DIVISION II
DESIGN STANDARDS

SECTION 22

WASTEWATER PUMP STATIONS

22. 1 GENERAL

The design standards outlined in this Section apply to public or private wastewater pump stations discharging 3000 gallons per minute or less.

Private pump stations shall be designed in accordance with the pump manufacturer's criteria, the regulations of the Florida Department of Environmental Regulations, and the applicable Sections of this MANUAL, such as Section 22.5.

If dedication to the CITY is desired, pump stations shall be municipally rated and of the submersible or self priming centrifugal above ground type.

For the design of pump stations discharging more than 3000 gallons per minute, the type of pump station and the basis of design shall be reviewed with the DIRECTOR with approval obtained before proceeding with the design.

Should the DEVELOPER desire to use a pumping system, which is to be dedicated to the CITY, other than those specified in Appendix "C", the DEVELOPER'S ENGINEER shall submit a signed and sealed document to the DIRECTOR specifically addressing all the differences between the proposed system and the pump specifications contained in this MANUAL.

22. 2 DESIGN

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:

Design Average Daily Flow	Minimum Peaking Factor for Peak Design Flow
Flows to 50,000 GPD	3.5
50,000 GPD to 250,000 GPD	3.0
250,000 GPD to 2,000,000 GPD	2.5

For design average daily flows above 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 1500 G.P.M. or less, a minimum of two pump units shall be provided. Where the peak design flow exceeds 1500 GPM, three or more units shall be provided. See Section 22.4 for standby requirements.

22. 2. 3 PUMP AND MOTOR SELECTION

The 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 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 the manufacturer's pump curves, hydraulic analysis of force main system, operating cycle calculations with wet well sizing, buoyancy calculations, and electrical calculations.

22. 3 DESIGN AND CONSTRUCTION

22. 3. 1 FLOODING

Wastewater pumping station structures and electrical and mechanical equipment shall be protected from physical damage by 100 year flood events. The finished top elevation of the submersible station's wet well and valve vault or the above ground station's finished floor elevation shall be a minimum of one (1) foot above said event's designated elevation or eighteen (18) inches above the crown of the adjacent roadway, whichever is higher. Wastewater pumping stations shall remain fully operational and accessible during the 100 year flood.

Regulations of Local, State, and Federal agencies regarding flood plain obstructions shall be complied with.

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 using concrete or asphaltic concrete. Consideration shall be given
to providing sufficient maneuvering space for CITY vehicles servicing the pumping station and an aesthetically pleasing site location. The facility shall not be located in public or private rights-of-way. In a phased development, the pumping station shall be situated within the boundaries of the initial phase.

22. 3. 3 BUOYANCY

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

22. 3. 4 PUMP REQUIREMENTS

Wastewater pump stations shall comply with the requirements as stated in Section 47. Only approved pumps listed in Appendix C shall be allowed for pumps subject to dedication to the CITY. Pumps and motors shall be designed specifically for raw sewage use, including totally submerged operation during a portion of each pumping cycle for submersible pump stations. 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 3 inches in diameter. Pump suction and discharge openings shall be at least 4 inches in diameter.

22. 3. 5 WET WELL

Wet well shall be minimum 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 under normal flow conditions.

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 1 to 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.

Interior ladders shall not be permitted in the wet well.

Only one inlet connection shall be permitted to a wet well unless otherwise approved by the DIRECTOR.

22. 3. 6 WASHDOWN WATER SUPPLY

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 water system shall be completely separated from the potable water supply by means of a reduced pressure type backflow preventer or other CITY approved device.

22. 3. 7 ELECTRICAL EQUIPMENT AND POWER SUPPLY

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 the pump station site by warranty deed or plat to the CITY. Dedicated easements may also be required around the site. In general, the property for the paved access drive 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 by the DIRECTOR, in the form of an ingress/egress easement for the access drive.

22. 3.10 SITE FENCING

Perimeter fencing at the pump station site, shall comply with the technical criteria established in Section 46.8. In general, all pump station sites shall be fenced. However, an exception to this requirement may be made by the DIRECTOR, on a case by case basis, subject to sufficient landscape screening and the satisfactory resolution of station security and public safety issues.

22. 3.11 LANDSCAPING AND IRRIGATION SYSTEM

Landscaping and complete site sodding shall be installed along with an A.C. powered automatically controlled complete irrigation system at all pump station sites to be dedicated to the CITY. The control box for the irrigation system shall be mounted on the pump station's control panel support structure.

22. 3.12 ABOVE GROUND PUMPING STATION

The sewage pumps, motors, and standby power generator system for above ground pumping stations shall be housed in an appropriately sized decorative concrete block structure as approved by the DIRECTOR. The building shall conform to all CITY building code requirements. Sufficient ventilation and interior and exterior illumination shall be provided. All areas shall be sodded and landscaped. A metered potable water line terminating in a hose bib at the building shall be provided along with the appropriate backflow prevention device. The appropriately sized power standby generator set shall be fully equipped and have an automatic electric starting capability.

22. 4 EMERGENCY OPERATION

All pump stations shall be provided with emergency power receptacles as specified in Section 48.9. In addition, for pump stations to be dedicated to the CITY, a stand-by emergency generator set shall be provided to the CITY at no cost for each wastewater pumping station containing dual 15 horsepower or larger pumps in accordance with Section 46.6. Stations with smaller horsepower pumps shall require the DEVELOPER to contribute to the CITY twenty five (25) percent of the cost towards the future purchase of a generator set as based on the project's pump station requirements as specified in Section 46.6. All such generators shall be rated and designed to operate the pump station under design conditions. Determination of the pump station's critical points shall be at the discretion of the DIRECTOR.

22. 5 PRIVATE PUMP STATIONS

22. 5. 1 PRESSURE SWITCH ASSEMBLY

All privately owned and maintained pump stations, not designed to meet the receiving force main's peak 24 hour operating conditions, shall have a pressure switch assembly installed on the station's force main prior to its connection to a CITY force main. The assembly shall be located on and directly adjacent to the subject property's side of the public right-of-way line. See STANDARD DRAWINGS.

22. 5. 2 SIGNAGE

Privately owned and maintained pump stations shall be signed so as to identify the current owner and provide a 24 hour per day 7 days a week emergency response telephone number. The aluminum sign shall be clearly visible from the adjacent roadway, use two (2) inch high black letters on a white background made of engineering grade reflective materials, and measure a minimum of twenty four (24) inches high by thirty six (36) inches long. The sign shall be mounted on the pump station's control panel support structure or the optional perimeter security fencing with the bottom of the sign three (3) feet above finish grade. See STANDARD DRAWINGS.