) Plant Certification Program:
   1. Precast Concrete Tank Suppliers manufacturing plant shall be certified by the PCI Plant Certification Program in Group C, Category C3 products. Certification shall be maintained throughout the production of the precast concrete units.
   2. Production shall immediately stop if at any time the Plant certification is revoked, regardless of the status of completion of contracted work. Production will not be allowed to re-start until the necessary corrections are made and certification has been re-established.
   3. In the event certification cannot be re-established in a timely manner to avoid project delays, the Precast Concrete Tank Supplier, at no additional cost to the Owner, will contract out the remainder of the units to be manufactured at a PCI certified plant.

D. The precast concrete manufacturing plant shall implement a Quality Control Plan and maintain a permanent Quality Control Manual outlining the quality control procedures used by the plant.

E. The precast concrete manufacturing plant shall have sufficient production capacity to produce required members to meet the project schedule.

F. Post-Tensioning Tendon Manufacturer Qualifications: Fabricating plant certified by PTI according to procedures set forth in PTI-CRT20-G1-1215.

G. Post-Tensioning Installer Qualifications: A qualified installer whose full-time Project superintendent has successfully completed PTI's Level 1 Unbonded PT - Field Installation course. Superintendent must receive training from post-tensioning supplier in the operation of stressing equipment to be used on Project.

H. Post-Tensioning Inspector Qualifications: Personnel performing field inspections and measuring elongations shall have successfully completed PTI's Level 2 Unbonded PT - Inspector course. Inspector shall be employed by Precast Concrete Tank Supplier.

I. Manufacturing procedures, testing requirements and quality control recommendations for types of members required shall comply with PCI MNL 116.

J. Dimensional tolerances shall comply with PCI MNL 135.

K. Engineer (or Independent Testing Laboratory) may perform a plant inspection at any time during casting of precast concrete components during the construction period. General Contractor shall notify the Engineer a minimum of 14 days prior to the availability of specific precast components for inspection. After notification, Engineer will notify the General Contractor a minimum of 72 hours prior to the inspection.

L. Plant Quality Control During Fabrication:
   1. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 116 requirements. If using self-consolidating concrete also test and inspect according to ASTM C1611, ASTM C1712, ASTM 1610, and ASTM C 1621.
   2. Testing:
      a. If there is evidence that the strength of precast concrete members are deficient as defined in the previous statement, Precast Concrete Tank Supplier shall employ an independent testing agency (at no additional cost to the Owner) to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C42 and ACI 350.
      b. Test results shall be reported in writing on the same day that tests are performed, with copies to the Engineer, General Contractor, and Precast Concrete Tank Supplier. Test reports shall include the following:
         i. Project identification name and number
         ii. Date when tests were performed
         iii. Name of Precast Concrete Tank Supplier
         iv. Name of concrete testing agency
         v. Identification letter, name, and type of precast concrete member(s) represented by core tests; design compressive strength; type of failure; actual compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
   3. Patching: If core test results are satisfactory and precast concrete members comply with requirements, clean and dampen core holes and solidly fill with

precast concrete mixture or repair material, and finish to match adjacent precast concrete surfaces.

4. Acceptability. Structural precast concrete members that do not comply with acceptability requirements in PCI MNL 116, including concrete strength, and manufacturing tolerances, are unacceptable. Replace unacceptable units with precast concrete members that comply with requirements. Chipped, spalled or cracked members may be repaired as long as the structural integrity of the concrete has not been compromised.

1.9 WARRANTY

A. The Precast Concrete Tank Supplier shall provide a ten-year warranty for each tank in the name of the Owner. The warranty shall at minimum include the following items:
   1. The Precast Concrete Tank Supplier shall provide a corporate guarantee not covered by any form of insurance or bond as a warranty for the precast tank that warrants the tank is free from structural defects due to faulty design, workmanship, materials or erection.
   2. The Precast Concrete Tank Supplier shall warrant the structural aspects of the tank for a period of ten years from the date when the tanks are completed and put into service by the Owner.
   3. The Precast Concrete Tank Supplier shall furnish, without charge to the Owner, all necessary labor and materials required to repair all structural defects subject to this warranty with a maximum cost of repair not exceeding the Tank Supplier's contract value of the tank.

PART 2 - PRODUCTS

2.1 PRECAST CONCRETE TANK SUPPLIERS

A. Dutchland, Inc., Gap, PA
B. No equal

2.2 PRECAST CONCRETE MATERIALS

A. Concrete mix design shall conform to the following:
   1. Minimum compressive strength of concrete at 28 days (f'c) = 5000 psi.
   2. Maximum water/cement ratio = 0.40
   3. Cement:
      a. Cement for all units shall be Type II Portland cement conforming to ASTM C150/C150M.
      b. Blended cements: ASTM C595/595M. Do not use blended cements conforming to ASTM C595/595M if they contain cements conforming to ASTM C1157/C1157M.
      c. Supplementary Cementitious Materials:
         i. Ground Granulated Blast Furnace Slag: ASTM C989/C989M - Grade 100 or 120.
         ii. Silica Fume: ASTM C1240/C1240M

iii. Fly Ash: ASTM C618/C618M - Type F

d. The proposed mix may contain Supplementary Cementitious Materials in the following proportions:
   i. Ground Granulated Blast Furnace Slag - No greater than 40% of the total by weight.
   ii. Fly Ash - No greater than 25% of the total by weight.
   iii. Fly Ash + Slag + Silica Fume – No greater than 50% of the total by weight.
   iv. Fly Ash + Silica Fume – No greater than 35% of the total by weight.

4. Entrained air content of concrete: 7% ± 1.0%.
5. Admixtures:
   a. Low Range Water Reducer: MasterPozzolith 210 by BASF; WRDA with HYCOL by W.R. Grace & Company; or equivalent meeting ASTM C494/C494M Type A.
   b. High Range Water Reducer (superplasticiser): Rheobuild 1000 or Glenium 3000 NS by BASF; Daracem 100 or ADVA 140M by W.R. Grace & Company; or equivalent meeting ASTM C494/C494M Type F.
   c. Air entraining agent: MasterAir AE 200 by Master Builders, DAREX II AEA by W.R. Grace & Company; or equivalent meeting ASTM C260/C260M.
   d. Water reducing-retarding agents: for use when ambient temperature is above 70°F, replace water reducing agent in whole or in part with water reducing-retarding agent meeting ASTM C494 Type D. Use amounts to produce concrete with a set time equal to that at 70°F without the retarder.
   e. Non-corrosive non-chloride accelerator: Pozzutec 20+ by BASF; Polarset by W. R. Grace; or equivalent meeting ASTM C494 Type C or E.
   f. Not permitted: Calcium chloride, thiocyanates or admixtures containing chloride ions.
6. Coarse aggregate shall consist of a well graded crushed stone or a washed gravel conforming to the requirements of ASTM C33/C33M and the following requirements:

	PERCENT PASSING			
SIEVE	NO. 8 (3/8”)	NO. 67 (3/4”)	NO. 57 (1”)	NO. 467 (1 1/2”)
1-½ inch	-	-	100	95-100
1 inch	-	100	95-100	
¾ inch	-	90-100	-	35-70
½ inch	100	-	25-60	
3/8 inch	85-100	20-55	-	10-30
No. 4	10-30	0-10	0-10	0-5
No. 8	0-10	0-5	0-5	
No. 16	0-5	-	-	
No. 50		-	-	

7. Fine aggregate shall consist of washed inert natural sand, free from mineral or other coatings, soft particles, clay, loam, organic or other deleterious materials conforming to the requirements of ASTM C33/C33M and the following requirements:

SIEVE NO.	PERCENT PASSING
4	95 to 100
8	80 to 100
16	50 to 85
30	25 to 60
50	5 to 30
100	0 to 10

8. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116

B. Reinforcing steel:
   1. Bars: ASTM A615/A615M Grade 60; deformed new materials. Cold-bent in accordance with CRSI 10MSP
   2. Welded wire fabric: ASTM A1064/A1064M. Flat sheets are required, rolls are not permitted
   3. Tie wire: ASTM A82/A82M, annealed.
   4. Supports: Use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

