Section XVII

SANITARY SEWER PUMP STATION

DESIGN GUIDELINES

A. GENERAL

1. The following sanitary sewer pump station design guidelines are based on Federal, State and local health requirements and the Hilton Head No. 1 Public Service District engineering design criteria.

2. These design guidelines are applicable to all developments including but not limited to residential, commercial and industrial developments, subdivisions and/or parks requiring sewer service from the Hilton Head No. 1 Public Service District.

3. Design criteria for other than normal circumstances are to be presented to the District for approval prior to preparation of plans and specifications.

B. GENERAL PUMP STATION DESIGN

1. Two (2) pumps of equal capacity, each capable of handling the design peak flow.

2. Capable of passing 3" diameter spherical solids, minimum.

3. Suction and discharge piping: 4" diameter, minimum.

4. Pump stations:

   a. **Submersible**
      1) Default for all applications.

   b. **Self priming centrifugal**
      1) Only for special exceptions as determined by the District.

   c. Grinder pumps are not acceptable.

5. Peak factor:

    a. Minimum, 2.5.

    b. Based on the source of the wastewater and the distance of the pump station from the source.

6. Future capacity: Consideration is to be given when designing pumps of the ultimate capacity as outlined in the District's sanitary sewer master plan.

7. Wetwell level settings:

    a. Distance between pump "OFF" and lead pump "ON": minimum as specified by the pump manufacturer.

    b. Distance between lead pump "ON" and lag pump "ON" and alarm "ON": 6", minimum.

    c. Distance between lag pump "ON" and alarm "ON": 6", minimum.

    d. Distance between alarm elevation and inlet pipe: 1'-0", minimum.

8. Provide a check valve, plug valve, uniflange coupling and pressure gauge connection on each pump discharge line to be located in the valve pit only.

9. Pumps shall have an operating point at or near peak efficiency.

10. Self priming pumps:

    a. Lower capacity pumps can be provided initially if:
        1) Adequate parts are provided to allow the speed or impeller to be changed for future ultimate capacity.
        2) Motor is designed for ultimate design flow.

11. Provide components of the pump station per details presented in Section XX.

12. Provide by-pass connection per Detail XX-11.

13. Locate pumps, influent pipe and float cable so that influent pipe does not interfere with manhole steps or float cables during operation.

14. Provide manhole on influent line within 40' of pump station for by-pass pumping.

C. SELF-PRIMING PUMP STATION

1. Self contained fiberglass enclosure.

2. Individual suction line for each pump.

3. Pressure and suction gauges with isolation valves on each pump.

D. SUBMERSIBLE PUMP STATION

1. Opposite opening, dual access covers with stainless steel safety chains or nylon coated stainless steel wire rope.

2. Stainless steel hoist sockets with covers on top of wetwell.

3. Install valves in a valve pit separate from the wetwell.

   a. Adequate valve pit dimensions to allow operation and maintenance of all valves in the pit.

   b. Minimum dimensions:
      1) 4-inch main: 4'x4'.
      2) 6-inch main: 6'x4'.

   c. Provide opposite opening, double leaf access hatch with opening dimensions the same as the inside dimensions of the vault.
      1) Stainless steel safety chains or nylon coated stainless steel wire rope.

   d. Provide manhole steps.

   e. Vault is to have a 4" floor drain with integral P-trap and float valve with drain back to the wetwell.
      1) Provide adequate depth to allow installation of the floor drain.

   f. Precast vaults are acceptable as long as the wall dimensions and reinforcing steel match Detail XX-7.

4. Provide ½" tap with pressure gauge connection prior to check valve. See Detail XX-8.

E. WETWELL DESIGN CRITERIA

1. Size the wetwell based on the following:

   a. Flow from proposed development and any associated future development.

   b. Capability to receive flows from surrounding areas as determined by the District's Master Sewer Plan.

   c. Formula:

$$V = \frac{T}{\left(\frac{1}{Q-S} + \frac{1}{S}\right)}$$

   Where: V = Effective volume of wetwell (in gallons)
   T = Time for one pump cycle (in minutes)
   Q = Pumping rate (GPM)
   S = Flow into wetwell (GPM)

2. Normal operating volume shall prevent any one pump from starting more than three (3) times per hour.

3. Interior components:

   a. Type 316L stainless steel hardware including, but not limited to, the following:
      1) Lifting chains
      2) Anchor bolts
      3) Bolts and nuts
      4) Guide rails
      5) Rail guides
      6) Cable holder
      7) Discharge piping.

