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STEEL WATER STORAGE TANKS/SINGLE PEDESTAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide steel water storage tank(s) as shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
 - 1. Documents affecting work under this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Division 1 - General Requirements of these Specifications.

1.2 SUBMITTALS

- A. Comply with pertinent provisions of Section 01 33 01.
- B. Submit:
 - 1. Certified mill test reports for the structural steel tank elements.
 - 2. Written report, at the conclusion of work, prepared by an inspection and testing agency certifying that the work was inspected in accordance with AWWA D100 "AWWA Standard for Welded Steel Tanks for Water Storage".
 - 3. Shop Drawings including complete details for fabrication and assembly of steel members certified by a registered structural engineer in the state having jurisdiction.
 - (a) Show design data;
 - (b) Include details of cuts, connections, holes, and other pertinent data;
 - (c) Indicate welds by AWS symbols, and show size, type, and length of weld;
 - (d) Provide setting drawings, templates, and directions for installing anchor bolts and other required anchors;
 - (e) Identify details by reference to sheet and detail number of the Drawings.
 - 4. Foundation plans and details certified by a registered structural engineer in the state having jurisdiction.
 - 5. Concrete reinforcing shop drawings.
 - 6. Paint product data:
 - (a) Material list of items to be provided.
 - (b) Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - (c) Color charts for selection of color by the Owner.
 - 7. Electrical equipment:
 - (a) Lighting fixtures.
 - (b) Aircraft warning light and photoelectric control.
 - (c) Lighting panel.

1.3 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Perform shop and field welding required in connection with the work of this Section in strict accordance with pertinent recommendations of the American Welding Society.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of Section 01 66 11.
- B. Delivery and storage:
 - 1. Deliver materials to the job site properly marked to identify the location for which they are intended.
 - 2. Use markings corresponding to markings shown on the approved Shop Drawings.
 - 3. Store in a manner to maintain identification and to prevent damage.
 - 4. Store paint materials in a safe, ventilated location.
 - 5. Remove oily rags, waste, etc. every day and do not allow to accumulate under any circumstances.
 - 6. Take every precaution to prevent spontaneous combustion.

1.5 WARRANTY

- A. Comply with SC-6.30.1 of the Supplementary Conditions, except: Guarantee the paint work of this Section for a period of 18 months from the date of acceptance of the work and final payment by the Owner.

PART 2 - PRODUCTS

2.1 TANK MATERIALS AND DESIGN

- A. Comply with AWWA D100.

2.2 SAFETY

- A. Provide ladders, ladder guards, railings, and access hatches conforming to Federal and local laws and regulations.
 - 1. Provide a climbing safety device similar to Saf-T-Climb, as manufactured by Miller by Honeywell or equal.
 - 2. Include notched climbing rails, mounting brackets, locking sleeves, and three (3) safety harnesses.
- B. For riser pipes 10-inch in diameter and larger, provide protective bars over the riser openings inside the tank.
- C. Provide railings or handholds at the center roof access hatch.

2.3 ACCESS HATCHES

- A. Set frames 6-inch above the surface of the roof at the opening.
 - 1. Fit with a solid watertight cover which overlaps the frames' opening and

2. extends at least 2 inches down around the frames.
2. Provide hinge at one side and a locking hasp.

2.4 ACCESS DOOR

- A. Provide one 36-inch by 80-inch access door with 1" steel threshold located in the base of the pedestal complete with a handle, drip cover, and dead bolt lock.
 1. Design specifically for use with the tank.
 2. Fabricate from steel plate with adequate stiffening.
 3. Do not use hollow metal doors or frames.
 4. Do not use a bulkhead type opening.

2.5 VENT AND OVERFLOW

- A. Provide 24-mesh non-corrodible screen for vent openings and overflow pipe openings to the outside.