C. Prestressing Tendons
   1. All tendons shall comply with ACI 423.7.
   2. Prestressing Strand: ASTM A416, Grade 270, 7-wire, low-relaxation, 0.6-inch-diameter strand with corrosion inhibitor conforming to ACI 423.7, with tendon sheathing.
   3. Post-Tensioning Coating: Compound with friction-reducing, moisture-displacing, and corrosion-inhibiting properties; chemically stable and nonreactive with prestressing steel, nonprestressed reinforcement, sheathing material, and concrete.
   4. Tendon Sheathing:
      a. Virgin high-density polyethylene or polypropylene with a minimum thickness of 50 mils.
      b. Continuous over the length of tendon to provide watertight encapsulation of strand.
      c. Sheathing Repair Tape: Elastic, self-adhesive, moisture proof tape with minimum width of 2 inches (50 mm), in contrasting color to tendon sheathing; nonreactive with sheathing, coating, or prestressing steel.
   5. Anchorage Device and Coupler Assembly:

a. Assembly of strand, wedges, and anchorage device or coupler complying with static and fatigue testing requirements and capable of developing 95 percent of actual breaking strength of strand.
b. Anchorage devices and coupler assemblies shall be fully-encapsulated with either plastic or epoxy coating.

6. Encapsulation System: Watertight encapsulation of prestressing strand consisting of the following:
   a. Wedge-Cavity Caps: Attached to anchorages with a positive mechanical connection and completely filled with post-tensioning coating.
   b. Sleeves: Attached to anchorage device with positive mechanical connection; overlapped a minimum of 4 inches with sheathing and completely filled with post-tensioning coating.
   c. The encapsulation system shall meet the hydrostatic pressure testing requirements of ACI 423.7, except with a hydrostatic pressure of 10 psi, instead of the specified 1.25 psi.

D. Plates and inserts:
   1. Plates:
      a. Steel: ASTM A36/A36M. Hot dipped galvanized in accordance with ASTM A123/A123M
      b. Stainless steel: ASTM A666. AISI Type 316 stainless steel.
   2. Headed Studs:
      a. Steel: ASTM A108, Grades 1010 through 1020, cold finished, Type A or B (AWS D1.1/D1.1M), with arc shields and with the minimum mechanical properties shown in Table 3.2.3 in PCI MNL 116.
      b. Stainless Steel: ASTM A276 and with the minimum mechanical properties shown in Table 3.2.3 in PCI MNL 116.
   3. Stainless Steel Bolts and Studs: ASTM F593 and ASTM F594, Alloy Group 2 (Type 316) hex-head bolts and studs with stainless steel nuts and flat, stainless steel washers.
   4. Deformed-Steel Wire or Bar Anchors: ASTM A1064/A1064M or ASTM A706/A 706M
   5. Erection Accessories: Provide steel plates and brackets, clips, hangers, high density plastic shims, and other accessories required to install precast concrete members.
   6. Other inserts provided by others:
      a. Pressure Relief Valves: as specified in Section 03300 Cast-In-Place Concrete
      b. Pipe Sleeves: as specified in Section 15092 Pipe Sleeves and Seals
      c. Sluice Gate Frames: as specified in Section 15126 Sluice Gates
      d. Conduit: as specified in Section 16050 Basic Materials And Methods

E. Bearing Pads - Provide one of the following bearing pads for structural precast concrete members as recommended by Precast Concrete Tank Supplier for application:
   1. Elastomeric Pads:
      a. AASHTO M251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer.

b. Molded to size or cut from a molded sheet.
c. Surface hardness of 50 to 70 Shore A durometer according to ASTM D2240,
d. Minimum tensile strength - 2250 psi per ASTM D412.

2. Random Oriented, Fiber Reinforced Elastomeric Pads:
a. Preformed, randomly oriented synthetic fibers set in elastomer.
b. Surface hardness of 70 to 90 Shore A durometer according to ASTM D2240.
c. Capable of supporting a compressive stress of 3000 psi with no cracking, splitting or delaminating in the internal portions of the pad.

3. High Density Plastic: Multimonomer, nonleaching, plastic strip capable of supporting loads with no visible overall expansion.

F. Forms:
1. Forms for manufacturing precast concrete products shall be of the type and design consistent with industry standards and practices.
2. Forms shall be constructed so that the forces and vibrations to which the forms will be subjected can cause no product damage
3. Forms shall be capable of consistently providing uniform products and dimensions.
4. Forms shall be mortar tight, of sufficient strength to withstand pressures due to concrete placement and vibration operations and temperature changes, and for prestressing and detensioning operations.
5. Coat contact surfaces of forms with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
6. Maintain forms to provide completed structural precast concrete members of shapes, lines, and dimensions within fabrication tolerances specified.
7. Edge and Corner Treatment: Provide ¾ inch chamfers at all exposed corners and edges.
8. Form Liner – specified in Specification Section 03300 “Cast-In-Place Concrete”.

G. Grout:
1. Specified in Specification Section 03640 “Non-Shrink Grout”.
2. Provide admixtures to the grout mix to prevent bleeding and settlement. Sika Intraplast-N by Sika Corporation or equal.

H. Joints:
1. Joint Filler
a. For non-moving joints: ASTM C 920, Type S, Grade NS, Class 35 one-part polyurethane, elastomeric sealant, for sealing precast panel joints and minor cracks. Sikaflex 1a+ by Sika Corporation or equal
b. For moving joints: ASTM C 920, Type S, Grade NS, Class 100/20 low-modulus, high-performance, one-part polyurethane-based, elastomeric sealant, for sealing precast panel joints subject to movement. Sikaflex 15 LM by Sika Corporation or equal

2. Joint Sealants (at intersection of walls and base slab)

a. Interior joint: Liquid applied urethane coating that will provide a flexible elastomeric lining. Apply 1 coat at 100 mil DFT. CIM 1000 by C.I.M Industries or equal.
b. Exterior joint: Liquid applied coal tar coating. Apply 1 coat at 25 mil DFT. Cooper Black No. 760 by Coopers Creek Chemical Corporation

I. Concrete Repair Materials:
1. Patching Mortar: 1 part of a mixture of white and grey Type II portland cement to 2.5 parts of damp loose sand. Cement type to match substrate.
2. Epoxy Adhesive:
a. Two or three part water based epoxy bonding agent with cementitious components
b. Acceptable products:
i. Armatec 110 Epocem by Sika Corporation
ii. Corr-Bond by Euclid Chemical Co.
iii. MasterEmaco P 124 by Master Builders
iv. Or equivalent
3. Repair of random cracks (dry – free of liquid or moisture):
a. 2-component, 100% solids, moisture-tolerant, low-viscosity, high-strength, multipurpose, epoxy resin adhesive.
b. Acceptable products:
i. Sikadur 35 Hi-Mod LV by Sika Corporation
ii. Eucopoxy Injection Resin by Euclid Chemical Co.
iii. MasterInject 1500 by Master Builders
iv. Or equivalent
4. Repair of random cracks (wet - presence of liquid or moisture):
a. Low viscosity polyurethane resin that expands and forms a closed cell foam when it comes in contact with water.
b. All cracks that are wet (either damp or leaking) at the time of repair shall be repaired with a material that is specifically intended for wet repair as recommended by the manufacturer.
c. Acceptable products:
i. SikaFix HH Hydrophilic by Sika Corporation
ii. Dural Aqua-Fil by Euclid Chemical Co.
iii. MasterInject 1210 IUG by Master Builders
iv. Or equivalent
5. Repair of excessive cracking:
a. Two component, 100% solids, moisture-tolerant, epoxy or urethane crack healer / penetrating sealer
b. Acceptable products:
i. Sikadur 55 SLV by Sika Corporation
ii. Euco Qwikstitch by Euclid Chemical Co.
iii. MasterSeal 370 by Master Builders
iv. Or equivalent
6. Repair of spalls, honeycombs areas and air voids and cementitious overlays:
a. Polymer modified, non-sag cementitious repair mortar with corrosion inhibitor.

b. Repair material shall include peastone for repairs of greater depth as required by the manufacturer. For repair areas involving depths generally in excess of three (3) inches, utilize a repair material suitable for the depth of repair.
c. Acceptable products:
   i. SikaTop 122 Plus or 123 Plus by Sika Corporation
   ii. Tamms Structural Mortar by Euclid Chemical Co.
   iii. MasterEmaco N 400 MasterEmaco N 400
   iv. Or equivalent

2.3 CAST-IN-PLACE CONCRETE

A. Cast-in-place concrete base slab materials, placing, finishing, curing and repairs shall be as specified in Sections 03300 and 03346.

