

SECTION 02000
PUMP STATION SPECIFICATIONS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This section stipulates features, design considerations, and other requirements for utilization of pumping facilities receiving sewage from gravity sewers 18" in diameter or less. Pumping facilities receiving sewage from larger diameter sewers will be reviewed by LRW Engineering Services Division on a case by case basis.
- B. No pump station of the size indicated above shall be allowed unless constructed in conformance with these specifications.
- C. Shop drawings and the Engineer of Record's design calculations must be approved by the Little Rock Wastewater prior to ordering materials and construction of the pump station.

1.02 GENERAL REGULATIONS

- A. Pumping stations may be installed only where gravity sewer service is not feasible in the opinion of LRW and then only with written approval from the Little Rock Wastewater.
- B. Any pumping station that is serving two or more parcels of property shall be owned and/or maintained by the Little Rock Wastewater.
- C. Clear title conveyance of the pump station and associated property to the Little Rock Wastewater shall be provided upon acceptance of the project. (Temporary stations may revert to the Developer upon abandonment.)
- D. The operation and maintenance expenses for the pump station must be paid in addition to the monthly sewer service charges paid by the

benefiting customers. The Developer must pay, in advance, the present value of the estimated operation and maintenance costs for the estimated service life of the pump station. The amount of payment shall be determined by Little Rock Wastewater based on historical records of similar facilities within LRW's System. The minimum estimated service life of the pump station shall be ten (10) years.

- E. A deposit equal to the estimated expense LRW will incur for the purchase and installation of remote pump station monitoring equipment shall be provided before project acceptance. Should the deposit exceed LRW's expense to install the remote pump station monitoring equipment, the remaining funds will be returned to the Developer. If the expenses exceed LRW's estimate, the additional expense will be billed to the Developer.

1.03 DESIGN

- A. The design of pump stations to be owned, operated, and maintained by the Little Rock Wastewater shall comply with the following general requirements:
 - 1. Pump Station structures and electrical and mechanical equipment shall be protected from physical damage by the one hundred (100) year flood. Stations should remain fully operational and accessible during the twenty five (25) year flood.
 - 2. The pump station shall be readily accessible by maintenance equipment during all weather conditions. Sufficient area for vehicular parking and turnaround shall be provided at the pump station site. "All weather" surfacing shall be provided on parking area as well as the access drive.
 - 3. Fencing shall be provided around pump station structures and electrical and mechanical equipment. Fencing shall be six (6) foot chain link with three (3) top strands of barbed wire. Alternate fencing

types may be used upon approval of the Engineering Services Division of the Little Rock Wastewater. The minimum acceptable width for access gates shall be sixteen (16) feet.

4. An automatic night light (“Night Watcher” or similar) and a potable water supply shall be provided at the pump station site. A Backflow Prevention Device (RPZ) must be installed on all potable water services and shall comply with the requirements of Central Arkansas Water. The RPZ shall meet the following requirements:
 - The RPZ shall be sized the same as the supply service with a ¾” service being the minimum size.
 - The RPZ shall be installed within the confinements of the fenced area.
 - A Frost/Freeze Proof (2 foot bury) hydrant should be installed after the RPZ, also within the confinements of the fenced area.
 - The RPZ will require a freeze protected enclosure (Hot Box).
 - A dedicated 120V, 20Amp ground fault receptacle shall also be provided inside the Hot Box for installation of a Pipe Heating Cable if necessary.
5. Three phase electrical power free of rate encumbrances must be provided. Electrical systems and components (e.g. motors, lights, cables, conduits, switch boxes, etc.) located in raw sewage wet wells or partially enclosed spaces where hazardous concentrations of flammable gases or vapors may be present, shall comply with the “National Electrical Code” requirements for Class 1 Group D, Division 1 locations. All wiring must be in accordance with the latest revisions of the “National Electrical Code” and the “City of Little Rock Electrical Code”. A fused disconnect switch located above ground shall be provided for the pump station. When such equipment is exposed to weather, it shall meet the requirements of weatherproof equipment (4X Stainless Steel). All electrical enclosures subject to

weather or corrosive gases shall be constructed of corrosion resistant material. Provide NEMA rated motor starters.

6. The pump station shall be of the submersible or wet well/dry well type. Other types of stations may be approved by the Engineer Services Division of the Little Rock Wastewater where circumstances justify their use.
7. The pump station must contain at least two pumps designed for pumping sewage. Except where grinder pumps are used, the pumps must be capable of passing spheres of at least three (3) inches in diameter. Pump suction and discharge piping shall be at least four (4) inches in diameter. Grinder pumps shall not be allowed if pump station design capacity exceeds ninety (90) gallons per minute. Pumps shall be under a positive suction head during normal operation.
8. Control systems shall be of the air bubble type or the encapsulated float type. Within a float type design, provide Myers Mini Floats or approved equal. Control systems shall be designed for the use intended, factory wired, fully adjustable, and capable of providing fail safe operation. Control systems shall minimally have five (5) set points (Low level alarm, All “Off”, Lead “On”, Lag “On”, High Level alarm). Within a float type design, low level float switch arrangement shall be normally closed. Provisions shall be made to automatically alternate the “Lead” pump. Provide Siemens alternator part #47AB10AF or approved equal. The electrical equipment shall comply with Section 1.03.A.5.
9. Control systems shall provide a separate terminal strip for future connection of SCADA equipment. Dry, isolated, Form C contacts shall be wired to the terminal strip to monitor the following functions and react as characterized.
 - A. Low Wet Well Alarm – provided contact shall remain closed during an alarm silence event.

