

The School District of Palm Beach County

Project Name:

SDPBC Project No.:

**SECTION 33 49 23
CISTERN SYSTEMS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cistern Tanks (Above Grade and Underground)
- B. Tank Anchoring Hardware
- C. Storm Water Cleaning Equipment
- D. Cistern Pump Stations
- E. Cistern Pumping Systems and Control Panels

1.2 REGULATORY REQUIREMENTS

- A. All components shall meet installation requirements promulgated by the local Drainage District or the South Florida Water Management District.

1.3 REFERENCE DOCUMENTS

- A. AWWA C110 - Ductile-Iron and Gray-Iron Fittings
- B. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast, for Water
- C. AWWA C600 - Installation of Ductile-Iron Water Mains and their Appurtenances
- D. ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
- E. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
- F. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- G. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
- H. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
- I. NEMA MG 1 - Motors and Generators
- J. National Electric Code
- K. UL 1316 - Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohol, and Alcohol-Gasoline Mixtures

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Prior to installation, the Contractor shall furnish to the Project Consultant the manufacturers' literature and data for all materials installed under this section for his approval.
 - 1. Installation details for anchoring above grade tanks, including wind load calculations, shall be provided to the SDPBC Building Department for review and approval prior to commencement of any Work on the system.
 - 2. Work proceeding in advance of approval is at the Construction Manager and/or Contractor's risk.
- C. Complete As-Built information and plans required before final acceptance of the system.
 - 1. Contractor shall provide accurate record of complete system relative to cleanouts, storm water cleaning equipment, cistern tanks, pipe size, pipe material, pipe lengths, pump stations, and similar features.
 - 2. Registered Surveyor shall provide all horizontal and vertical information in the Contractor's As-Built information.

The School District of Palm Beach County

Project Name:

SDPBC Project No.:

3. Final approval of the project "As-Built" information from the regulatory agencies having jurisdiction

1.5 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 specification sections, apply to work in this section.
- B. Section 31 20 00, Earth Moving
- C. Section 33 40 00, Storm Drainage Utilities
- D. All applicable Division 26, 27, and 28 electrical and control specifications.

1.6 WARRANTY

- A. Cistern tanks shall have a minimum 5-year warranty covering 100% of all manufacturers' defects in the tanks.
- B. Storm water cleaning equipment shall have a minimum 2-year warranty covering 100% of all manufacturers' defects in the cleaning equipment.
- C. Pump and motor assembly shall have a minimum of 5-year warranty covering 100% of all parts and labor for the first year and 50% of all parts and labor for the remaining four-years.
 1. The pump manufacturer shall provide the warranty for the complete pump and motor assembly.
 2. The warranty period commences with the discharging of storm water into the pump station.
- D. The unconditional labor and material warranty period for the pump station (5-years for station pump and motor assemblies, and 1-year for all other components) commences with the discharging of storm water into the pump station.

PART 2 PRODUCTS

2.1 GENERAL

- A. Design and fabricate all stationary equipment and fixtures to provide a 50-year service life when installed under local conditions.

2.2 PIPING

- A. All below grade-gravity flow piping shall comply with material requirements presented in Section 33 40 00, Storm Drainage Utilities.
- B. All below grade-pressurized piping shall comply with material requirements presented in Section 32 84 23, Underground Irrigation System.
- C. All above grade piping shall be metal.
 1. Pipe shall be rated for operation at 150 psig.
 2. Pipe shall be made of corrosion resistant material or suitable coated.
 3. Pipe joints shall be rigid and self-restraining.
 4. Pipe shall include, starting at the pump discharge:
 - a. Spool piece
 - b. Flow meter
 - c. Spool piece with instrument taps and a tap for a glycerin-filled pressure gauge.
 - d. Silent check valve
 - e. Non-rising stem gate valve
 - f. Spool piece
 - g. 90 degree bend
 - h. Spool piece to 36" below grade