PART 3 - EXECUTION

3.1 FABRICATION OF PRECAST UNITS

A. Cast-in Items:
   1. Coordinate the installation of all embedded items with the General Contractor.
   2. Fabricate hardware with sufficient anchorage and embedment to comply with design requirements.
   3. Accurately position for attachment of loose hardware and secure in place during precasting operations.
   4. Locate hardware where it does not affect position of main reinforcement or concrete placement.
   5. Weld headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4.

B. Reinforcing Steel:
   1. Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.
   2. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete.
   3. Accurately position, support, and secure reinforcing steel against displacement during concrete-placement and consolidation operations.
   4. Locate and support reinforcement by plastic tipped or corrosion resistant metal or plastic chairs, runners, bolsters, spacers, hangers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcing steel in place according to PCI MNL 116.
   5. Provide cover requirements as indicated herein. Arrange, space, and securely tie bars and bar supports to hold reinforcing steel in position while placing concrete.
   6. Install welded wire reinforcing steel in lengths as long as practicable. Lap adjoining pieces in accordance with ACI 350 and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.

C. Comply with requirements of PCI MNL 116 and of this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
D. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete members.
E. Place self-consolidating concrete with minimal vibration without dislocating or damaging reinforcing steel and built-in items, and minimize pour lines, honeycombing or entrapped air voids on surfaces. Use equipment and procedures complying with PCI MNL 116.
F. Comply with PCI MNL 116 procedures for hot and cold-weather concrete placement.
G. Identify pickup points of precast concrete members and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast concrete member on a surface that will not show in finished structure.
H. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using live steam or radiant heat and moisture. Cure members until compressive strength is high enough to ensure that stripping does not have an effect on the performance of final product.
I. Fabricate structural precast concrete members of shapes, lines and dimensions indicated, so each finished member complies with PCI MNL 135 product tolerances as well as position tolerances for cast-in items.

3.2 PRODUCTION, CURING, FINISHING, REPAIRS AND STORAGE

A. Production, curing and storage of the precast units shall conform to the provisions of the NPCA Quality Control Manual For Precast and Prestressed Concrete Plants.
B. Production:
    1. Each precast concrete unit shall be an integral placement without any construction or cold joints.
    2. Structures shall be fabricated from the minimum number of precast sections in order to minimize the number of joints. Joints shall be located penetrations do not intersect joints.
C. Curing:
    1. All precast concrete unit shall be cured by either:
        a. Moist curing (steam, ponding or application of burlap kept continuously wet)
        b. Covering the exposed surface with polyethylene sheets
        c. Covering the exposed concrete with membrane curing compounds
        d. Application of steam. This method may only be used after the initial set of the concrete.
    2. Alternate wetting and drying shall not be permitted
D. Finishing:
    1. Standard Grade: Normal plant-run finish produced in forms that impart a smooth finish to concrete. Surface holes smaller than 1/2 inch caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls are acceptable. Fill air holes greater than 1/4 inch in width that occur in high concentration (more than one per 2 square inches). Major or unsightly

imperfections, honeycombs, or structural defects are not permitted. Allowable joint offset limited to 1/8 inch.

E. Repairs of Defects at the Plant:
   1. Surface defects:
      a. Defects not impairing the functional use or expected life of a precast concrete product as determined by the Precast Concrete Tank Supplier Design Engineer shall be considered minor defects.
      b. Surface defects shall be repaired in accordance with Parts 3.4 and 3.5.
      c. All repairs shall be made and identified prior to shipment to the Project site.
   2. Structural defects:
      a. Defects in precast concrete products that may impair the functional use or the expected life of products as determined by the Precast Concrete Tank Supplier Design Engineer shall be considered major defects.
      b. All precast units with Structural defects that compromise the structural integrity of the unit shall be rejected and not delivered to the Project site.
      c. Structural defects that do not compromise the integrity of the unit shall be repaired in accordance with Parts 3.4 and 3.6.

F. Storage:
   1. Areas used for storage of products at the plant shall be firm enough and level enough to avoid causing damage to stored products.
   2. Products shall be stored on level surfaces in a manner that will minimize damage caused by uneven bearing, improperly located dunnage blocks, stacking products too high or difficulty in handling.

3.3 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle post-tensioning materials according to PTI-M10.3

B. All materials shall be inspected at the project site by the Precast Concrete Tank Supplier for shipping damage at the time of delivery. All damaged materials shall be replaced by the Precast Concrete Tank Supplier at no additional cost to the Owner.

C. Store precast concrete units at the project site to ensure against cracking, distortion, staining, or other physical damage, and so that markings are visible. Lift and support units at the designated lift points only.

D. All precast concrete units shall be placed on supports such that they are stored off the ground.

E. All precast concrete units shall be lifted using designated pick points and lifting inserts. Extreme caution shall be exercised so as not to damage the units during handling.

F. Prior to shipment, all precast products shall be inspected by Plant personnel to assure design conformance, all defects have been repaired and all units have proper identification. Products not conforming to requirements shall be clearly labeled and the defects noted on the inspection report. Only products conforming to the requirements shall be shipped.

G. Transportation:
   1. Precast concrete units shall be properly supported during transportation to minimize damage.

2. Transport units in a position consistent with their shapes in order to avoid excessive stresses that may cause damage. Unique shipping instructions or special stacking may be required for irregularly shaped pieces.
3. Do not transport units until they have been cured for a minimum of 5 days or have reached 75% of their 28 day design strength.

3.4 REPAIRS TO PRECAST CONCRETE SECTIONS (GENERAL)

A. Definitions:
   1. Honeycombed areas: Areas where voids are left in the concrete due to inadequate vibration and consolidation resulting in a failure of the mortar to effectively fill the spaces among coarse aggregate particles.
   2. Spalls: Concrete that has chipped, flaked, scaled or broken off from the surface of the concrete.
   3. Surface Defects: Those defects that affect the appearance of the finished concrete but do not affect the structural integrity.
   4. Structural Defects: Those defects that affect the appearance of the finished concrete and the structural integrity.

B. Surface Defects:
   1. Form tie holes
   2. Air voids (bugholes)larger than those specified for the required surface finish
   3. Honeycomb areas with a depth less than 1 inch
   4. Blisters
   5. Delaminations
   6. Crusting
   7. Visible construction joints, fins and burs
   8. Non-uniform concrete color and appearance
   9. Floors that are not level

C. Structural Defects:
   1. Random cracks
   2. Spalls
   3. Air voids (bugholes) and honeycombed areas with a depth greater than or equal to 1 inch

D. All repairs to precast concrete sections shall be at no additional cost to the Owner.

3.5 REPAIR OF SURFACE DEFECTS

A. Form Tie Holes: After cleaned and thoroughly dampened, apply grout paint and fill holes solid with patching mortar.

B. Air voids (bugholes): After cleaned and thoroughly dampened, apply grout paint and fill holes solid with patching mortar.

C. Honeycomb areas:
   1. All honeycombed areas shall be removed to sound concrete by means of hand chisels or pneumatic chipping hammers or hydrodemolition.
   2. Saw cut a 1 inch minimum square groove around the edges of the defective area perpendicular to the surfaces to serve as the boundary for concrete removal. Saw cut the edges perpendicular to the surface. No feather-edges shall be allowed.

3. Remove all loose aggregate paste and debris and scrub clean. Thoroughly wet area to be repaired. Brush and scrub grout paint into the substrate of the area to be repaired.
4. Mix patching mortar using as little water as possible. Allow to stand with frequent manipulation of trowel to achieve stiffest consistency. Blend white and gray portland cement to achieve color match with surrounding concrete.
5. Prior to the set of grout paint (but after it has cast its water sheen), apply a stiff consistency of patching mortar to the area with a trowel. Leave patched surface slightly higher than surrounding surface. Do not finish for 1 hour minimum. Cure in same manner as adjacent concrete.

