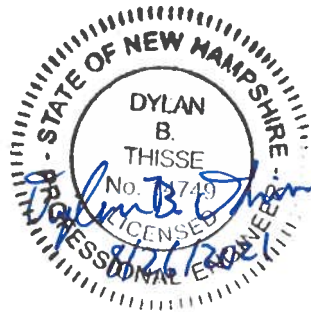


**ADDENDUM NO. 2**  
**TO**  
**BIDDING AND CONTRACT**  
**REQUIREMENTS AND SPECIFICATIONS**  
**FOR THE**  
**ROUTE 202A WATER MAIN EXTENSION AND WATER STORAGE TANK**  
**WP PROJECT NO. 14206**

8/26/2021



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# ROUTE 202A WATER MAIN EXTENSION AND WATER STORAGE TANK

## ADDENDUM NO. 2

### WP PROJECT NO. 14206

As a point of clarification, it should be understood that the Contract Documents govern all aspects of the project. Discussions held during the Pre-Bid Conference or over phone or email are informal and 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:

#### GENERAL

1. Bid receipt and opening will both be extended by seven calendar days from the dates and times in the original Advertisement for Bid. As a result the period for receiving questions will be adjusted to seven working days from the new date of bid opening. Another Addendum is anticipated to answer remaining questions.

#### SPECIFICATIONS

1. Specification Section 00020, Advertisement for Bid, 3. Bid Receipt Date & Time; **REPLACE** “No later than **September 1, 2021** by **5:00 PM.**” with “No later than **September 8, 2021** by **5:00 PM.**”
2. Specification Section 00020, Advertisement for Bid, 4. Bid Opening Date & Time; **REPLACE** “**September 2, 2021** at **2:30 PM.**” with “**September 9, 2021** at **2:30 PM.**”
3. Specification Section 13010, Factory-Coated Bolted Steel Tank For Water Storage, 1.2.D **DELETE** “D. AWWA D107-16 Composite Elevated Tanks for Water Storage”
4. Specification Section 13010, Factory-Coated Bolted Steel Tank For Water Storage, 3.1.C.4 **REPLACE** “inside” with “outside”.
5. Specification Section 13010, Factory-Coated Bolted Steel Tank For Water Storage, **REPLACE** in its entirety Specification Section 13010 with the Specification Section attached to this addendum (**Attachment 1**) to correct formatting in addition to those changes indicated in 3 and 4 above.

#### DRAWINGS

None

#### QUESTIONS AND ANSWERS

1. *Q: Does the project have federal funding? Are Davis-Bacon wage rates applicable?*  
A: The project is funded in part by the New Hampshire Drinking Water Groundwater Trust Fund and the MtBE Remediation Fund. Davis-Bacon wage rates do not apply to this project.

2. *Q: Article 3.1.C.4. of Section 13010 indicates “Ladder feet are to be provided inside the pedestal for mounting of a 24” cable tray.”. It is SAI suggestion to keep all cellular communication cables outside the pedestal. This allows cellular companies service their cables without having to access the pedestal interior. Also, with only a single double door in the pedestal, standard lifts will not be an option for future servicing of the cables.*

*A: Specifications have been corrected to indicate ladder feet are to be placed outside of pedestal for future cable tray installation. Conduit currently indicated to be located inside pedestal as part of antenna and solar power systems is to be installed inside pedestal.*

3. *Q: Item 14: MtBE Soil Sampling (STA. 100+00 to STA. 127+00) – Requesting allowance to be carried for this item. Vendors and subcontractors typically do not price the associated work by lump sum. This leaves an unusual amount of risk on the contractor for an atypical item.*

*A: An allowance will not be provided for Item No. 14- MtBE Soil Sampling (STA. 100+00 to STA. 127+00).*

**ATTACHMENTS FOLLOW:**

Attachment 1- Section 13010 Composite Elevated Factory Coated Bolted Steel Tank For Water Storage

**END OF ADDENDUM NO. 2**

Attachment 1- Section 13010 Composite  
Elevated Factory Coated Bolted Steel Tank For  
Water Storage



SECTION 13010COMPOSITE ELEVATED FACTORY COATED BOLTED STEEL TANK FOR WATER STORAGEPART 1 - GENERAL1.1 SCOPE OF WORK

- A. Furnish and erect a 256,000 gallon nominal, 247,000 gallons usable composite elevated glass-fused-to-steel water storage tank constructed of factory prefabricated glass-coated, bolt-together steel panels. The tank structure shall include; foundation, concrete support pedestal, floor, free span dome, prefabricated panels, insulated piping and valves with heat tracing, electrical systems, instrumentation systems, site work, disinfection, testing and other accessory components for a complete water storage tank as indicated on the Drawings and as specified here in.
- B. All required tank materials and principal appurtenances shall be supplied by the tank manufacturer, including solar powered mixer, unless otherwise noted.
- C. Tank structures and appurtenances shall be new and not previously used.
- D. Tanks shall be designed, manufactured, and glass coated in the United States of America, by a tank manufacturer specializing in the production of glass-coated, bolt-together steel tank systems. All structural steel utilized in the tank structure shall be produced and glass coated in the United States of America.
- E. Manufacturer is completely responsible for design of foundations and all structural elements of the tank, including floor slab, accounting for appurtenances, including mixer, as indicated in the Contract Documents. Design of foundation and structural elements is to meet applicable local, state, and federal codes and is to be certified by a professional engineer registered in the State of New Hampshire. Manufacturer's structural engineer is responsible for coordination with Owner's geotechnical engineer on applicable elements of structural design utilizing information contained in the geotechnical report. If additional geotechnical information, beyond that included in the geotechnical report, is needed, obtaining said additional geotechnical information will be the responsibility of the tank manufacturer at no additional cost to the Owner.
- F. The tank structures shall be supplied by Statewide Aquastore, Inc. located in East Syracuse, New York. No other manufacturer will be acceptable.

