

## SECTION 22

### WASTEWATER PUMP STATIONS

#### 22.1 GENERAL CONSIDERATIONS

The design standards outlined in this section apply to wastewater pump stations discharging three thousand (3,000) gallons per minute or less. All such pump stations shall be submersible type stations. For designing pump stations discharging more than three thousand (3,000) gallons per minute, the type of pump station and the Basis of Design shall be reviewed with the CITY and approval obtained before proceeding with the Design.

#### 22.2 DESIGN BASIS

##### 22.2.1 DESIGN FLOWS

Design flow shall be based upon the total ultimate development flow from all contributory areas to the pump station. The design average daily flow shall be computed as outlined in Section 20.2.1. The design pumping capability of the station shall be based upon the Peak Design Flow which shall be calculated by multiplying the design average flow with the applicable minimum peaking factors as outlined below:

<b>Minimum Factor For:</b>	
<u>Design Average Daily Flow</u>	<u>Peak Design Flow</u>
Flows to 100,000 GPD	4
100,000 GPD to 250,000 GPD	3.5
250,000 GPD to 1,000,000 GPD	3
Flows greater than 1,000,000 GPD	2.5

For design average daily flows above two million (2,000,000) GPD, peaking factors less than 2.5 may be considered if substantiated by extensive data. Under no circumstances shall peaking factors less than 2.0 be allowed.

##### 22.2.2 NUMBER OF PUMPS

For pump stations with a peak design flow of one thousand five hundred (1,500) GPM or less, a minimum of two (2) pump units shall be provided. Where the peak design flow exceeds one thousand five hundred (1,500) GPM, three (3) or more units shall be provided. See Section 22.2.3 for standby requirements.

### 22. 2. 3 PUMP AND MOTOR SELECTION

Pump station shall be capable of pumping the peak design flow with the largest pumping unit out of service. Pumps shall be capable of meeting all system hydraulic conditions without overloading the motors. In addition a minimum five (5) HP motor shall be required. Head capacity curves shall be prepared and submitted to the CITY along with the pump station plans. Such curves shall be based upon the friction losses outlined in Section 21.3.2 of these specifications. Head capacity curves shall verify that the pumps are operating at peak efficiency and are suitable for the design flow application. Pump and motor selection and head capacity curves shall reflect hydraulic conditions in cases where receiving force main systems are interconnected to additional pumping stations.

### 22. 2. 4 DESIGN CALCULATIONS

DEVELOPER's ENGINEER shall submit signed, sealed and dated design calculations for all wastewater pump stations. Calculations shall include head capacity curves with copies of manufacturers pump curves, hydraulic analysis of force main system, operating cycle calculations with wet well sizing, and buoyancy calculations.

## **22. 3 DETAILS OF DESIGN AND CONSTRUCTION**

### 22. 3. 1 FLOODING

Wastewater pumping station structures and electrical and mechanical equipment shall be protected from physical damage by the 100 year flood. Wastewater pumping stations should remain fully operational and accessible during the 100 year flood. Regulations of Local, State and Federal agencies regarding flood plain obstructions shall be considered.

### 22. 3. 2 ACCESSIBILITY

The pumping station shall be readily accessible by maintenance vehicles during all weather conditions. The access road to the pumping station shall be paved. The facility shall not be located in road rights-of-way. In a phased development, a stabilized access road may be accepted during the initial phase with paving to be accomplished in the later phase.

### 22. 3. 3 BUOYANCY

Buoyancy of the pump station structures shall be considered and adequate provisions shall be made for protection.

### 22. 3. 4 PUMP REQUIREMENTS

Submersible wastewater pump stations shall comply with the requirements spelled out in Section 47. Only approved pumps listed in Appendix D shall be allowed. Submersible pumps and motors shall be designed specifically for raw sewage use, including totally submerged operation during a portion of each pumping cycle. Submersible pumps shall be readily removable and replaceable without dewatering the wet well or disconnecting any piping in the wet well.

Pumps shall be capable of handling raw sewage and passing spheres of at least three (3) inches in diameter. Pump suction and discharge openings shall be at least four (4) inches in diameter.

#### 22. 3. 5 WET WELL REQUIREMENTS

Wet well shall be minimum six (6) foot diameter and shall have a minimum 4.5 foot depth below the lowest invert. Additional depth shall be provided based on station design and cycle time.

Pumping levels shall be set to provide a minimum capacity between operational water levels sufficient to allow a minimum of five (5) minutes between successive starts of the pumps.

Pump-off water levels shall provide adequate submergence to preclude pump inlet vortexing, or air binding. Operational maximum water levels shall not exceed the invert elevation of the influent pipe.

The wet well floor shall have a minimum slope of one (1) to one (1) to the hopper bottom. The horizontal area of the hopper bottom shall be no greater than necessary for proper installation and function of the pump inlet.

No interior ladders shall be permitted in the wet well.

Only one inlet connection shall be permitted to a wet well.

#### 22. 3. 6 PUMP STATION WATER SYSTEM

All wastewater pump stations shall be provided with a water system with adequate capacity and pressure for station wash down and other requirements. The station's water system shall be completely separated from the potable water supply by means of a reduced pressure type backflow preventer or other CITY approved system.

#### 22. 3. 7 ELECTRICAL EQUIPMENT, POWER SUPPLY AND POWER CORDS

Requirements in Sections 47 and 48 shall apply.

#### 22. 3. 8            CONTROLS

Requirements in Section 48 shall apply.

#### 22. 3. 9            SITE SIZING AND EASEMENT REQUIREMENTS

Pump station sites shall be sized as delineated on the "Pump Station Site Plan" in the STANDARD DRAWINGS. The DEVELOPER shall dedicate pump station site by warranty deed or plat to the CITY. Dedicated easements shall also be required around the site as delineated on the "Pump Station Site Plan" in the STANDARD DRAWINGS. In general, the site for the paved access road shall also be dedicated to the CITY by Warranty deed or plat. An exception to this requirement may be allowed on a case by case basis in the form of an ingress/egress easement for the access road.

#### 22. 3. 10          SITE FENCING

Fencing at the pump station site perimeter shall comply with the technical criteria established in Section 46.8. In general, all pump station sites shall be fenced. However, exception to this requirement may be made for pump stations serving residential areas only, on a case by case basis and subject to sufficient landscape screening.

### **22. 4    FLOW METERS**

Indicating, totalizing and recording flow measurement shall be provided at pumping stations designed to handle peak flows of one thousand (1,000) GPM or more. Applicable provisions of Section 46.7 shall apply.

Bypass piping around the meter shall be provided for all stations with flow meters to facilitate meter maintenance.

### **22. 5    EMERGENCY OPERATION**

All pump stations shall be provided with emergency power receptacles as specified in Section 48.9. In addition, stand-by emergency generators shall be provided at all wastewater pumping stations which are at critical points in the sewer system or which have a peak design capacity of one thousand GPM or more. Determination of pump station critical points shall be at the discretion of the CITY. Such stand-by generator facilities shall comply with the requirements in Section 46.6. All such generators shall be rated and designed to operate the pump station under design conditions.