D. Blisters, delaminations and crusting: Repairs shall be similar to those for honeycomb areas. Depth of saw cut shall match the depth of the defective concrete.

E. Visible construction joints, fins and burrs: Remove by grinding until a smooth uniform surface is attained.

F. Concrete with an overall non-uniform color or appearance as determined by the Engineer shall be repaired with a complete cementitious overlay. Application of the overlay shall be in strict accordance with the manufacturer’s written instructions and recommendations.

3.6 REPAIR OF STRUCTURAL DEFECTS

A. Remove and replace or repair all structural defects in precast concrete sections.

B. Unless otherwise indicated, all concrete defects shall be repaired in accordance with the specific repair material manufacturer’s recommendations.

C. Random cracks:
1. Cleaning of cracks:
   a. Dry cracks: Crack or void must be dry at time of application. Remove all dust, debris or disintegrated material from cracks or voids by the use of oil-free compressed air or vacuuming. Cracks saturated with oil or grease must be chipped out to unsaturated concrete. "Vee" out cracks in horizontal surfaces slightly.
   b. Wet cracks: Clean the crack surface so that the crack can be located. If the crack is wide or high water flows are encountered, seal the surface of the crack with a surface sealing material as recommended by the manufacturer.
2. Where cracks extend through members and are accessible, seal bottom of crack which is to receive the repair material.
3. Patching of vertical wall or overhead cracks shall be accomplished in the same manner using a similar epoxy material of higher viscosity as recommended by the manufacturer.
4. Apply repair material in strict accordance with manufacturer's recommendations.

D. Spalls and honeycomb areas:
1. All weakened, damaged or disintegrated concrete shall be removed to sound concrete by means of hand chisels or pneumatic chipping hammers or hydrodemolition.

2. Saw cut a 1 inch minimum square groove around the edges of the defective area perpendicular to the surfaces to serve as the boundary for concrete removal. Saw cut the edges perpendicular to the surface. No feather-edges shall be allowed.
3. Remove defective concrete. If defective areas extend around reinforcing steel, chip to provide a clear space of at least 1 inch all around the bar. When pneumatic chipping hammers are used for removal of concrete around reinforcement, they shall not exceed 15 pounds.
4. Apply repair material in strict accordance with manufacturer's recommendations.

3.7 REPAIR OF PRECAST CONCRETE SECTIONS AT PROJECT SITE

A. Repair all defects in precast concrete sections at the project site prior to erecting tank in accordance with the requirements of this Section. All units that are damaged beyond repair as determined by the Engineer shall be removed from the project site and replaced at no additional cost to the Owner.
B. Repair of precast concrete units that are damaged during the shipping process shall be brought to the attention of the Precast Tank Supplier Design Engineer for resolution.

3.8 ERECTION OF CAST-IN-PLACE CONCRETE BASE SLABS

A. Erection of cast-in-place concrete base slabs shall be in accordance with Specification Sections 03300 “Cast-In-Place Concrete” and 03346 “Concrete Finishing, Curing and Repairs”.

3.9 ERECTION OF PRECAST STRUCTURES

A. Earthwork:
   1. General Contractor shall prepare base slab subgrade in accordance with Section 02200 “Earthwork.”
   2. Construction of base slabs shall not proceed until Independent Testing Agency has inspected and tested the subgrade and has verified that it has been prepared in accordance with the Contract Documents.
   3. General Contractor shall notify the Precast Concrete Tank Supplier in writing that the base slab subgrade has been prepared in accordance with the Contract Documents.
   4. Excavation shall include a minimum of four feet in plan beyond the perimeter of the approved exterior wall line.
B. Site access roads: General Contractor shall provide and maintain access to the tank locations as indicated below:
   1. Access roads shall be provided and maintained by the General Contractor throughout the installation of the base slab and precast tank structure.
   2. Access roads shall be cleared, leveled, stoned, and free of mud to provide 14-feet of vertical clearance and 14-feet of horizontal clearance.
   3. Access roads shall be capable of handling 80,000 pounds GVWR.
   4. Access roads shall support live loaded trucks operating under their own power.

5. Access roads shall allow drop-deck, spread axle combinations with 53-ft trailers. This includes a 60-foot-long sweep radius for corners and egress/regress to roadways.

C. Crane and concrete pump pads: General Contractor shall provide and maintain crane and concrete pump pads as indicated below:
   1. Pads shall be provided and maintained by the General Contractor.
   2. Pad shall be cleared, leveled, stoned, and free of mud.
   3. Tank Supplier shall communicate the required locations and sizes of the pads with the General Contractor.

D. Erect structural precast concrete level, plumb and square within the specified allowable erection tolerances of PCI MNL 135. Provide temporary bracing as required to maintain position, stability, and alignment of members until permanent connections are completed.

E. Install temporary plastic spacing shims as necessary as precast concrete members are being erected.

F. Use patching material to fill voids within recessed lifting devices flush with surface of adjacent precast concrete surfaces when recess is exposed.

G. Install post-tensioning tendons as soon as practical.

H. Grouting or Dry-Packing Connections and Joints:
   1. Grout open spaces at keyways, connections and joints where required or indicated with non-shrink, non-metallic grout.
   2. Retain flowable grout in place until it gains sufficient strength to support itself.
   3. Fill joints completely without seepage to other surfaces. Alternatively, pack spaces with stiff dry pack grout material, tamping until voids are completely filled.
   4. Promptly remove grout material from exposed surfaces before it hardens.

I. Field cutting of precast concrete members is not permitted without approval of the Precast Concrete Tank Supplier Design Engineer.

J. After erection is complete, all surface damages to the precast concrete units shall be properly repaired in accordance with this Section. All lifting inserts and holes shall be patched after final installation.

3.10 INSTALLATION AND STRESSING OF TENDONS

A. Inspect sheathing for damage before installing tendons. Repair damaged areas by restoring post tensioning coating and repairing or replacing tendon sheathing.
   1. Ensure that sheathing is watertight and there are no air voids.
   2. Follow tape repair procedures in PTI-M10.3.

B. Immediately remove and replace tendons that have damaged strand.

C. Stressing jacks and gauges shall be individually identified and calibrated to known standards at intervals not exceeding six months. Exercise care in handling stressing equipment to ensure that proper calibration is maintained.

D. Protection of Tendons:
   1. Do not expose tendons to electric ground currents, welding sparks, or temperatures that would degrade components.
   2. Prevent water from entering tendons during installation and stressing.

3. Provide weather protection to stressing-end anchorages if strand tails are not cut within 10 days of stressing the tendons. If stressing pockets are not able to be filled within ten days after tendon tail cutting, then temporary protection shall be provided.

E. Stress tendons only under supervision of a qualified post-tensioning superintendent.

F. Tendon stressing shall not begin until grout strength in the joints has attained at least 2,500 psi compressive strength.

G. Tendon stressing shall be performed in the sequence indicated on the Shop Drawings.

H. Mark and measure elongations according to PTI-M10.3. Measure elongations to closest 1/8-inch.

I. Tendon elongations shall be recorded and compared to the theoretical elongations indicated on the Shop Drawings. Prestressing will be considered acceptable if gage pressures shown on stressing record correspond to required stressing force and theoretical and measured elongations agree.

J. In the event that measured elongations exceed the tolerances indicated on the Shop Drawings, the Precast Tank Supplier Engineer shall be notified for resolution.

K. Strand tails may be cut once prestressing has been deemed acceptable.

L. Do not cut strand tails or cover anchorages of tendons where elongations exceed tolerances until all discrepancies have been resolved to the satisfaction of the Precast Tank Supplier Design Engineer.

M. Cut strand tails as soon as possible after approval of elongations.

N. The tendon tails shall be cut using hydraulic shears.

O. The strand length protruding beyond the wedges after cutting of the tendon tail shall be between 0.5-inch and 0.75-inch.