1.2 QUALITY ASSURANCE

Comply with the latest revision of the following codes, standards and specifications, except where more stringent requirements have been specified herein:

- A. ANSI/AWWA D103-19
- B. Tank steel panel materials, design, fabrication and erection shall conform to all pertinent sections of the AWWA Standard for Factory-Coated Bolted Carbon Steel Tanks for Water Storage (AWWA D103-19), unless otherwise specified herein.
- C. ANSI/NSF Standard 61

- D. All materials furnished by the tank manufacturer (which are in contact with the stored water), including vitreous glass-coated steel panels, joint sealant, encapsulated bolt heads, etc., shall be certified and listed by the National Sanitation Foundation (NSF) to meet ANSI/NSF Additive Standard No. 61. Tank as a complete system needs to be certified, certification of a coating type alone will not be sufficient to meet this requirement.
- E. ASTM
1. ASTM A36/A36M – Standard Specification for Carbon Structural Steel
  2. ASTM A992/A992M – Standard Specification for Structural Steel Shapes
  3. ASTM A1011/A1011M – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength
  4. ASTM B916-01 – Standard Test Method for Adherence of Porcelain Enamel Coatings to Sheet Metal
  5. ASTM C633-13 – Standard Test Method for Adhesion or Cohesion Strength of Thermal Spray Coatings
  6. ASTM A615/A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
  7. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
  8. ASTM C33 Specification for Concrete Aggregates
  9. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
  10. ASTM C618 Type F Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
  11. ASTM D1557 Test Method for Laboratory Compaction, Characteristics of Soil Using Modified Effort (56,000 Ft. - lbf/ft<sup>3</sup>) 2700 KN.M/M<sup>3</sup>)
- F. ACI
1. ACI 301 Specifications for Structural Concrete
  2. ACI 305 Hot Weather Concreting
  3. ACI 306 Cold Weather Concreting
  4. ACI 309R Guide for Consolidation of Concrete
  5. ACI 318 Building Code Requirements for Reinforced Concrete and Commentary
  6. ACI 350 Code Requirements for Environmental Engineering Concrete Structures and Commentary
- G. FACTORY MUTUAL (FM)  
Certification of annual review of quality control procedures of the manufacturing plant by FM.
- H. IBC Design  
Tanks will be designed such that Seismic, Wind, Snow, Ice and Roof Load design conform to the current state and local standards when specified.
- I. ISO 9001  
The tank manufacturer's Quality Assurance program shall be certified to comply with ISO 9001 standards.
- J. AWWA C652 Standard for Disinfection of Water-Storage Facilities
- K. NACE International

- L. Occupational Safety and Health Administration (OSHA)
- M. American Welding Society (AWS)
- N. American Institute of Steel Construction (AISC)

### 1.3 SUBMITTALS

- A. In accordance with Section 01340 Submittals.
- B. Independent Testing Laboratory qualifications and experience.
- C. Before executing any work in this Section, the tank manufacturer shall submit for documentation, job specific structural calculations for the tank, pedestal, support floor and foundation, general arrangement drawings and specifications for the tank structure, pedestal, support floor, foundation, joint sealant, and all appurtenances. The calculations shall be reviewed and the submittals noted above shall be sealed by a Professional Engineer licensed and registered in the state of New Hampshire.
- D. Submittals shall include certification that each applicable Section of AWWA D103-19 and all addendums is met. Any exceptions taken shall be noted with full explanation given for the deviation.
- E. NSF certification of the tank system and individual components (tank, sealant, anodes, bolts) shall be provided with submittals.
- F. Copy of Builder Certification Program, sponsored by the tank manufacturer, certifying experience of the proposed Builder.
- G. The tank manufacturer shall provide a standard Operation and Maintenance Manual upon approval of the drawings and four (4) weeks prior to completion of the tank installation.

### 1.4 WARRANTY

- A. If within a period of one (1) year from date of completion (or 14 months after delivery), the tank structure or any part thereof shall prove to be defective in material or workmanship upon examination by the manufacturer, the manufacturer will supply a replacement part, will repair, or allow a credit for same.
- B. The warranty shall be further extended with the use of a Manufacturer supplied Cathodic Protection system as follows: the glass coated product zone surfaces, that portion of the tank interior below the normal high elevation of the contained liquid will not corrode under normal and proper use, maintenance and operation during the period expiring on the earlier of (i) 60 months after liquid is first introduced into the tank or (ii) 62 months after shipment from the factory.

## PART 2 - PRODUCTS AND MATERIAL

### 2.1 GENERAL

- A. Tank structures shall be of vertical, cylindrical, flat bottom glass-coated, bolt-together steel construction.