5. Make instrument taps with welded half couplings or threaded nipples where the pipe thickness will support a threaded connection.
 - a. All instruments will be isolated with a ball valve for removal and replacement.
 - D. Configure cistern inlet piping to limit disturbance of the bio-film that will accumulate on the cistern walls.
 1. Provide a flow distribution device or specially design distribution manifold.
 - E. Design the cistern outlet piping to draw water from the cleanest area of the cistern tank and limit bio-film disturbance.
 1. Provide a flow suspended outlet filter or other device.
 - F. Cistern overflow piping shall discharge to the storm water management system and:
 1. Protect against entry of odors and gasses from the storm-water management system.
 2. Protect against backflow from the storm-water management system.
 3. Protect against vermin entry.
 4. Provide surface skimming of the cistern contents during discharge.
- 2.3 CISTERN TANKS
- A. Make all tanks from a corrosion resistant material.
 1. Tanks installed above grade shall resist degradation due to ultraviolet radiation exposure of local intensity.
 - B. All tanks shall be equipped with the necessary pipefittings, vents, and access hatches for inspection and cleaning.
 - C. Vent all tanks to the atmosphere with a vent that prohibits vermin entry.
- 2.4 TANK HARDWARE
- A. Fabricate all underground and at grade tank, hardware using an austenitic grade (300 series) stainless steel.
- 2.5 STORM WATER CLEANING EQUIPMENT
- A. Storm water cleaning equipment shall operate without external sources of power or use of chemical coagulants.
 1. Plugged storm water cleaning equipment shall automatically send all storm water to the storm-water management system without further debris accumulation in the plugged screen, filter, or sub-unit.
 - B. Storm water cleaning equipment shall be easily maintained by one person and require handling a maximum weight of 25 pounds during cleaning.
 - C. Fabricate the storm water cleaning equipment from corrosion resistant materials to provide a design service life as outlined herein.
- 2.6 STORM WATER PUMP STATION WET WELLS
- A. Storm water pump station wet wells shall be fabricated using standard corrosion resistant materials to provide a design service life as outlined herein.
 - B. Where a pre-manufactured pump station is not used, provide details for:
 1. Wet well covers and access hatches.
 2. Pump base plates and support foundations.
 3. All piping connections on the suction and discharge side of the pumps.
 4. Control panel mounting posts and hardware.
 5. Control panel electrical schematic diagrams for power and controls.
 6. Control panel dead front and interior layouts.
 7. Float switch-mounting, access, and control elevation for float switches mounted in the wet well.

2.7 STORM WATER PUMPS

- A. Provide storm water pumps by an approved vendor regularly engaged in the manufacture of pumps specifically designed for pumping storm water.
 - 1. Pump vendors (manufacturers) shall be approved on a case-by-case basis.
 - 2. Barnes and Flygt are pre-approved at this time.
- B. The pump motor shall be non-overloaded at all points on the pump curve. Operation within the service factor is not permitted to satisfy a non-overloaded condition.
 - 1. Motors shall have a 1.15 service factor and class F insulation, minimum.
- C. Pump motors will have a TEFC or submersible, water-cooled configuration.
- D. Pump motors will be equipped with external contacts that allow a thermal overload to report at the control panel.
- E. If within the scope of the Energy Independence and Security Act of 2007, pump motors shall have efficiency ratings compliant with NEMA MG1.

2.8 PREMANUFACTURED STORM WATER PUMPSTATIONS

- A. An approved vendor regularly engaged in the manufacture of storm water or irrigation pump stations will supply all pre-manufactured pump stations.
- B. Storm water pumps supplied as a part of the station shall comply with pump requirements listed herein.
- C. Mount all piping, valves, instrumentation, power, and control wiring, control panels, pumps, wiring conduits, and other operating appurtenances on a base and supply as a unit by the pump station vendor.
 - 1. Site work necessary to install the pump station shall be provision of power and control-wiring connections, placement of the pump station upon a suitable support slab and installation of wet well level controls.
 - 2. Electrical controls for pump actuation shall comply with requirements presented elsewhere in this section.

2.9 POWER SUPPLY AND ELECTRICAL CONTROLS

- A. All devices and wiring shall comply with requirements listed under other parts of this project manual and the National Electric Code.
- B. All control panels shall be Underwriters Laboratory listed.
 - 1. Control panels will allow motor operation with an HOA switch accessible from the panel front.
 - a. HOA switch position in OFF will report with a red indicator light on the control panel.
 - b. HOA switch position in HAND will report with an amber indicator light on the control panel.
 - c. HOA switch position in AUTO will report with a green indicator light on the control panel when the pump is running.
 - 2. Control panels will have the following features:
 - a. Surge protection, phase monitor, voltage monitor, and lightning arrester.
 - b. ETM meters for pump run time.
 - c. Red indicator lights for all system faults that prohibit pump operation as listed below
 - i) Phase loss
 - ii) Low voltage
 - iii) Low wet well level
 - iv) No flow
 - v) High discharge pressure