P. Wedge-cavity caps shall be installed within one working day after cutting tendon tails.

Q. Grouting of Bonded Tendons:

1. Execute grouting within 10 days after approval of tendon elongations. If grouting will not be performed within this time period, provide weather protection for the jacking access pockets.
2. Pump grout through ports into the ducts under pressure.
3. Temperature of concrete walls at time of grouting shall be above 35° F and shall be maintained above 35° F until field-cured 2-inch grout cubes reach a minimum of 800 psi.
4. Grout temperatures shall not be above 90° F during mixing and pumping.
5. Coat tendon anchor plates with epoxy coating after grouting is complete.

R. Patching:

1. Patch stressing pockets within one day of cutting strand tail. Clean inside surface of pocket to remove laitance or post-tensioning coating before installing patch material.
2. Finish patch material flush with adjacent concrete.

S. Cleaning:

1. Clean grout and any other deleterious material from concrete surfaces and adjacent materials immediately.

2. Clean exposed surfaces of precast concrete members after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
    a. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect adjacent work from staining or damage due to cleaning operations.
    b. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

3.11 REPAIRS TO COMPLETED TANK STRUCTURE

A. Repairs to the tank structure will be permitted provided the structural adequacy, serviceability and durability of the tank are not impaired.
B. Repair of precast concrete units that are damaged during the installation process shall be brought to the attention of the Precast Tank Supplier Design Engineer for resolution.
C. Repair all defects to the concrete surfaces in accordance with the requirements of this Section.
D. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A780.
E. Misaligned grout ports or connection ports in walkways may be repaired by either enlarging the existing port, or drilling a new one, as required. Coordinate with the Precast Concrete Tank Supplier Design Engineer to avoid internal reinforcing and hardware.
F. Additional repairs, if necessary, shall be performed as directed by the Precast Tank Supplier Design Engineer.

3.12 WATERTIGHTNESS (LEAKAGE) TESTING

A. General:
    1. Perform leakage tests on all precast concrete tanks prior to backfilling.
    2. All testing must be performed in the presence of the Engineer.
    3. Plug all pipes entering precast concrete tank and brace plugs to prevent blow out.
B. Leakage Tests:
    1. Perform leakage tests in accordance with Section 03305 "Concrete Testing" (unless otherwise indicated herein).
    2. Rate of filling the precast concrete tanks with water shall be at a uniform rate of not greater than 4.0 feet per hour.
    3. General Contractor shall be responsible for providing potable water for the tests.
    4. Leakage tests shall meet qualitative (Part 1) and quantitative criteria (Part 2).
    5. Qualitative criteria of leakage tests (Part 1):
        a. Part 1 of the leakage test consists of repairing concrete surfaces where leaks or wet areas are observed as indicated in Section 03305 "Concrete Testing".
    6. Quantitative criteria of leakage tests (Part 2):

a. Part 2 of the leakage test measures drops in water levels. Part 2 of the leakage test shall be scheduled for a period when the following 2 conditions will not occur:
   i. When the forecast is for a difference of more than 35°F between the ambient temperature readings at the times of the initial and final level measurements of the water surface.
   ii. When the weather forecast indicates the water surface could freeze before the test is completed.
b. Measurements of water levels:
   i. The vertical distance to the water surface shall be measured to within 1/16 inch from a fixed point on the containment structure above the water surface.
   ii. The initial measurement shall not be taken until at least 24 hours after the tank is completely filled.
   iii. Measurements shall be recorded at 24-hour intervals.
c. The test period shall be the theoretical time required to lower the water surface 3/8 inch, assuming a loss of water at the maximum allowable rate of 0.05% per 24 hour period. However, the test period shall not be longer than five days.
d. In uncovered containment structures, evaporation and precipitation shall be measured.
e. At the end of the test period, the water surface shall be recorded to within 1/16 inch at the location of the original measurements. The water temperature and precipitation measurements shall be recorded.
f. The change in water volume in the containment structure shall be calculated and corrected, if necessary, for evaporation, precipitation, and temperature. If the loss exceeds the required criterion (3/8 inch), the containment shall be considered to have failed Part 2 of the test.

7. Retesting:
   a. A restart of Part 2 shall be required when test measurements become unreliable due to unusual precipitation or other external factors.
   b. It shall be permitted to immediately retest a containment structure failing Part 2 of the leakage test when Part 1 is passed. If the containment structure fails the second test or if not immediately retested after the first test failure, the interior of the containment structure shall be observed for probable problem areas by the Tank Supplier. The containment structure shall only be retested after the probable problem areas are repaired.
   c. Containment structures shall be retested until they meet the required Part 1 and Part 2 criteria. Repairs shall be made before each retest.

END OF SECTION

The State of New Hampshire

DEPARTMENT OF ENVIRONMENTAL SERVICES

Clark B. Freise, Assistant Commissioner

February 15, 2017

Ms. Jennifer Perry
Town of Exeter
13 Newfields Road
Exeter, NH 03833

Via email: jperry@exeternh.gov

Subject: **Town of Exeter Public Works Complex**
PWS 0806020 – Proposed Water System Upgrades - **APPROVAL**
Exeter, NH

Dear Ms. Perry:

The New Hampshire Department of Environmental Services, Drinking Water and Groundwater Bureau (NHDES) has received and reviewed plans entitled "Exeter, New Hampshire Contract No. 1, Wastewater Treatment Facility Upgrades" prepared by Edward James Leonard of Wright-Pierce, Inc., dated December 16, 2016. The plans reviewed pertained to the planned upgrades to the potable water system serving the facility.

The scope of the proposed public water system improvements include installation of four hydropneumatic tanks totaling 632 gallons, expansion of distribution piping to new buildings supporting the proposed upgrades to the wastewater treatment system, and internal piping modifications to the system control building.

The proposed system modifications are hereby approved.

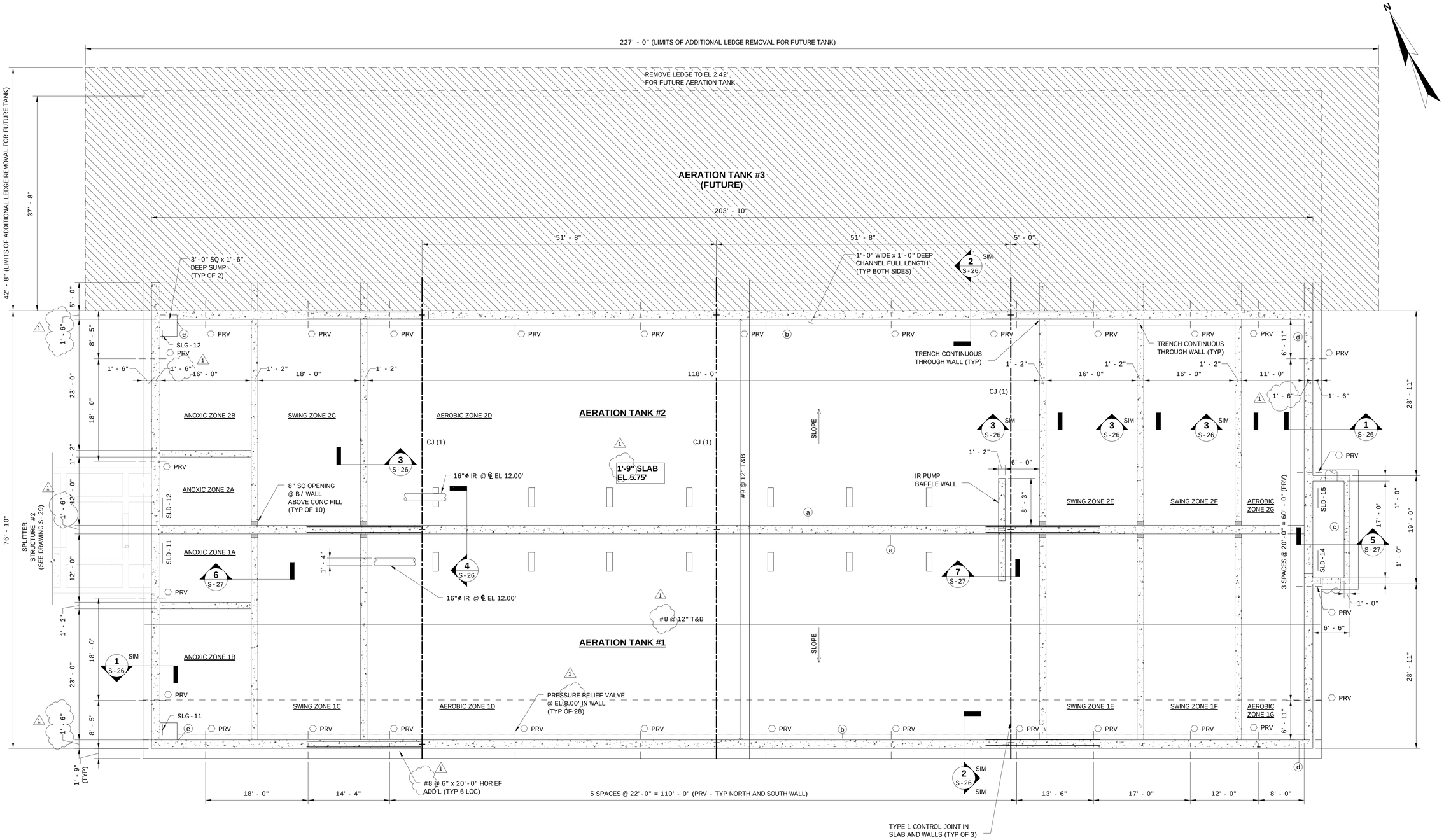
Please inform this office when the project is complete and the system modifications are in place so that we may update our database at the appropriate time.