## 2.2 DESIGN CRITERIA

- A. The concrete support pedestal dimensions shall be as determined by manufacturer, with the tank floor elevation of 560'-2".
- B. The factory coated glass-fused-to-steel; bolt together tank shall have a nominal diameter of 36.37 feet, with a nominal sidewall height (to roof eave) of 33.01 feet, or as determined by manufacturer.
- C. Tank capacity shall be a minimum of 247,000 gallons (usable, U.S. gallons) at 31.83 feet liquid depth. Design freeboard shall be 14.12 inches.
- D. Tank finished floor elevation shall be set at Elev. 560.17 feet.
- E. Tank overflow elevation shall be set at Elev. 592 feet.
- F. **DESIGN CRITERIA**
  - 1. Specific Gravity 1.0 (Minimum design shall be 1.0)
  - 2. Net allowable soil bearing capacity 4,000 psf (per Geotechnical report)
  - 3. Seismic Design
    - a. Design per the IBC 2015
    - b. Map Spectral Response (per Geotechnical report & IBC 2015)
      - i.  $S_s = 0.280$
      - ii.  $S_1 = 0.084$
    - c. Importance Factor (IE) 1.5 based on Category IV (Use Group III)
    - d. Site Class D (per Geotechnical report)
    - e. Long Period Transition Period 6 (TL)
  - 4. Snow load
    - a. Ground Snow Load 70 PSF.
    - b. Snow Load Importance Factor:  $I_s=1.2$
    - c. Thermal Factor ( $C_t$ ) = 1.2
    - d. Snow Exposure Factor:  $C_e=1.0$
  - 5. Wind Load (per AWWA D103-19 and ASCE 7-10)
    - a. Basic Wind Speed 130 mph.
    - b. Risk Category IV
    - c. Exposure Category C
  - 6. Load cases (include the self-weight of the structure in all of the following load combinations) shall be analyzed to determine the controlling stresses, as follows:
    - i. Normal operating conditions (full tank) with a full snow or ice load.
    - ii. Empty tank, no snow.
    - iii. Wind, or earthquake, on empty tank, full snow.
    - iv. Wind, or earthquake, on empty tank, snow on leeward side of dome.
    - v. Wind, or earthquake, on empty tank, no snow.
  - 7. Liquid - Drinking Water
  - 8. Tank Wall Color (outside) – To be determined by the Owner.
  - 9. Tank Wall Color (inside) - Cream Color
  - 10. Tank Site Coordinates (NAD83 NH State Plane in Feet): 291191.3 Northing, 1158373 Easting
  - 11. Frost Depth 4 feet.



## 2.3 MATERIALS

### A. PLATES AND SHEETS

1. Plates and sheets used in the construction of the tank shell, floor, or roof shall comply with the minimum standards of AWWA D103, latest edition. All steel shall be smelted and produced in the United States of America.
2. The annealing effect created from the glass coated firing process shall be considered in determining ultimate steel strength and yield strength. In no event shall a yield strength greater than 50,000 psi be utilized for calculations detailed in AWWA D103.
3. The tank manufacturer shall have and provide for the Engineer's review, upon request, published ultimate tensile and yield strength values for the proposed steel. In addition, per AWWA D103 the tank manufacturer shall have test results for the most recent two (2) year period to substantiate the use of Fu and Fy values used in the tank manufacturer's design calculations if the values exceed 70 percent of the published values.
4. Design requirements for mild strength steel shall be ASTM A-1011 Grade 30 with a maximum allowable tensile stress of 12,135 psi. High strength steel shall be ASTM A-1011 Grade 50 with a maximum allowable tensile stress of 21,167 psi.
5. When multiple vertical bolt line sheets and plates of ASTM A-1011 Grade 50 are used, the effective net section area shall not be taken as greater than 85% of the gross area. Multiple vertical bolt line sheets and plates shall be manufactured such that holes are staggered in the vertical bolt lines and that no two adjoining holes are in-line horizontally, except at the center of the sheet or plate.
6. When Rolled Structural Shapes are used, the material shall conform to minimum standards of ASTM A36 or ASTM A992.
7. Vertical tank seams shall be offset.
8. Minimum acceptable sheet thicknesses, manufacturer is to determine final sheet thickness required:
 

a. Foundation	0.1970
b. Course 7	0.1640
c. Course 6	0.1640
d. Course 5	0.1320
e. Course 4	0.1320
f. Course 3	0.1320
g. Course 2	0.1320
h. Course 1	0.1320

### B. HORIZONTAL WEB STIFFENERS

1. Stiffeners shall be of the "web truss" design, with extended tail to create multiple layers of stiffener, permitting wind loads to be distributed around the tank. Stiffeners shall be fabricated of steel with hot dipped galvanized or epoxy coating. Rolled angle stiffeners shall not be permitted for intermediate horizontal wind stiffeners.
2. Four (4) web stiffeners shall be provided at the top of courses 1, 2, 3 and 4 for future mounting of telecommunication equipment.

3. The storage tank has been designed with a minimum sheet thickness of 0.1320 inches and 4 horizontal web stiffeners for mounting purposes. Outside this project, future mounting of antennas or other equipment to a part of the storage tank, mounting ring, pedestal, or any other piece of the structure, other than that shown in the drawings, will require a design certified by a Professional Engineer certified in the State of New Hampshire. The design is to be submitted to the tank manufacturer and the City of Rochester for review and approval.

#### C. BOLT FASTENERS

1. Bolts used in tank lap joints shall be 1/2 13 UNC 2A rolled thread and shall meet the minimum requirements of AWWA D103, Section 4.2. Bolt material shall be SAE J429 Grade 5/ASTM A325 (1" and 1-1/4" bolt length) and heat treated to a tensile strength of 120,000 psi min and a proof load of 85,000 psi min. and having an allowable shear stress with threads excluded from the shear plane of 29,454 psi min.
2. SAE J429 Grade 8/ASTM A490 (bolts greater than 1-1/4") and heat treated to a tensile strength of 150,000 psi min and a proof load of 120,000 psi min. and having an allowable shear stress with threads excluded from the shear plane of 36,818 psi min.
3. The bolt finish shall be Zinc coated, mechanically deposited 2.0 mils minimum per ASTM B695.
4. The entire bolt head shall be encapsulated up to the splines on the shank with high impact polypropylene copolymer. Resin shall be stabilized with an ultraviolet light resistant material such that the color shall appear black. The bolt head encapsulation shall be certified to meet the ANSI/NSF Standard 61 for indirect additives.
5. All lap joint bolts shall be properly selected such that threaded portions will not be exposed in the "shear plane" between the sheets. In addition, bolt lengths shall be sized as to achieve a neat and uniform appearance. Excessive threads extending beyond the nut will not be permitted.
6. All lap joint bolts shall include a minimum of four (4) splines, 0.002 inches minimum, on the underside of the bolt head at the shank in order to resist rotation during torque wrench application.