2.6 PIPE AND PIPE FITTINGS

- A. Flanged joint ductile iron pipe and fittings:
 1. Pipe: Comply with ANSI A21.15, thickness Class 53 with pipe flanges faced and drilled to ANSI Class 125 standard template unless otherwise designated on the Drawings.
 2. Fittings: Comply with ANSI A21.10 or ANSI B16.1.
 3. Flange gaskets: 1/16-inch thick sheet rubber, full face type.
 4. Flange bolts, studs, and nuts: Use cadmium plated type complying with ANSI B16.1.
 5. Provide cement lining for all ductile iron pipes and pipe fittings complying with ANSI A21.4, standard thickness.
- B. Welded steel pipe and fittings:
 1. Pipe: Comply with ASTM A-53 and AP1-5L for black seamless and welded pipe.
 - (a) Pipe sizes 12-inch diameter and smaller: ASA Schedule 40 weight and wall thickness.
 - (b) Pipe sizes 14-inch and larger: ASA Standard weight and 0.375-inch wall thickness.
 2. Pipe flanges and fittings: Continuous weld type conforming to ANSI B16.5.
 3. Connections: Continuous butt weld type.
 - (a) Welding procedures: Conform to ANSI B31.1.
 - (b) Minimum yield strength of welded joints: 35,000 psi.
- C. Corporation stop:
 1. Provide 3/4-inch corporation stop with Mueller threaded inlet and I.P. threaded outlet, Mueller No. H-9996, or equal.

2.7 PIPE INSULATION

- A. Provide 1-inch thick expanded polyurethane preformed pipe insulation with corrugated aluminum jacket and stainless steel bands, and mastic seals.

2.8 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of

the Engineer.

2.9 FABRICATION

- A. Shop fabrication and assembly:
 - 1. Fabricate items of structural steel in accordance with AWWA D100 and as indicated on the approved Shop Drawings.
 - 2. Properly mark and match-mark materials for field assembly and for identification as to location for which intended.

2.10 PAINT MATERIALS

- A. Acceptable materials:
 - 1. The Painting Schedule in Part 3 of this Section is based, in general, on products of the Tnemec Company, Inc.
 - 2. Equal products of other manufacturers approved in advance by the Engineer, may be substituted in accordance with provisions of the Contract.
 - 3. Where products are proposed other than those specified by name and number in the Painting Schedule, provide under the product data submittal required by Article 1.2 of this Section a new painting schedule compiled in the same format used for the Painting Schedule included in this Section.
- B. Undercoats:
 - 1. Provide undercoat paint produced by the same manufacturer as the finish coat.
 - 2. Insofar as practicable, use undercoat and finish coat material as parts of a unified system of paint finish.
- C. Provide all paints and materials supplied by one manufacturer.

2.11 PAINT APPLICATION EQUIPMENT

- A. For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint, and as approved by the Engineer.

2.12 ELECTRICAL EQUIPMENT

- A. General:
 - 1. Provide complete electrical system as shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
 - 2. Comply with requirements of the National Electric Code (NEC), local government regulations, and local utility requirements.
- B. Conduit, fittings, and boxes:
 - 1. Provide rigid galvanized steel conduit complying with ANSI C80.1 and UL 6.
 - 2. Provide zinc coated cast fittings.
 - 3. Provide Crouse-Hinds "WCB" series, or equal, junction boxes.
 - (a) Weatherproof cast iron, hot-dipped galvanized body and cover.
 - (b) Stainless steel cover screws.
 - (c) Neoprene gaskets.
- C. Wiring:
 - 1. Provide type THHN/THWN copper conductors with 600 volt, nylon jacketed insulation.