Please feel free to call me at (603) 271-2953 or thomas.willis@des.nh.gov with any questions about this approval.

Sincerely,

Thomas H. Willis, Jr., PE
Small Systems Engineering and Design Review
Drinking and Groundwater Bureau

ec: Chris Berg, Wright-Pierce, Inc.



BASE PLAN

SCALE: 1/8" = 1'-0"

NOTES:

1. (#) INDICATES CONCRETE FILL ELEVATIONS AS FOLLOWS:
   (a) - EL 6.30', (b) - EL 5.90', (c) - EL 14.00' (d) - EL 5.75'
2. MAIN REINFORCING STEEL (OUTER LAYERS) RUNS IN THE NORTH - SOUTH DIRECTION
3. FOR GENERAL STRUCTURAL NOTES SEE DRAWING S - 1. FOR TYPICAL STRUCTURAL DETAILS SEE DRAWING S - 51 THROUGH S - 55.

NO	SUBMISSIONS/REVISIONS	APP'D	DATE
	ISSUED FOR BID	EJL	12/16
1	ADDENDUM #3	EJL	2/17
2			
3			
4			

DESIGNED BY: CAS
CAD/CORD: APC
CAD: TLS
CHECKED BY: DCS, EJL, JJP
DATE: 10 - 28 - 16
APPROVED BY: DCS, EJL
DATE: 12 - 16 - 16
PROJECT NO. 12883B

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EXETER, NEW HAMPSHIRE
CONTRACT NO. 1
WASTEWATER TREATMENT
FACILITY UPGRADE

AERATION TANKS
BASE PLAN

DRAWING
S - 24

2/15/2017 2:06:53 PM

AERATION TANK #3
(FUTURE)

203' - 10"

1' - 6" | 16' - 0" | 1' - 2" | 18' - 0" | 1' - 2" | 118' - 0" | 1' - 2" | 16' - 0" | 1' - 2" | 16' - 0" | 1' - 2" | 11' - 0" | 1' - 6"

1¾" x 3/16" ALUM GRATING

TOP MOUNTED ALUM GUARD (TERMINATE EACH SIDE OF OPERATOR)

SEE PARTIAL PLAN - STAIR ON THIS DRAWING

2 S-26

CJ (1)

T/ WALL EL 24.00' (TYP OF 4)

ALUM C12x8.274

SIDE MOUNTED ALUM GUARD

T/ WALL EL 24.10' (BELOW)

T/ WALL EL 24.35'

T/ WALL EL 24.10'

T/ CONC WALKWAY EL 28.00' (TYP OF 2 - SEE NOTE 4 ON THIS DRAWING)

3 S-26

3 EQ SPACES =13' - 1" (CONTROL JOINTS)

SIDE MOUNTED ALUM GUARD (TYP)

TYPE 2 CONTROL JOINT IN SLAB (TYP)

4 S-26

6 S-27

7 S-27

5 S-27

SIM

PROVIDE 5' - 6" LONG REMOVABLE SECTIONS OF ALUM GUARD @ DAVIT CRANE (TYP 4 LOC)

7' - 0" | 6' - 0"

5' - 6"

6' - 0"

3' - 0"

9"

EFFLUENT CHANNEL

DN

SPLITTER STRUCTURE #2 SEE DRAWING S-29

76' - 10"

36' - 2" | 6 EQ SPACES = 33' - 5" (CONTROL JOINTS) | 1' - 2" | 23' - 0" | 3' - 3" | 1' - 6"

25' - 6"

27' - 3"

15' - 9"

7' - 0"

1 S-26

25 EQ SPACES = 121' - 3" (CONTROL JOINTS)

10 EQ SPACES @ 5' - 3" = 52' - 6" (CONTROL JOINTS)

T/ WALL EL 23.50' (TYP OF 2)

T/ WALL EL 23.45' (TYP OF 2)

T/ WALL EL 25.00' (TYP OF 2)

T/ WALL EL 24.00' (TYP OF 2)

T/ WALL EL 24.00' (TYP OF 4)

26' - 5"

T/ WALL EL 28.00' (TYP PERIMETER WALL)

TOP MOUNTED ALUM GUARD (TERMINATE EACH SIDE OF GATE OPERATOR)

1¾" x 3/16" ALUM GRATING

AERATION TANK #2

AERATION TANK #1

TOP PLAN

SCALE: 1/8" = 1'-0"

5' - 0" | 3' - 0"

8 S-27

CONC LANDING PAD @ EL 24.67'

SIDE MOUNTED ALUM GUARD (TYP)

C12x8.274 (TYP OF 2)

1¾"x3/16" ALUM GRATING TREAD

3' - 0"

5T@ 10" = 4' - 2"

PARTIAL PLAN - STAIR

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

NOTES:

1. (a) INDICATES CONCRETE FILL ELEVATIONS AS FOLLOWS:
   (e) - EL 21.50', (f) - EL 21.25'
2. DESIGN WALKWAY AND GRATING LIVE LOAD = 100 PSF.
3. SEE DRAWING S-26 FOR PIPE SUPPORT DETAILS
4. ELECTRICAL CONDUIT SHALL NOT BE INSTALLED ALONG THE OUTER 12" EDGES OF EACH SIDE OF THE CONCRETE WALKWAYS.
5. FOR GENERAL STRUCTURAL NOTES, SEE DRAWING S-1.
   FOR TYPICAL STRUCTURAL DETAILS, SEE DRAWINGS S-51 THROUGH S-55.