#### D. SEALANTS

1. The lap joint sealant shall be a one component, moisture cured, polyurethane compound. The sealant shall meet applicable FDA Title 21 regulations, and be manufactured by a United States supplier as well as be suitable for contact with potable water and shall be certified to meet ANSI/NSF Additives Standard No. 61.
2. The sealant shall be used to seal lap joints, bolt connections and for sheet edge fillets. The sealant shall be approved by the Engineer. The sealant should have a curing rate at 73°F and 50% RH and be tack free in 6 to 8 hours. Final cure time should be 10 to 12 days. Sealer shall be resistant up to 100-ppm chlorine concentration during disinfection. Neoprene gaskets and tape type sealer shall not be used.
3. The sealant shall cure to a rubber like consistency, have excellent adhesion to the glass coating, low shrinkage, and be suitable for interior and exterior use.

## E. MANUFACTURING PROCESS

### 1. GLASS COATING

- a. The glass coating system shall be in full accordance with the requirements of AWWA D103 latest revision. Every batch of coating frits shall be individually tested in accordance with PE1 Test T-2 (Citric acid at room temperature). The coating process shall employ equipment that evenly coats the sheet surface and all four exposed sheet edges.

### 2. SURFACE PREPARATION

- a. Following the de-coiling and shearing process, sheets shall be steel grit blasted on both sides to the equivalent of SSPC PC-10 (near white metal blast cleaning). Sandblasting and chemical pickling of steel sheets is not acceptable. The surface anchor pattern shall be not less than 1.0 mils. (0.0001 inches). Sheets shall be evenly oiled on both sides to protect them from corrosion during fabrication.

### 3. CLEANING

- a. After fabrication and prior to application of the coating system, all sheets shall be thoroughly cleaned by caustic wash and hot water rinse followed immediately by hot air drying. Inspection of the sheets shall be made for traces of foreign matter, soil particles, grease or rust. Any such sheets shall be re-cleaned or grit-blasted to an acceptable level of quality.

### 4. COATING APPLICATION

- a. All sidewall sheets shall receive one coat of a catalytic nickel oxide glass pre-coat to both sides, followed by air-drying.
- b. A second coat of milled cobalt blue glass shall be made to both sides of the sheets and then dried.
- c. A final cover coat of milled glass shall then be applied to the inside of the sheet and the sheet edges. This milled glass shall be formulated with 18% to 22% titanium dioxide to produce a finish interior surface with optimum toughness and resistance to conditions normally found in potable water storage tanks.
- d. The sheets shall then be fired at a minimum temperature of 1500 °F in strict accordance with ISO 9001 quality process control procedures, including firing time, furnace humidity, temperature control, etc.
- e. The dry film interior coating thickness shall be 10-18 mils min. The dry film exterior coating thickness shall be 7-15 mils min. This is a three-coating process. The finished tank inside sidewall glass coating shall be white.
- f. The standard tank sidewall finished outside color shall be determined by the Owner.
- g. Finished outside colors shall not vary noticeably among tank panels. Off color panels will be rejected; replacement panels of matching color shall be supplied by the tank manufacturer.

### 5. SHEET EDGE COATING

- a. After initial sheet preparation and prior to sheet glassing, all four (4) exposed continuous sheet edges for each specific sheet radii shall be mechanically rounded in profile resulting in an optimized radius and adhere to The Porcelain Enameling Institute's Technical Manual PEI-101.

- b. The sheet surface next to the edge must remain flat, post process, to prevent 'bulging' to less than 0.030 inches (0.79mm) relative to the flat, while being rolled. All (4) exposed sheet edges will then be directionally sprayed by nozzles, using an automated machine process, and coated with the same vitreous enamel glass coating as the sheet surface.
- c. Sheet edge encapsulation will have an enamel coating minimum DFT (dry film thickness) of 5 mils (127 microns). Coating adhesion shall be tested in accordance with ISO 28765 Class 2 or better. Sheet face and sheet edge must meet the same glass quality test. Rounded sheet edge encapsulation will not have exposed uncoated steel.
- d. The coating shall have a tensile strength of 1500 psi. Sealer or glass overspray as edge coating shall not be acceptable.

#### F. INSPECTION

- a. All coated sheets shall be inspected for mil thickness using an electronic dry film thickness gage with a valid calibration record. Test frequency shall be a minimum of every gage change and/or a minimum of every half hour.
- b. All sheets shall be measured for color using an electronic colorimeter with a valid calibration record. Test frequency shall be a minimum of every gage change and/or a minimum of every half hour. The color must fall within the specified tolerance or it shall be rejected.
- c. An electrical leak detection test shall be performed on the interior and exterior surface of each panel after fabrication. Inside wet sheet surfaces shall be inspected using a low voltage wet sponge holiday tester in accordance with ASTM D5162-91 Method A. HVST testing is not acceptable. The tester shall be used at a voltage of 67.5 volts (+/- 10 %) and set so the alarm is sounded if the electrical resistance of the glass coating falls below 125,000. The tester shall have a valid calibration record. The testing solution used to wet the sponge shall contain a low suds wetting agent added at a ratio of not more than ½ fluid oz. per gallon of water. Every sheet shall be 100% tested for holidays and any sheet with a discontinuity shall be rejected.
- d. All inside sheet surfaces shall be holiday free. A 1000 dry volt test shall not be acceptable as this is not recommended by ASTM for coating thicknesses less than 20.0 mils.
- e. Adherence of the glass coating to the tank steel shall be tested in accordance with ISO standards. Any sheet that has poor adherence will be rejected. Coating adhesion shall be tested in accordance with ISO 28765 Class 2 or better. The minimum frequency of testing for this shall be one sheet per gage lot run. Sheet face and sheet edge must meet the same glass quality test.
- f. Glass coating shall be tested for fishscale by placing the full size production sheets in an oven 400°F for one hour. The sheets will then be examined for signs of fishscale. Any sheet exhibiting fishscale shall be rejected and all sheets from that gage lot will be similarly tested. The minimum frequency of testing for this shall be five times per month.