2. Use copper wire only.
- D. Wiring devices:
1. Toggle switches:
 - (a) Comply with UL 20 requirements.
 - (b) Rated for 20 amperes.
 - (c) Federal specification grade switch.
 - (d) Provide gasketed weatherproof covers.
 2. Receptacles:
 - (a) Provide ground fault circuit interrupter type duplex convenience outlet.
 - (b) Rated for 20 amperes, NEMA 5-20R.
 - (c) Federal specification grade receptacle.
 - (d) Provide gasketed, snap, weatherproof covers.
- E. Lighting fixtures:
1. Provide Crouse-Hinds "Vaporgard" vapor-proof incandescent type fixture, or equal, to operate on 120 volts.
 2. Provide 100 watt incandescent lamps.
 3. Include Crouse-Hinds "Vaporgard" polycarbonate globe, or equal.
- F. Aircraft warning light:
1. Provide Crouse-Hinds No. 50021, or equal.
 2. Dual unit to operate on 120 volts.
 3. Provide lamps with average life of 8,000 hours.
 4. Provide Crouse-Hinds photoelectric control with "fail-safe" feature Type PCF, Cat. No. 70006 with flasher, or equal.
- G. Lighting panel:
1. Provide single phase, 3 wire 120/240 volt Hertz dead front load center panel with the following features:
 - (a) 100 ampere main breaker with 22,000 RMS amperes short circuit rating.
 - (b) Circuit breakers with ratings as shown on the Drawings.
 - (c) NEMA 3R enclosure.
- H. Ground rod:
1. Provide 5/8-inch diameter copper clad steel ground rod, 10 feet long.
- I. Utility company service entrance equipment:
1. Provide pedestal type metering equipment as shown on the Drawings.
 2. Comply with local utility company requirements for service entrance equipment.
 3. Provide grounding system in compliance with local utility requirements.
- J. Electrical service:
1. Provide necessary wiring and equipment for a complete electrical service as shown on the Drawings.
 2. Service to be 120/240 volt, single phase, three wire, 60 Hertz rated at 100 amperes.
 3. Provide transformer concrete pad in compliance with local utility requirements.

2.13 CATHODIC PROTECTION SYSTEM

- A. Furnish and install a cathodic protection system with automatic potential control to protect the interior surfaces of the reservoir similar to XL Anode Assembly/ Polatrol Control unit, as manufactured by CorrPro (no substitutions).
- B. Tank anode assemblies:
1. Provide silicon-chromium cast iron electrodes vertically suspended from

- the tank top with extensible, self-releasing elements.
 - 2. Design and install assemblies as a permanent, year-round system capable of withstanding tank ice without damage.
 - 3. Minimum service life: 10 years.
- C. Potential control unit:
 - 1. Maintain a D.C. current automatically at the optimum level necessary to prevent tank corrosion utilizing a reference electrode for control system feedback.
 - 2. Include a rectifier, transformer, control circuitry, meters, and operation selector.
 - 3. Operate on a 120 Volt, single phase, 60 Hertz alternating current.
 - 4. Mount control unit in a steel cabinet at the location shown on the Drawings.
 - 5. Provide electrical service to the control unit and electrical connections between the control unit and a junction box located three feet above the base of the tank adjacent to the access ladder.
 - 6. Furnish and install the number and type of electrical wires required for the cathodic protection system.

PART 3 - EXECUTION

3.1 TANK FOUNDATION

- A. Design tank foundation in accordance with AWWA D100 based on allowable soil bearing pressure and minimum depth determined by a soils testing agency.

3.2 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.3 ERECTION

- A. Comply with AWWA D100 except as may be modified herein.
- B. Surveys:
 - 1. Establish permanent benchmarks necessary for accurate erection of tank.
 - 2. Check elevations of concrete surfaces, and locations of anchor bolts and similar items, before erection proceeds.
- C. Field assembly:
 - 1. Set structural frames and plates accurately to the lines and elevations indicated.
 - 2. Align and adjust members before fastening permanently.
 - 3. Adjust as required to compensate for discrepancies in elevation and alignment.
 - 4. Install pipe and pipe insulation in accordance with manufacturer's recommendations.

3.4 FIELD QUALITY CONTROL

- A. Provide the services of an independent qualified testing and inspection agency,

approved by the Engineer for inspection of the fabrication of materials and the field welding work.

1. Inspect and test in accordance with AWWA D100, as amended herein.
- B. Replace defective welding.
- C. Perform tank leakage testing after completion of erection, painting, and disinfection.
 1. Provide all equipment and devices necessary to fill tank from Owner's water system.
 - (a) The Owner will provide water for initial leakage testing at no charge to the Contractor.
 2. Fill tank with water to the overflow level.
 3. Repair, repaint, and disinfect leaks and other defects discovered during testing.
 4. Retest by refilling the tank.
 - (a) Pay for water used to refill the tank at the Owner's regular water service rate.
- D. Provide operational testing for electrical devices.
- E. Test receptacles for correct polarity, proper, ground connection, and wiring faults.
- F. Measure and record resistance levels at ground rod.
 1. Measure in normally dry condition not less than 48 hours after rainfall.
 2. Isolate ground under test from other grounds.