NO	SUBMISSIONS/REVISIONS	APP'D	DATE
	ISSUED FOR BID	EJL	12/16
1	ADDENDUM #3	EJL	2/17
2			
3			
4			

DESIGNED BY CAS
CAD/COORD APC
CHK TLS
CHECKED BY DCS, EJL, JJP
DATE 10-28-16
APPROVED BY DCS, EJL
DATE 12-16-16
PROJECT NO. 12883B

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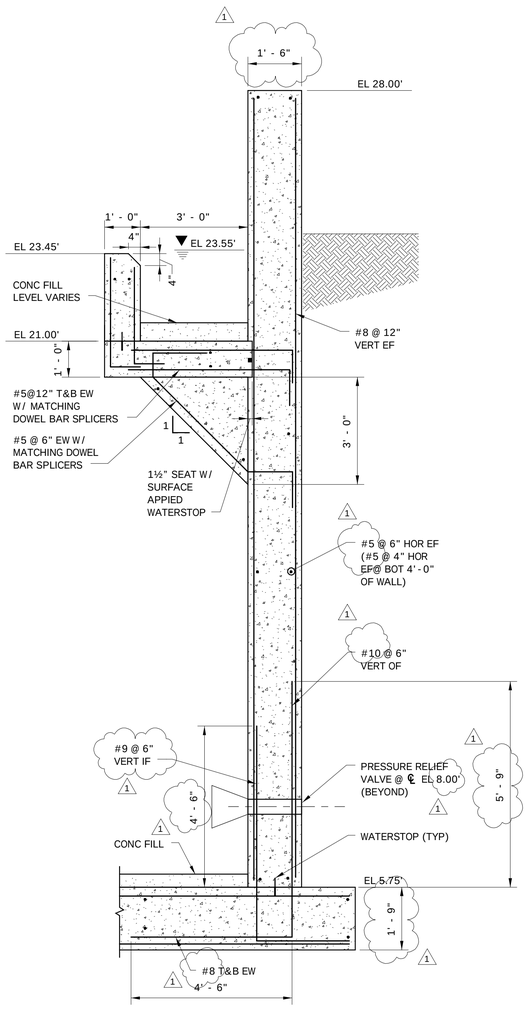
EXETER, NEW HAMPSHIRE
CONTRACT NO. 1
WASTEWATER TREATMENT
FACILITY UPGRADE

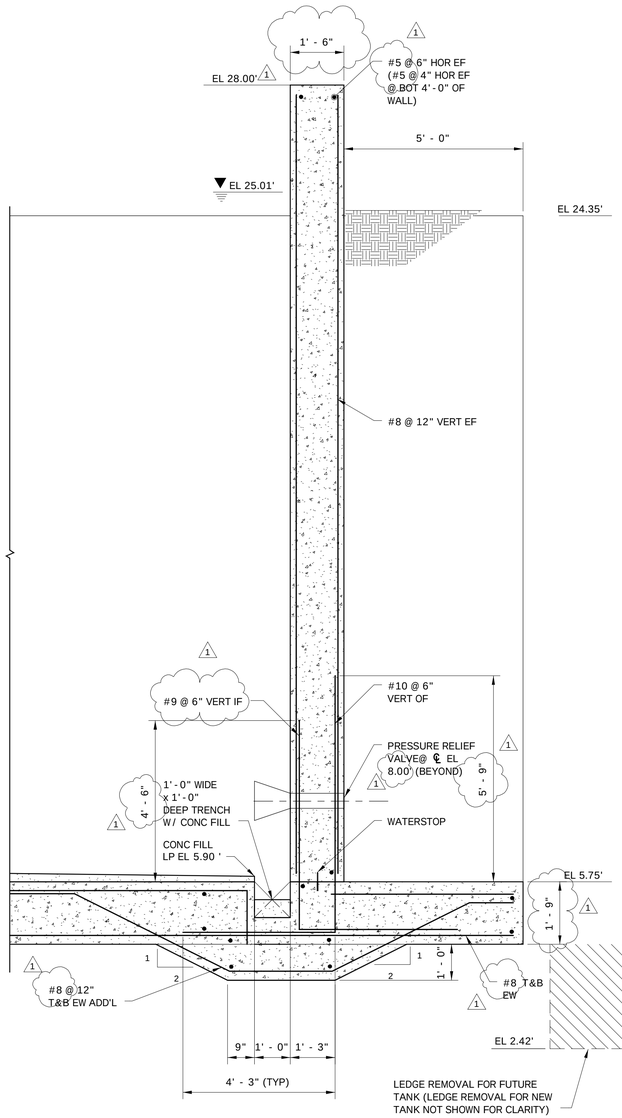
AERATION TANKS
TOP PLAN AND PARTIAL STAIR PLAN

DRAWING
S-25

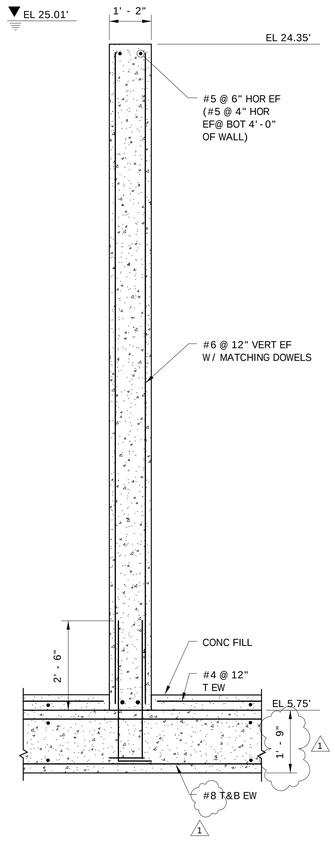
G:\dwgs\NH\Exeter\12883 - WWTF - Upgrade\12883 - CA\STR\Revit\12883 - SM - AerationTank.rvt



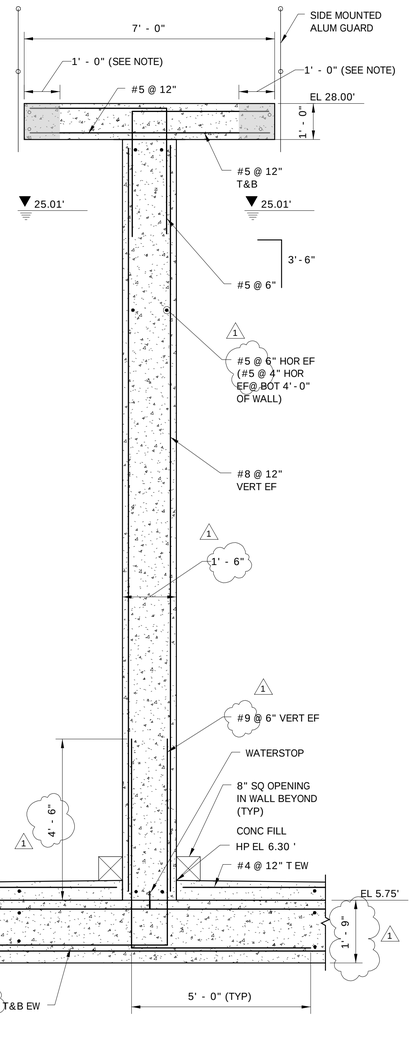
1 SECTION
S-24 / S-27 SCALE: 1/2" = 1'-0"



2 SECTION
S-24 / S-27 SCALE: 1/2" = 1'-0"



3 SECTION
S-24 / S-27 SCALE: 1/2" = 1'-0"



NOTE:
ELECTRICAL CONDUIT SHALL NOT BE
INSTALLED IN OUTER EDGES OF ELEVATED
CONCRETE WALKWAY AS INDICATED

4 SECTION
S-24 / S-27 SCALE: 1/2" = 1'-0"

NOTES:

1. FOR GENERAL STRUCTURAL NOTES SEE DRAWING S-1.
   FOR TYPICAL STRUCTURAL DETAILS SEE DRAWINGS S-51 THROUGH S-55.

NO	SUBMISSIONS / REVISIONS	APP'D	DATE
	ISSUED FOR BID	EJL	12/16
1	ADDENDUM #3	EJL	2/17
2			
3			
4			

DESIGNED BY CAS
CAD/COORD APC
CHECKED TLS
CHECKED BY DCS, EJL, JJP
DATE 10-28-16
APPROVED BY DCS, EJL
DATE 12-16-16
PROJECT NO. 12883B