- g. The tank manufacturer shall provide documentation of the above tests including mill reports and traceable documents, upon request.

#### G. FLOORS

1. The tank floor and pedestal floors shall be constructed of reinforced concrete as shown on contract drawings.
2. Reinforced concrete floors and all structural elements of the tank, shall be constructed in accordance with the design prepared by the tank manufacturer/pedestal designer and the contract drawings.
3. The tank floor design shall include an embedded glass-coated starter sheet ring per the manufacturer's design and in accordance with AWWA D103 section 13.4.
4. Provide a 4000 psi reinforced concrete floor slab on grade at the base of the pedestal support structure. The slab on grade shall be placed on compacted non-expansive select fill.
  - a. Provide expansion joint between the floor slab and support wall including all piping penetrating the floor.
  - b. The slab shall be sloped toward the overhead door for drainage. A floor or center drain can be installed if desired.
  - c. All fill shall be compacted to at least 95 percent of the Standard Proctor maximum dry density, ASTM D-698.
5. All piping or other penetrations through the tank concrete floor shall be specifically detailed with respect to special steel reinforcing requirements and shall be properly waterstopped.
  - a. Pipes or other items installed shall be provided with a welded waterstop along with bentonite and butyl waterstops.
6. The tank floor shall have a 45 mil polypropylene geomembrane liner installed after the tank has been constructed and before the initial fill is started.
  - a. Liner shall be secured with 3/8 x 2-inch HDG battens both on the interior tank perimeter and around any floor located pipe penetration. Battens shall be secured approximately every eight inches using 3/8 x 3-inch 304 SS wedge anchors.
  - b. Tank sealant shall be utilized between the concrete and liner under the battens and at the juncture of the concrete floor and tank sidewall.

#### H. ROOFS

1. Tank roof shall be furnished by the tank manufacturer and be constructed of triangular aluminum panels as shown on contract drawings.
2. Roofs shall be clear span and self-supporting. Center post supports are not permitted. Roof live loads and dead loads shall be carried by tank sidewalls, without additional support. A roof hatch, with a hinged gasketed cover and locking hasp, shall be provided near the outside tank ladder.
3. Roofs shall be manufactured and supplied from the same manufacturer as the tank.
4. ALUMINUM DOME ROOFS
  - a. Aluminum dome roofs shall be constructed of non-corrugated, triangular aluminum panels, which are sealed and firmly clamped in an interlocking manner within a fully triangulated aluminum space truss system of wide

flange extrusions, thus forming a dome structure. Fabric type flashing is not allowed.

- b. The dome shall be self supporting from the periphery structure with horizontal thrust contained by an integral tension ring. The entire structure shall be designed as a watertight system under all design loads and temperature conditions. The design shall include sealant to be completely encapsulated by applying it to the gusset covers inner circumference, beneath the gusset covers top closure plates.
- c. The top surface of the batten bars must be completely flush with the triangular panel surfaces so that no ponding of water occurs at cover joints.
- d. The walkway and handrail shall be constructed of aluminum.
- e. The roof manway opening shall be at least 30" square. The opening shall have a curb of at least 4" in height, and the cover shall have a downward overlap of at least 2". The manway shall be aluminum.
- f. Dome Materials:
  - i. Triangulated dome frame struts: 6061-T6 aluminum or 6005A-T61.
  - ii. Structural frame gussets: 6061-T6 aluminum, 0.3125 inch nominal thickness.
  - iii. Triangular closure panels: 0.050-inch nominal thickness, 3003-H16 aluminum Sheet.
  - iv. Perimeter tension/compression ring: 6061-T6 aluminum or 6005A-T61.
  - v. Fasteners: 7075-T73 anodized aluminum or Series 300 stainless steel.
  - vi. Sealant: Silicone by Pecora, General Electric Silpruf or equal and shall be resistant to UV.
  - vii. Gaskets: Silicone, General Electric SE-44/88 or equal. Gaskets must be 1/8" thickness minimum.
  - viii. Anchor Fasteners: Series 300 stainless steel.
  - ix. Dormers, doors, and hatches: 6061-T6, 5086-H34, 5052-H36, or 5052-H32 aluminum, 0.090-inch nominal thickness.

## I. APPURTENANCES

### 1. ROOF VENT

- a. A properly sized aluminum vent assembly in accordance with AWWA D103 shall be furnished and installed above the maximum water level. A curbed opening shall be provided at the apex of the dome. At maximum possible rate of water fill or withdrawal, the resulting interior pressure or vacuum will not exceed 0.5-inch water column. Maximum rate of fill is anticipated to be 1,250 gpm and maximum rate of draw is anticipated to be 2,700 gpm.
- b. Protection against birds and protection against ice plugging shall be provided. An insect screen shall be provided and designed to open should the screen become plugged by ice formation.
- c. The vent shall be constructed of aluminum such that the hood can be unbolted and used as a secondary roof access.

