

**SECTION 9
SEWAGE PUMPING STATIONS**

9.1 GENERAL

9.2 DESIGN STANDARDS

- 9.2.1 References
- 9.2.2 Design Flow
- 9.2.3 Pump Selection
- 9.2.4 Wet Well Design
- 9.2.5 Station Water System (Non-Potable)
- 9.2.6 Emergency Power Provisions – Generators and Emergency Power Connections
- 9.2.7 Sewage Pumps, Motors and Standby Generators
- 9.2.8 Valves and Vaults

SECTION 9 SEWAGE PUMPING STATIONS

9.1 GENERAL

- 9.1.1 This section includes the general requirements for the design criteria and installation of sewage pumping stations.
- 9.1.2 Relevant provisions included in these Standard Specifications shall be applicable to this section, unless otherwise indicated herein or approved by the City.

9.2 DESIGN STANDARDS

9.2.1 Reference

The developer shall comply with the design guidelines established by the Water Environment Federation (WEF) Manual of Practice No. 9, Latest Edition; Great Lakes Upper Mississippi River Board of State Public Health & Environmental Managers, "Recommended Standards for Wastewater Systems," Latest Edition (Ten States Standards) and as established by the Florida Department of Environmental Protection.

9.2.2 Design Flow

Sewage pumping stations shall be designed for the total ultimate development flow from all contributory areas. The design average daily flow shall be computed at the unit rates detailed in Section 7. The maximum required pumping capability shall be the product of selected peak factors times the accumulative average daily flow (ADF) from the total service area. In general, the following factors shall be applicable for the range of flow contributions indicated (million gallons per day average daily flow: MGD – ADF), unless larger valves are required or smaller amounts are justified, with prior approval from the City.

Flow Range	Peak Factor
0.00 to 0.05 MGD-ADF	3.5 to 4.0
0.05 to 0.25 MGD-ADF	3.0
0.25 to 2.00 MGD-ADF	2.5

Note: Special analysis shall be made for flows beyond 2.0 MDG-ADF and peak factors less than 2.5.

9.2.3 Pump Selection

- A) For pumping stations with a peak flow demand of 1,000 gallons per minute (GPM) or less, a minimum of two pump units shall be provided (with one (1) pump operation to meet peak flows, and one (1) pump on standby). Where the peak design flow exceeds 1000 GPM, three or more units shall be included in the facility with two (2) pumps operating to meet maximum demand and one (1) pump on standby. The pumps shall be designed to alternate as lead and lag with each start.

- B) The selected sewage pump system shall have the minimum capability of pumping the design peak flow at the maximum computed system total dynamic head (TDH) requirements.
- C) Head-Capacity curves shall be prepared for the proposed pumping system in order to determine the various operational conditions. Hydraulic computations shall be in accordance with good engineering, practice, with pipe friction loss calculated by the "Hazen-Williams Formula", using standard friction factors based on the materials utilized.

9.2.4 Wet Well Design

- A) The wet well structure shall provide a minimum capacity between operational water levels sufficient to allow a minimum of five (5) minutes between successive starts of the pumps, when the effluent rate is one-half the maximum one pump capacity. Low water levels shall provide adequate submergence to preclude pump inlet vortexing, air binding or other design considerations. Operational maximum high water levels shall not exceed the invert elevation of the lowest influent pipe, with high water alarm no higher than the 0.8 of the lowest pipe. The bottom of the wet well floor shall slope to the pump intakes at a slope of not less than one to one (1/1). The wet well structure shall be designed to eliminate any possibility of flotation. Calculations shall be provided to the City along with other design calculations.
- B) Odor control shall be provided as required and specified by the City of Groveland Public Works Department.
- C) Lift stations shall be provided with a cast in place HDPE liner where directed by the City.

9.2.5 Station Water System (Non-Potable)

All sewage pumping stations shall be provided with a water system, with adequate capacity and pressure, for wash down and other requirements. The supply shall be completely separated from the potable supply by use of a reduced pressure type backflow preventors or other City approved protective systems. Backflow devices shall be tested by a certified tester within five days of installation, with written results provided to the City.

9.2.6 Emergency Power Provisions – Generators and Emergency Power Connections

All pumping stations shall be provided with an emergency power generator to maintain uninterrupted wastewater flow during periods of commercial power outages. Therefore, all lift stations shall be provided with an onsite standby, diesel, power generator and automatic transfer switch

Stations shall also be equipped with standby power generator connections for emergency auxiliary pumping. Standard generator plugs shall be as follows:

All 240 V, 3PH plugs shall be Russell Stoll Model #JRS2044FR
All 480 V, 3PH plugs shall be Russell Stoll Model #JRS2044MR

All 240 V, 1PH plugs shall be Russell Stoll Model #JRS1044FR

9.2.7 Sewage Pumps, Motors, and Standby Generators

- A) Sewage pumping units shall be capable of handling raw, unscreened sewage and shall be capable of passing a sphere of at least 3 inches in diameter. Pumps shall be electric motor driven and of a proven design that has been in sewage service under similar conditions for at least five years.

Pumps shall provide the required peak design performance requirements and be suitable for operation within the total hydraulic range of operation. See attached drawing. Pumps shall be as manufactured by Flygt, Hydromatic or other City approved manufacturer.

- B) Pump Motors

Pump motors shall be non-overloading, excluding service factor, throughout the entire operating range of the pumps. Two or more normally closed heat sensing miniature switches connected in series and embedded within the motor windings shall be provided to shut off power and initiate alarm light for motor over-temperature conditions.

- C) Pump controls & SCADA System

(Future)

- D) Submersible Pump Facilities

Installation shall include the removable pump units, aluminum access frame and cover, stainless steel pipe pump guide bars, pump discharge connection and other necessary appurtenances. The submersible pumping system and accessories shall all be provided by the same manufacturer. All stations shall be supplied with a 3" Kam-Lok quick coupling for emergency by-pass at pumping stations.

- E) Factory Built Facilities

Factory built facilities (package stations) shall receive City approval before inclusion in the construction plans.

9.2.8 Valves and Vaults

- A) Valve Vaults

Valve vaults must be a minimum of 6 feet by 6 feet (inside dimension), with no less than 12" clearance from the vault walls. The vault must be coated, with Inextol Epoxy inside and outside with a finish coat of 32 mils. All metal on the inside of the valve vault shall also be coated with Inextol Epoxy and will also have a finish coat of 32 mils.

B) Valves

All valves used in station valve boxes shall be DeZurik or Clow, 100% full flow plug valves.