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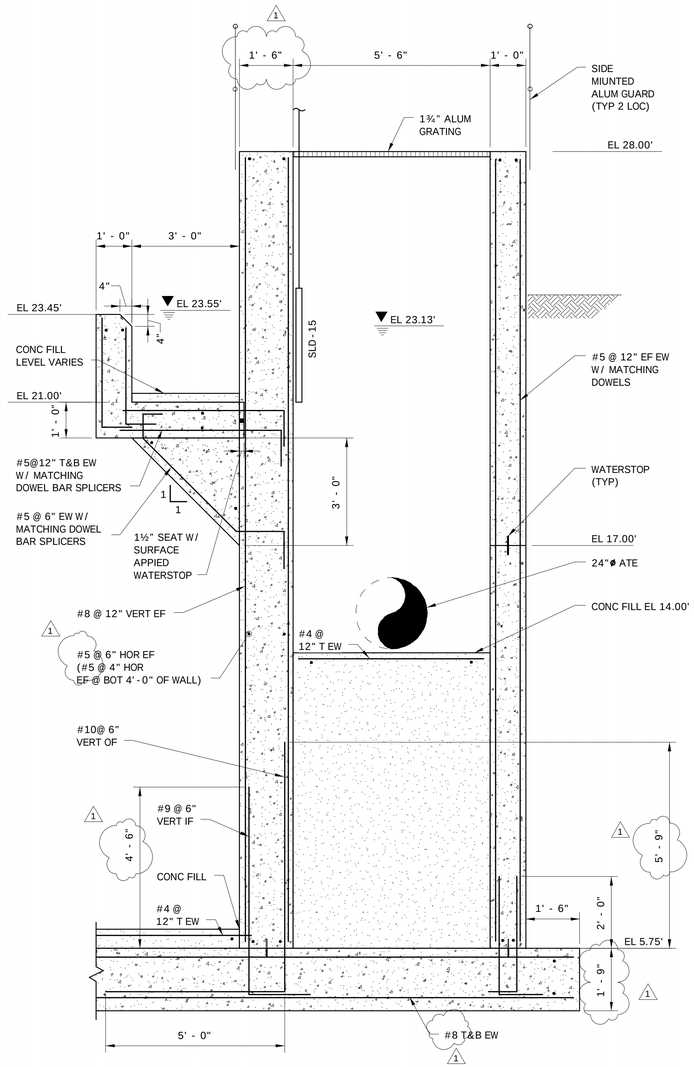
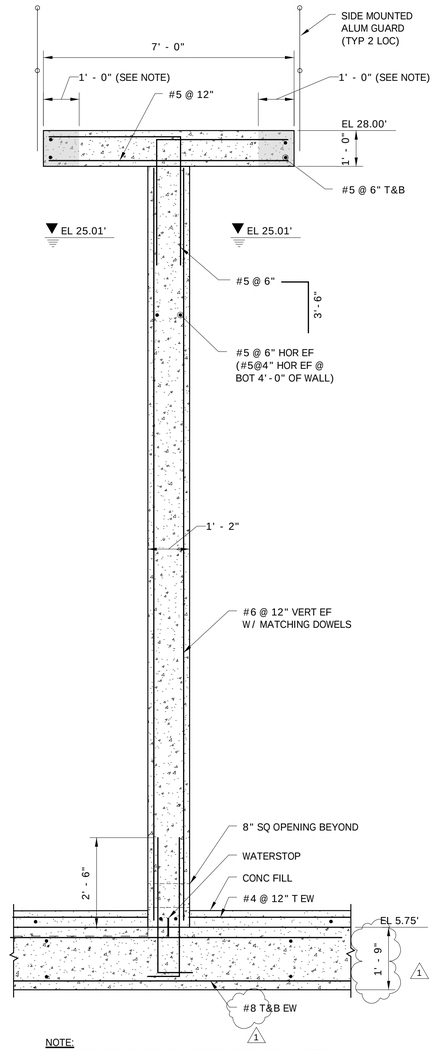
EXETER, NEW HAMPSHIRE
CONTRACT NO. 1
WASTEWATER TREATMENT
FACILITY UPGRADE

AERATION TANKS
SECTIONS AND DETAILS I

DRAWING
S-26

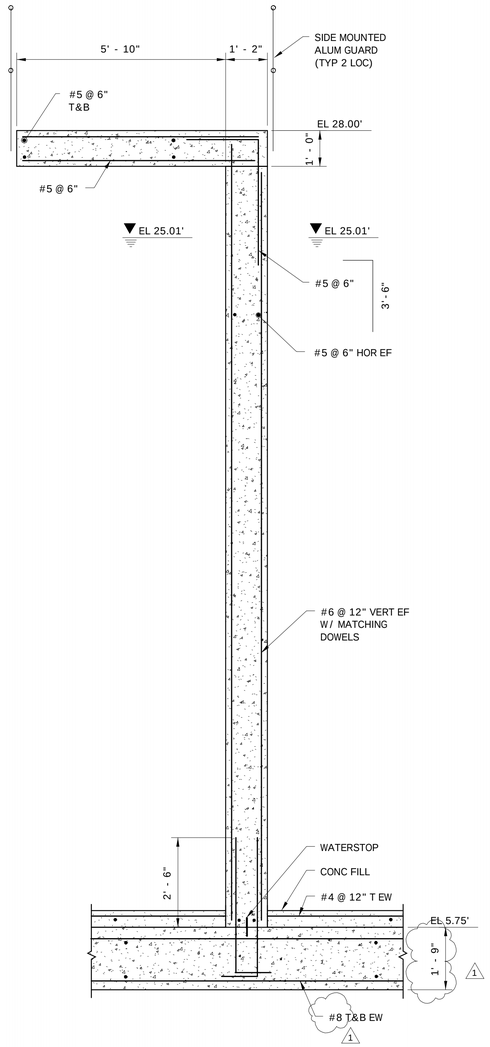


5 SECTION S-24 / S-27 SCALE: 1/2" = 1'-0"

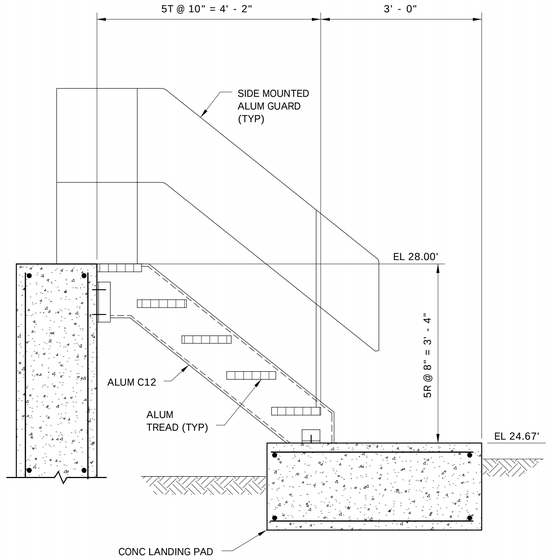


NOTE:
ELECTRICAL CONDUIT SHALL NOT BE INSTALLED IN OUTER EDGES OF ELEVATED CONCRETE WALKWAY AS INDICATED.

6 SECTION S-24 / S-27 SCALE: 1/2" = 1'-0"

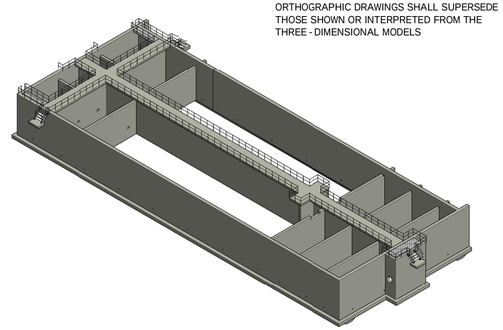


7 SECTION S-24 SCALE: 1/2" = 1'-0"



8 SECTION S-25 SCALE: 3/4" = 1'-0"

NOTE: THREE - DIMENSIONAL MODELS INTENDED TO SUPPLEMENT VISUALIZING DESIGN INTENT. IN THE EVENT OF DISCREPANCIES OR DIFFERENCES, DIMENSIONS AND DETAILS SHOWN IN TWO - DIMENSIONAL ORTHOGRAPHIC DRAWINGS SHALL SUPERSEDE THOSE SHOWN OR INTERPRETED FROM THE THREE - DIMENSIONAL MODELS



AERATION TANKS PERSPECTIVE
NTS

NOTES:

1. FOR GENERAL STRUCTURAL NOTES SEE DRAWING S - 1.
   FOR TYPICAL STRUCTURAL DETAILS SEE DRAWINGS S - 51 THROUGH S - 55.

NO	SUBMISSIONS / REVISIONS	APP'D	DATE
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1	ADDENDUM #3	EJL	2/17
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DESIGNED BY CAS
CAD/COORD APC
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EXETER, NEW HAMPSHIRE
CONTRACT NO. 1
WASTEWATER TREATMENT FACILITY UPGRADE

AERATION TANKS
SECTIONS AND DETAILS II

DRAWING
S - 27