## 2. PIPE CONNECTIONS

- a. Where pipe connections are shown to pass through tank panels, they shall be field located, saw cut, (acetylene torch cutting or welding is not permitted), and utilize an interior and exterior flange assembly. Tank shell reinforcing shall comply with AWWA D103 latest edition. Sealer shall be applied on any cut panel edges or bolt connections.

## 3. OVERFLOW WEIR AND PIPING

- a. Overflow piping shall be constructed of irrigation grade seamless aluminum tubing. The overflow weir and piping shall be designed to carry the maximum design flow rate of 1,250 GPM. The piping shall be installed on the tank exterior as close to the sidewall as possible, pass down through the walkway and into the top of the support pedestal. The piping will continue down the inside of the pedestal and exit out through the pedestal wall terminating as shown on the contract drawings.

## 4. LADDERS

- a. Tank Ladder - An outside tank ladder shall be furnished and installed as shown on the contract drawings. Ladders shall be aluminum and utilize grooved, skid-resistant rungs.
- b. Interior Pedestal Ladder - An interior support pedestal ladder shall be furnished and installed from finished floor elevation inside the base of the support wall to the walkway access platform located below the tank.
- c. Perimeter Walkway Access Ladder – An exterior walkway access ladder shall be furnished and installed from the walkway access platform to the Perimeter Walkway.
- d. Safety cage and step-off platforms (step-off platforms shall be approximately every 30 feet) shall be fabricated of galvanized steel. Ladders shall be equipped with a hinged lockable entry device and a ladder safety system.

## 5. ACCESS DOORS

- a. Each tank shall be provided with one (1) 30-inch diameter bottom access door as shown on contract drawings per AWWA D103. The manhole opening shall be a minimum of 30 inches in diameter. The access door and tank shell reinforcing shall comply with AWWA D103 latest edition. A davit to hold the cover plate is required.
- b. A double 36" x 84" door shall be installed at the base of the pedestal to permit entry for equipment, and water utility supplies. The door is to have an active and inactive leaf with alarming contact placed on active leaf.
- c. A 3'-0" x 7'-0" pass door shall be installed at the top of the pedestal for entry to the exterior platform.

## 6. PERIMETER WALKWAY

- a. One 30" wide outside perimeter walkway shall be supplied and installed by the tank contractor as shown on the contract drawings.
- b. Walkway shall have 42" high handrail.
- c. Walkway materials exposed to weather shall be Mill Finished Aluminum (grating, angles, handrail etc.)
- d. Walkway fasteners shall be 304 stainless.

7. WALKWAY MATERIALS
  - a. Extruded shapes and bars – Alloy 6061-T6
  - b. Bolts, nuts, washers – 304 stainless steel
  - c. Concrete anchors – 304 stainless steel (for support arms from walkway to pedestal wall)
  - d. Grating – Aluminum serrated swage-locked grating
  - e. Nosing – Aluminum extruded reinforced profile with non-slips ribs
8. WALKWAY FABRICATION
  - a. Brackets will bolt directly to pedestal support wall using stainless steel anchors & fasteners.
  - b. Platform Sections where indicated will be shop assembled in sections.
  - c. Weld corners and seams continuously complying with AWS recommendations at exposed connections, grind exposed welds smooth and flush.
  - d. Finish – Aluminum walkway framing and treads to be mill finish.
  - e. Standards - Complies with OSHA codes.
  - f. Designed to support a superimposed live load of 60 PSF.
9. HANDRAIL MATERIALS
  - a. Posts and horizontals – 1-1/2” SCH 40 6061-T6 Aluminum pipe
  - b. Toe plate – 4” where required
  - c. All hardware – 304 stainless steel
  - d. Post base flanges – shall all be aluminum
  - e. Post spacing – Not to exceed 5’-6”
10. HANDRAIL FABRICATION
  - a. Handrail shall be provided on both sides of ladder.
  - b. All joints to be machine coped and continuously TIG welded and buffed to a smooth finish.
  - c. Finish – All handrails to be clear anodized after fabrication
  - d. Standards - Complied with OSHA codes
  - e. Designed for 200-pound loads or 50 pounds per square foot
11. PIPING INSIDE PEDESTAL
  - a. Inlet/outlet piping shall extend through the tank support floor and down the inside wall of the pedestal. Pipe that extends below the base slab and out through or under the pedestal foundation shall be encased in concrete. Piping shall be placed below the applicable frost level, where connections will be made to valves or yard piping
    - i. All piping inside pedestal shall be Ductile Iron.
    - ii. All piping cast into concrete floors and concrete pedestal walls is to be 316 Stainless Steel Sch 40.
    - iii. All piping inside the pedestal shall be heat traced and insulated, except the overflow piping. Overflow piping shall not be insulated or heat traced. See Section 15185 for Heat Tracing requirements. Heat tracing system to be provided by General Contractor and coordinated and approved by tank manufacturer.
    - iv. All piping inside the pedestal shall be insulated with minimum 3-inch TRYMER 2000 XP Polyisocyanurate Foam Insulation (or equal). Insulation shall have SARAN 540-CX Jacket (or equal).



- v. All piping supports are to be provided in accordance with Section 15094.

#### 12. IDENTIFICATION PLATE

- a. A manufacturer's nameplate shall list the tank serial number, tank diameter and height, maximum design capacity, intended storage use, and date of installation. The nameplate shall be affixed to the tank exterior sidewall at a location approximately 5' from grade elevation in a position of unobstructed view. A second nameplate shall be located close to the ladder at the bottom of the pedestal.