3.5 PAINTING

- A. Paint all interior and exterior exposed metal surfaces in accordance with the requirements of AWWA Standard D102, latest edition, Standard for Painting Steel Water Storage Tanks, as amended herein.
- B. Clean all metal surfaces of mill scale and rust after fabrication and immediately prior to application of a full coat of primer paint.
 1. Shop cleaning of surfaces may be by blastcleaning or pickling.
 2. Field cleaning of surfaces shall be by blastcleaning.
- C. Apply paint coatings only on surfaces that are perfectly clean, smooth, and thoroughly dry.
- D. Apply paint coatings in accordance with SSPC Paint Application Specifications No. PA1 and manufacturer's recommendations.
- E. Paint color(s) shall be selected by the Owner.
- F. Paint the name of the Owner on two sides of the tank. Size of letters is defined in the attached sketch at the end of this Section.
- G. Tint each prime and finish coat differently for contrast to assure complete coverage of surfaces.
- H. Paint schedule:

	<u>Dry Film - mils</u>
1. Interior metal surfaces of water storage tank and other metal surfaces which will be in contact with water:	
(a) Comply with AWWA D102, Section 3.2, as amended herein.	
(b) Surface preparation: SSPC-SP10 Near White Metal Blast Cleaning	
(c) 1st coat: Series 140-1255 Pota-Pox Plus	4.0 - 5.0
(d) 2nd coat: Series 140-WH02 Pota-Pox Plus	<u>4.0 - 6.0</u>
	8.0 - 11.0

2. Interior non-immersed exposed metal surfaces of the supporting structure and appurtenances:
 - (a) Surface preparation: SSPC-SP6 Commercial Blast Cleaning
 - (b) 1st coat: Series 68-1212 Poxiprime II 4.0 - 5.0
 - (c) 2nd coat: Series 140-WH02 Pota-Pox Plus 4.0 - 5.0
8.0 - 10.0

3. Exterior exposed metal surfaces of elevated tank(s), ground level tank(s), supporting structure, and appurtenances:
 - (a) Surface preparation: SSPC-SP6 Commercial Blast Cleaning
 - (b) 1st coat: Series 68-1212 Poxiprime II 2.0 - 3.0
 - (c) 2nd coat: Series 69 color Hi-Build Epoxoline II 2.0 - 3.0
 - (d) 3rd coat: Series 75 Endura-Shield 2.0 - 3.0
6.0 - 9.0

- I. Tank color shall be Tnemec Tank White #15BL
- J. Verify the dry film thickness of all completed paint coatings and test for holidays in the finished interior tank surfaces in accordance with Section 8 of AWWA D102. All tests shall be witnessed by the Engineer or the Owner's representative
 1. A test report shall be submitted to the Engineer.
- K. Conduct an anniversary inspection of the tank(s) with the Engineer approximately 11 months after completion of the painting work.
 1. Inspect, and repair if necessary, in accordance with Section 9 of AWWA D102, latest edition.
 2. Disinfect the tank(s) in accordance with these specifications upon completion of the inspection if any persons have entered the water storage area.

3.6 DISINFECTION

- A. Disinfect the tank in accordance with AWWA C652.
 1. Provide all equipment and devices necessary to fill tank from Owner's water system.
 - (a) The Owner will provide at no charge to the Contractor water for the initial filling.
 2. Procure necessary water sample containers.
 3. Collect water samples for bacteriological analysis on two successive days at least 24 hours apart.
 4. Send water samples to a laboratory approved by the State agency responsible for the safety of public water systems.
 5. Repeat the disinfection procedure until satisfactory water samples are obtained, paying the entire cost of draining and refilling the tank.
 - (a) Pay for the water required for refilling at the Owner's regular water service rate.

3.7 ELECTRICAL WORK

- A. Coordinate installation of electrical service to site with local utility company and Owner/Engineer.
- B. Install conduit, boxes, wiring, fixtures, wiring devices, panels, and electrical

equipment in accordance with NEC, manufacturer's written instructions, applicable standards, and recognized industry practices to ensure products serve intended function.

- C. Run conduits parallel to or at right angles with lines of structure.
- D. Clean electrical boxes of dirt and debris before installing wiring devices or light fixtures.
- E. Install top of underground conduit 30 inches below final grade or at depth shown on the Drawings.

END OF SECTION