4. Level control is to be provided by ultrasonic level controller or submersible transducer.

5. Provide high water and low water alarm activated by ultrasonic or submersible level control system and backup float switches.

6. Locate level switch where flow from the inlet pipe will not interfere with the float.

7. Provide a hanger for the float switch cable and power cables.

8. Line wetwells, walls, and bottom surface of the top cover with a high density polyethylene (HDPE) concrete protective liner (CPL) or Raven epoxy coating.

9. Where an increase in main size is required, provide a reducing elbow at the pipe flange connection.

10. Locate to allow access with vacuum truck and boom truck.

11. Minimum slope of one to one on the floor to the hopper bottom.

12. Horizontal area of hopper bottom shall be no larger than necessary for proper installation and operation of the pump or pump inlet.

13. Provide a vent as shown in Details XX-2 and XX-7.

F. ELECTRICAL

1. Design electrical service to handle the ultimate capacity of the pump station.

2. Provide support for electrical equipment in accordance with Details XX-4 and XX-10.

3. Location of control panel.

   a. Minimum, three (3) feet clear access from front face of panel to wetwell.

4. Provide 3-phase power.

5. Provide surge protector on main power source.

6. Provide emergency receptacle.

7. Provide quartz-halogen floodlight.

G. PUMP STATION SITE

1. Minimum property size: 50' x 50'.

2. Design gate to allow entrance of service trucks without blocking the main roadway.

3. Design site layout to allow access of service trucks to the pump station.

4. Access road:

   a. 12 foot wide.

   b. Crushed stone pavement.

5. Area within pump station site:

   a. 4" of No. 57 washed stone with plastic weed barrier to 1' beyond fence.
      1) Acceptable weed barrier product: Mirafi 600X.

6. Fencing:

   a. Provide as shown in Detail XX-13.

7. Provide potable water source, minimum 1".

H. Operational Description

1. The pump station shall be supplied with a pump control panel which shall provide local pump control and shall interface with the Remote Telemetry Unit (RTU) being supplied by the Instrumentation and Control System Integrator.

2. In normal operation level in the wet well shall be detected by a level sensing device supplied by the Instrumentation and Control System Integrator. This level signal (4 to 20 mA) shall be input to the RTU. Upon increasing level, when the level reaches the "Lead Pump On" set point, the RTU shall produce a dry contact closure which shall be wired to the Pump Control Panel and shall cause the lead pump to start. If the level in the wet well continues to rise and reaches the "Lag Pump On" set point, the RTU shall produce a dry contact closure which shall be wired to the Pump Control Panel and shall cause the lag pump to start.

3. When the level in the wet well falls below the "Lag Pump Off" set point, the RTU shall produce a dry contact closure which shall be wired to the Pump Control Panel and shall cause the lag pump to stop. When the level in the wet well falls

below the "Lead Pump Off" set point, the RTU shall produce a dry contact closure which shall be wired to the Pump Control Panel and shall cause the lead pump to stop.

4. After each complete pumping cycle the pumps shall be alternated by logic in the RTU.

5. In the event that the level sensing device fails or the RTU fails and the level in the wet well rises to the High-High level, the High-High level float switch shall be activated. This signal shall be wired directly to the Pump Control Panel and when activated shall cause both pumps to start. When the level in the wet well falls to below the Low-Low level, the Low-Low level float switch shall be activated. The Low-Low level float switch shall be wired directly to the Pump Control Panel and when activated shall cause both pumps to stop running.

6. A dedicated terminal strip shall be installed in the Pump Control Panel to allow the following signals to be wired out as dry contacts for monitoring by the RTU:

   High-High Wet Well Level Alarm
   Low-Low Wet Well Level Alarm
   Pump No. 1 Status (Running/Stopped)
   Pump No. 1 Fault Condition
   Pump No. 1 H-O-A Selector Switch in "Auto" Position
   Pump No. 2 Status (Running/Stopped)
   Pump No. 2 Fault Condition
   Pump No. 2 H-O-A Selector Switch in "Auto" Position
   Power Phase Loss Alarm

7. A dedicated terminal strip shall be installed in the Pump Control Panel to accept the following control signals (as dry contacts) from the RTU:

   Pump No. 1 Start/Stop
   Pump No. 2 Start/Stop