#### 13. PLASTIC ENCAPSULATED CAP

- a. High density co-polymer caps and sealant shall be utilized to cover the bolts, nuts, and washers exposed on the exterior sidewall of the tank.

#### 14. CATHODIC PROTECTION SYSTEM

- a. The cathodic protection system shall be designed to protect both the tank and the foundation rebar in concrete floors.
- b. The manufacturer shall design and supply a passive, cathodic protection system based upon information supplied by the Engineer or Owner. Design shall be by a licensed professional engineer.
- c. The anodes shall be floor mounted.
- d. The resistivity of the water to be stored in the tank will determine the type and number of anodes.

#### 15. LADDER FEET

- a. Ladder feet are to be provided on exterior of tank panels for future installation of 24" wide cable tray.

### J. WATER TANK ELECTRICAL REQUIREMENTS

- a. The Water Tank will have several electrical components, some requiring design by a professional engineer registered in the State of New Hampshire. Refer to the Drawings and the following Sections for further detail on the electrical components to be designed and incorporated into the Water Tank.
  - i. 13440 Instrumentation and Process Control
  - ii. 15185 Heat Tracing
  - iii. 15131 Solar Potable Water Tank Circulation Equipment
  - iv. 16000 Electrical
  - v. 16160 Cabinets and Enclosures

### K. TANK MIXING SYSTEM

- a. Refer to Section 15131.

### L. INTERIOR ENCLOSURE

- a. Wood framed, insulated, interior enclosure with doors is to be furnished and installed complete as indicated in Drawings and Specifications.
- b. See specifications:
  - i. 06100 Rough Carpentry
  - ii. 07213 Under Slab and Perimeter Insulation
  - iii. 07216 Mineral Wool Batt Insulation

#### M. PROPANE HEATING SYSTEM

- a. Propane heating system is to be furnished and installed complete, including full propane cylinders, as indicated in Drawings and Specifications.
- b. See specifications:
  - i. 15443 Propane Gas System
  - ii. 15400 Plumbing General
  - iii. 15401 Plumbing, Piping & Specialties

#### 2.4 PACKAGING, DELIVERY AND HANDLING

- A. All sheets that pass Factory Inspection and Quality Control checks shall be protected from damage prior to packing for shipment.
- B. Heavy paper or plastic foam sheets shall be placed between each panel to eliminate sheet-to-sheet abrasion during shipment.
- C. Individual stacks of panels will be wrapped in heavy waterproof cover and steel banded to special wood pallets built to the roll-radius of the tank panels. Shipment from the factory shall be by truck, exclusively hauling the tank components. This procedure minimizes contact or movement of finished panels during shipment.

### PART 3 - EXECUTION

#### 3.1 ERECTION

##### A. GENERAL

1. Supervisory personnel of the erection crew shall identify themselves to responsible personnel of the Engineer or Inspector upon initially entering the job site. Only trained and certified personnel will be allowed on site.
2. The crane used in the construction of the tank and pedestal is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 L Change 2, Obstruction Marking and Lighting, flags/red lights – Chapters 3 (Marked), 4, 5 (Red), and 12. Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, shall be reported immediately to (877)-487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, the same number shall be notified.
3. Concrete is to be tested in accordance with this Section, Section 01400, Section 03305, or tank manufacturer's requirements, whichever is more stringent, at the expense of the CONTRACTOR, and shall be conducted by an independent testing agency approved by the Engineer.
4. All materials testing for trial batches are to be paid for by the CONTRACTOR.
5. At a minimum, conform to manufacturer's instructions, ACI 306.1 and ACI 308.1 for curing of concrete in cold and hot weather.
6. Concrete testing shall be in accordance with ASTM C-31 and C-39 and tank manufacturer's requirements
7. Compaction testing for Earthwork shall be in accordance with this Section, Section 01400, Section 02200, and tank manufacturer's requirements,

whichever is more stringent, at the expense of the CONTRACTOR, and shall be conducted by an independent testing agency approved by the Engineer.

8. Owner reserves the right to periodically duplicate testing using Owner's independent testing agency for quality control purposes.

B. TANK FOUNDATION

1. The tank foundation and pedestal shall be built in accordance with the contract drawings and/or approved Shop Drawings prepared by the tank manufacturer/pedestal designer and approved by the Owner. Reinforced foundations, to support the pedestal and tank, shall be designed by a professional engineer licensed in the State of New Hampshire to safely sustain the structure and all code prescribed design live loads.
2. Tank floor leveling of the starter ring shall be required and the maximum differential elevation with the ring shall not exceed 1/8 inch, nor exceed 1/16 inch within any 10 feet of circumference.
3. A leveling plate assembly, consisting of two anchor rods welded to the pan assembly and a slotted plate shall be used to secure the starter ring, prior to encasement in concrete. Installation of the starter ring on concrete blocks or bricks, using shims for adjustment, is not permitted.
4. Place one butyl rubber elastomeric waterstop seal on the inside surface of the starter ring below the concrete floor line. Place one bentonite impregnated water seal below the butyl rubber seal. Install materials in accordance with manufacturer instructions.
5. Pedestal foundation design shall be based on the soil bearing capacity given by the engineer, as determined by geotechnical analysis performed by a licensed soils engineer. The cost of this investigation and analysis is not to be included in the bid price. The geotechnical report is included in Appendix A.