The School District of Palm Beach County

Project Name:

SDPBC Project No.:

- vi) Motor over temperature
- d. All indicator lights will be push to test, suitable for outdoor mounting, use an anodized aluminum mounting ring, 30 mm size, Cutler Hammer HT800, or equivalent.
- 3. Control panels will have NEMA 4X stainless steel enclosures.
- C. Supply the pump station power from a lighting panel in the main school building.
- D. Wet well level control and/or cistern tank level control shall be provided with float switches.
 - 1. The switches shall be accessible and removable for service from ground level.
 - 2. Use wet well level control to disable the pump motor when the wet well water level is below the elevation needed for safe pump operation.
- E. Pump control shall be via timer for normal operation. The pump will activate in accordance with a zone based watering schedule. The timer may be located remote from the station.
 - 1. Multiple water sources will be coordinated with the pump control logic.
- F. The pump discharge piping will be equipped with sensors that disable the pump motor when either a no-flow or an overpressure condition occurs.

PART 3 EXECUTION

3.1 GENERAL

- A. Provide complete shop drawings of all cistern system components for review and approval by the School District Palm Beach County Building Department prior to installation of any components.
 - 1. Submission and approval will be in accordance with Building Department Standard Operation Procedure #BD-005, entitled "Shop Drawings Requirements and Product Approval".
 - 2. This document is available on the School District website.
- B. Immediately notify the Owner and Architect/Engineer regarding any visible inflow, infiltration, or damages occurring during installation. The Owner reserves the sole right to reject the entire damaged installation, at which time the Contractor shall remove and replace all damaged items without additional payment from the Owner.

3.2 PIPING

- A. All underground piping shall comply with installation requirements listed by the manufacturer and as presented in Section 33 40 00, Storm Drainage Utilities, section 32 84 23, Underground Irrigation System, and in Section 31 20 00, Earth Moving. The more stringent requirement shall govern in case of conflict.
- B. Install all above ground piping in accordance with the piping manufacturer's requirements and AWWA requirements.
 - 1. Provide pipe stand to support above ground pipe for maintenance and repair operations.

3.3 CISTERN TANKS

- A. Install below grade tanks to be non-buoyant when fully submerged in an empty condition.
 - 1. Installation shall include anchor blocks, geotextile, and special bedding requirements per the design drawings.
- B. Install per manufacturer's recommendations.
- C. Install plumb and true maintaining required horizontal and vertical alignments.
- D. Install backfill per Section 31 20 00, which appears elsewhere in these technical specifications.

The School District of Palm Beach County

Project Name:

SDPBC Project No.:

3.4 STORM WATER CLEANING EQUIPMENT

- A. Install below grade cleaning equipment to be non-buoyant when fully submerged in an empty condition.
- B. Install per manufacturer's recommendations.
 - 1. Installation shall maintain inlet pressure and outlet backpressure requirements for proper operation of the unit.
- C. Install plumb and true maintaining required horizontal and vertical alignments.
- D. Install without visible infiltration, inflow, or damages.

3.5 STORM WATER PUMP STATION WET WELLS

- A. Install wet wells to be non-buoyant when fully submerged in an empty condition.
- B. Install per manufacturer's recommendations.
- C. Install plumb and true maintaining a vertical centerline.
- D. Install without visible infiltration, inflow, or damages.

3.6 STORM WATER PUMPS

- A. Install per manufacturer's recommendations.
- B. Install plumb and true maintaining required horizontal and vertical alignments.
- C. Install without transfer of stress due to misalignment between piping connections, conduit junctions, or other connections to site utilities or other site work.
- D. Install to maintain operational vibration and noise within manufacturer's limits.
 - 1. Excessive noise or vibration will be treated as a damaged installation.

3.7 PREMANUFACTURED STORM WATER PUMP STATIONS

- A. Install per manufacturer's recommendations.
- B. Install plumb and true maintaining required horizontal and vertical alignments.
- C. Install without any binding of hatches, panel doors, or other movable parts.
- D. Install without transfer of stress due to misalignment between piping connections, conduit junctions, or other connections to site utilities or other site work.
- E. Install to maintain operational vibration and noise within manufacturer's limits.
 - 1. Excessive noise or vibration will be treated as a damaged installation.

3.8 POWER SUPPLY AND ELECTRICAL CONTROLS

- A. Install in accordance with approved shop drawings, design drawings, electrical codes and standards, and other technical specifications included elsewhere herein.

END OF SECTION