- B. High Wet Well Alarm – provided contact shall remain closed during an alarm silence event.
 - C. Pump Running – for each pump, provide auxiliary motor starter contact, or power relay connected to motor starter output.
 - D. Pump Failure – for each pump, provide factory installed pump circuit breaker contact, or power relay connected to breaker output.
 - E. Pump OOS (Out of Service) – provide panel mounted DPDT switch for each pump.
 - F. Intrusion Alarm – provide normally closed magnetic switch on MCC enclosure door.
 - G. Power Failure – provide power/phase monitor, Square D part #8430 or approved equal, to monitor incoming power service. Provide relay output to monitor MCC control voltage fuses. Parallel these outputs to a single normally open connection to terminal strip for overall MCC power indication.
10. The wet well size and control setting shall be appropriate to avoid heat buildup in the motor due to frequent starting and to avoid septic conditions due to excessive detention times.
 11. The wet well floor and pump intakes shall be designed to prevent deposition of solids. The wetwell floor shall have a minimum slope of one to one to the hopper. The horizontal area of the hopper bottom shall not be greater than what is necessary for proper installation of inlets or submersible pumps.
 12. All metal fasteners, bolts, nuts, and supports located in the wet well shall be constructed of stainless steel.
 13. A sign identifying the Pump Station name and Little Rock Wastewater as the Owner shall be provided and clearly displayed.
 14. Temporary pump stations serving sanitary sewers that will be connected to future gravity lines shall be designed in a way that will allow conversion with minimum construction.

- B. Submersible pump stations shall comply with the general provisions set forth in Section 1.03.A. Submersible pumps shall be designed specifically for raw sewage use, including totally submerged operation during a portion of each pump cycle. An effective method to detect shaft seal failure or potential failure shall be provided, and the motor shall be of squirrel cage type design without brushes or other arc producing mechanisms. Pump motor power cables shall be specifically designed for submersible pump applications and shall be properly sealed and insulated. Motor control centers for submersible pumps shall be located outside the wet well and be protected by a conduit seal to prevent the atmosphere of the wet well from gaining access to the control center. Submersible pump stations shall, as a minimum, include the following accessories:
1. Check valves with lever and weights and resilient seat gate valves on the discharge line of each pump. The check valve shall be installed between the gate valve and the pump and shall be suitable for the material handled. Check valves and gate valves shall be located above ground on wetwell only stations. Separate valve pits will not be required for grinder stations.
 2. Ductile iron influent line.
 3. Stainless steel guide rails.
 4. Wet well vent to atmosphere with 180 Degree Turndown.
- C. Wet well/dry well pump stations shall comply with the provisions set forth in Section 1.03.A. Dry wells, including their super structure, shall be completely separated from the wet well. Provision shall be made to facilitate removal of pumps, motors, and other mechanical and electrical equipment. Suitable and safe means of access shall be provided to dry wells, and to wet wells containing mechanical equipment that requires inspection and maintenance. As a minimum, the following accessories shall be included in wet well/dry well stations:

1. Check valves with lever and weights and resilient seat gate valves on the discharge line of each pump. Check valves shall be located between the pump and the gate valve.
 2. Resilient seat gate valve on the suction line of each pump.
 3. Float controlled dry well sump pump discharging into the wet well.
 4. Adequate lighting switched at the dry well entrance.
 5. Thermostatically control electric heat.
 6. Dehumidifier
 7. Ductile Iron influent line.
 8. Intermittent mechanical ventilation of dry well providing 30 complete air changes per hour. "On" switch for ventilation shall also be located at dry well entrance.
 9. Wet well vent to atmosphere.
- D. Design of force mains shall comply with the following requirements:
1. Minimum pumping rate shall result in a velocity of at least two (2) feet per second and not greater than five (5) feet per second.
 2. The physical elevation of the force main should not exceed the hydraulic grade line at any location along the force main's length.
 3. Automatic air relief valves designed for use with sewage shall, at a minimum, be installed at high points of the force main. Air relief valve assemblies shall include inlet and outlet ports for backflushing, isolating valves to facilitate inspection and repair, and all threaded fittings and bolts shall be stainless steel.
 4. Friction losses through force mains shall be based on the Hazen-Williams formula and actual pipe diameters. Hazen-Williams "C" values of 120 and 100 for PVC and Ductile Iron, respectively, shall be used for design. When initially installed force mains will have significantly higher "C" values. Designs should be checked at "C" values of 150 and 130 for PVC and Ductile Iron, respectively, to determine power and net positive suction head requirements.

5. A ten (10) foot horizontal separation shall be maintained between potable water mains and sewage force mains. Where water mains and force mains cross, force mains shall be laid to provide a distance of eighteen (18) inches between the outside of force main to the outside of the water main. Both joints of the force main shall be located as far as possible from the water main.
6. Force main materials, installation and testing shall comply with applicable provisions in Sections 02220, 02610, 02730, and 02734.

END OF SECTION 02000