C. CONCRETE SUPPORT PEDESTAL

1. Design per IBC 2015. The support column for the composite elevated water storage tank shall be of jump-form reinforced concrete construction in accordance with ACI standards 318-14 and 371 R-16, and ASCE 7-10, as applicable.
2. Concrete
  - a. Compressive strength 4000 psi, minimum
  - b. Air Entrainment as required by ACI 318
  - c. Curing shall conform to ACI 318 and ACI 308.
  - d. Curing compounds shall be membrane forming or combination curing/surface hardening type conforming to ASTM C309.
  - e. Formwork design, installation and removal shall conform to the requirements of ACI 318 and the recommendations of ACI 347R.
  - f. Concrete finishing shall conform to Section 5.1.15 of ACI 371R-16. A beveled-edge rectangular pattern (the size of the 4' tall jump forms) shall be formed into the outer pedestal surface.
3. Openings - An opening shall be made at the base of the pedestal for a 6'-0" x 7'-0" double door. An opening shall be made near the top of the pedestal for a 3'-0"x7'-0" personnel door. Penetrations in pedestal are to be made for conduit and cable included with project as needed.

- a. The top door and double doors shall be Plyco Series 23 or equal, painted White. Doors shall be designed for Mortice Locks. Double door shall have a center plate.
  - b. Top door Mortice locks shall be Corbin Russwin ML2000 Series or Equal, Satin Stainless Steel Finish.
  - c. Top Door shall have "Passage" ML2010 or equal.
  - d. Double Door shall have "Entrance" ML2065 or equal.
4. Ladder feet are to be provided outside pedestal for mounting of a 24" wide cable tray.

D. FLOORS

1. Concrete floors shall be poured monolithically.
2. Penetrations through concrete tank floors for piping or other items shall be properly waterstopped. Pipes or other items installed shall be provided with a welded waterstop along with bentonite and butyl waterstops.

E. TANK STRUCTURE

1. Field erection of the glass-coated, bolted-steel structures and components shall be in strict accordance with the procedures established by manufacturer and performed by an authorized dealer of the tank manufacturer regularly engaged in erection of these tanks, using factory-trained certified erectors.
2. Only specialized erection jacks and building equipment developed and supplied by the tank manufacturer shall be used to erect the tanks.
3. Particular care shall be taken in handling and bolting of the glass-coated steel tank panels, appurtenances and members to avoid abrasion of the coating system. Prior to liquid test, all surface areas shall be visually inspected. Chips or scrapes in the glass coating shall be repaired per the tank manufacturer's recommended procedure.
4. An electrical leak test shall be performed during erection using a wet sponge nine-volt leak detection device. All electrical leak points found on the inside surface shall be repaired in accordance with manufacturers published touch-up procedures.
5. No backfill is to be placed against the pedestal walls without prior written approval of the tank manufacturer. Any backfill allowed shall be placed strictly in accordance with the instructions of the tank manufacturer.

3.2 FIELD TESTING

- A. Following completion of erection and cleaning of the tank, the structure shall be tested for liquid tightness by filling to its overflow elevation.
- B. Any leaks disclosed by this test shall be corrected by the manufacturer's representative in accordance with the manufacturer's recommendations.
- C. Water required for testing will be furnished and disposed of by the Owner following completion of tank erection. Labor and equipment necessary for hydrostatic tank testing shall be included in the contract price of the tank.

### 3.3 DISINFECTION

- A. The tank structure shall be disinfected at the time of testing by chlorination in accordance with AWWA C652-19, or latest revision, "Disinfection of Water Storage Facilities".
- B. Acceptable method of disinfection: Chlorination Method 1, 2 or 3 per AWWA C652-19.
- C. Acceptable form of chlorine for disinfection: Sodium Hypochlorite, as specified in AWWA C652-19.
- D. Disinfection shall not take place until the tank sealant is fully cured (10 to 12 days at 73°F and 50% relative humidity or equivalent).
- E. After disinfection is complete and prior to placing the tank into service, at least two (2) samples of water shall be taken from the tank 24-hours apart and submitted to a New Hampshire certified laboratory for total coliform analysis. Copies of all test results shall be submitted to the Owner. If results of the bacteriological tests are negative for coliform, the disinfection process will be considered complete and the tank may be placed into service. If test results are positive, the complete disinfection process shall be repeated. Repeated disinfection and sampling will be at the Contractor's expense. The Owner shall provide the Contractor, at no charge, a sufficient quantity of water to disinfect the tank once. Water required for repeated disinfection of the tank shall be purchased by the Contractor from the Owner at the current metered rate, or other agreeable pricing method.
- F. Prior to placing the tank into service, the Contractor shall determine the chlorine residual within the tank. If the residual is greater than 4.0 mg/l the tank must be partially drained and refilled until the chlorine residual level is 4.0 mg/l or less. Chlorine residual prior to placing the tank in service must be reported to the Owner and Engineer before the tank is placed online.
- G. The Contractor shall obtain approval of location(s) for discharging the heavily chlorinated water, which will result from the chlorination procedures. Great care shall be exercised in the selection of the rate of flow and the discharge points, in order to minimize complaints, and damage to public or private property.
- H. The heavily chlorinated water shall be suitably and thoroughly neutralized prior to disposal into the environment. In no case shall chlorinated or neutralized water be discharged directly into a water body. If necessary, state, federal, and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water. Contractor will be responsible for obtaining appropriate permits.

### 3.4 VOC TESTING

- A. Once the tank is filled, the Contractor shall collect a water sample representative of the volume within tank and have a certified laboratory perform an EPA Method 524.2 VOC test. Owner to receive test results on laboratory letterhead before tank is placed online.

3.5 INSPECTION

- A. Prior to the (1) year anniversary date of initial tank use the manufacturer's authorized representative shall make a visual inspection of the tank interior coating and appurtenances, tank exterior coating and appurtenances, and the immediate area surrounding the tank for evidence of leakage. A written summary of the inspection report will be filed with the tank Owner and the tank manufacturer.
- B. Water required for the inspection process will be furnished and disposed of by the Owner.

END OF SECTION