

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 less than 18” in diameter. Pumping facilities receiving sewage from larger diameter sewers will be reviewed by LRWRA 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 Water Reclamation Authority 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 LRWRA and then only with written approval from the Little Rock Water Reclamation Authority
- B. The use of an Individual Private Grinder Pump Station serving a single residence and discharging to a public force main or gravity main will only be constructed with prior approval from must be approved by LRWRA prior to issuance of permit and construction. Allowance of an Individual Private Grinder Pump Station will be reviewed by LRWRA on a case by case basis and will be privately owned by the

responsibility of the property owner of the property and to size, install, operate, and maintain operated and maintained either by the owner of the property or by a Property Owner's Association legally set up to maintain these pumps. See Part 1.04 of this Section for the Individual Private Grinder Pump Requirements.

- C. Any pumping station that is serving multiple parcels of property shall be owned and/or maintained either by the Little Rock Water Reclamation Authority or by a Property Owner's Association legally set up to own and maintain these pumping stations. Any such installation shall be approved in advance by the Little Rock Water Reclamation Authority and/or the Little Rock Water Reclamation Commission, as may be required.
- D. For any pump station to be owned by the Little Rock Water Reclamation Authority, clear title conveyance of the pump station and associated property to the Little Rock Water Reclamation Authority shall be provided upon acceptance of the project. (Temporary stations may revert to the Developer upon abandonment.)
- E. For any pumping station to be conveyed to LRWRA, the operation and maintenance expenses for that pump station must be paid in advance 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 Water Reclamation Authority based on historical records of similarly sized facilities within LRWRA's System. The minimum estimated life cycle of the pump station shall be ten (10) years, for the purpose of calculating this payment amount.
- F. A deposit equal to the estimated expense LRWRA will incur for the purchase and installation of a SCADA Remote Terminal Unit panel, complete with antenna or communications equipment shall be provided before project acceptance. A good-faith estimate of the amount of deposit required under this section shall be furnished to the Developer by LRWRA prior to commencing the project. Should the deposit exceed LRWRA's expense to install the remote pump station monitoring equipment, the remaining funds will be returned to the Developer. If the expenses exceed LRWRA's estimate, then 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 Water Reclamation Authority 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. Adequate area for vehicular parking and turnaround shall be provided at the pump station site. “All weather surfacing” shall be provided at all pump station sites, as defined below:
 - a. For pump stations with 2” discharge piping, “all weather surfacing” shall be defined as subgrade compacted to min. 95% standard proctor, topped by min. 8” thick Class 7 aggregate compacted to min. 98% standard proctor, per ARDOT Standard Specifications. This “all weather surfacing” shall be placed upon the entire fenced area of the pump station site as well as upon the entire unpaved portion of the access road or driveway, including turning radii. An 8” thick 3500 psi concrete driveway apron shall be provided, which shall extend 5’ min. from back of curblin e or edge of pavement, and shall cover the entire width of the driveway, including turning radii. If ARDOT or City of Little Rock specifications require a larger concrete apron or installation of sidewalk, then Developer shall conform to the more stringent requirement.
 - b. For pump stations with discharge piping 3” and larger, “all weather surfacing” shall be defined as all features required in the above section

2.a, plus the following: 1) 6” thick, 3500 psi concrete paving for min. 12 foot width of driveway or access road, plus all turning radii, and 2) 4” thick, 3500 psi concrete paving around the complete wet well. This paving shall extend from the outer edge of the wet well out to the last fitting prior to the discharge piping penetrating the ground to exit the station site, with a minimum width of 4 feet out from the edge of the wet well.

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 Water Reclamation Authority. The minimum acceptable width for access gates shall be sixteen (16) feet. A cantilever gate may be required, as site conditions dictate.
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.
 - The RPZ will require a freeze protected enclosure (Hot Box).
 - A dedicated 120V, 20Amp ground fault breaker and a duplex 120V receptacle shall also be provided inside the Hot Box for installation of a Pipe Heating Cable if necessary.
 - A Frost/Freeze Proof (2 foot bury) hydrant shall be installed after the RPZ, also within the confinements of the fenced area.
5. Three phase electrical power free of rate encumbrances shall 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 Article Number 500.6 (4) 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”. An over-current device (breaker) 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 only for motor starting.

6. The pump station shall be of the submersible type. Other types of stations may be approved by the Engineering Services Division of the Little Rock Water Reclamation Authority where circumstances justify their use.
7. The pump station must contain at least two pumps designed for pumping sewage. Grinder-type pumps shall be considered as standard, and other pump types shall not be installed without the approval of LRWRA Engineering Services Division. Pumps shall be under a positive suction head during normal operation.
8. Control systems shall be of the encapsulated float type, which shall be Anchor Scientific Model SM40NO Mini Floats. 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). Low level float switch arrangement shall be normally closed (Anchor Scientific Model SM40NC). Provisions shall be made to automatically alternate the “Lead” pump. Provide Siemens alternator part #47AB10AD 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. Designer shall provide run time calculations with the project submittal.
11. The wet well floor and pump intakes shall be designed to prevent deposition of solids. The wet well 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. All piping and fittings within the wet well shall be stainless steel.
14. A sign identifying the Pump Station name and street address as well as contact information for Little Rock Water Reclamation Authority as the Owner shall be provided and clearly displayed.

15. 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. All 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. 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-off 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. For 3” and larger discharge piping, check valves with lever and weights and resilient seat gate valves on the discharge line of each pump. For 2” discharge piping, stainless steel swing check valves shall be installed. The check valves shall be installed between the gate valves and the pumps and shall be suitable for the material handled.
 2. In-line tees with 2”x3/8” NPT plugs shall be furnished between the pump and the check valve, on each discharge line from the station.
 3. In-line tee with 4” gate valve on branch (gate valve shall be same size as discharge piping if less than 4”) and a 4” quick-connect coupling on the discharge side of the discharge tee.
 4. For pump stations with 2” discharge piping, an in-ground external valve vault, the same diameter as the wet well shall be provided, in which shall be housed the in-line tees, the check valves, and the gate valves, as well as the discharge tee connecting the two pumps to the effluent force main, and the quick-connect assembly and valve. No valves shall be installed in the wet well except as may be integral with the pumps as furnished.
 5. For pump stations with 3” and larger discharge piping, no valve vault will be required. The discharge piping for each pump shall instead turn up, and the inline

tees, check valves, gate valves, and discharge tee shall be installed with their centerlines 34" above ground, and with adequate supports provided for each valve and fixture. A concrete slab shall be placed below the above-ground fixtures, per Section 1.03.A.2.b of this specification.

6. Ductile iron influent line.
 7. Stainless steel guide rails.
 8. Wet well vent to atmosphere with 180 Degree turndown, screened with stainless steel screen.
- C. 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.
 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 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, and 02734.

1.04 INDIVIDUAL PRIVATE GRINDER PUMP STATIONS

- A. Individual grinder pump low pressure sewer systems shall connect to the LRWRA sewer system at a gravity sewer manhole, unless otherwise approved by LRWRA.
- B. Businesses with public restrooms shall be equipped with duplex grinder pump stations (two pumps at a minimum).
- C. Small diameter pressure sewer systems incorporating the use of individual home grinder pump units will be allowed on a case-by-case basis subject to approval of LRWRA. In general, these systems shall only be considered in locations where the surrounding area is currently served by sanitary sewer and the site cannot be sewerred by gravity.
- D. The design, installation, ownership and maintenance of the grinder pump station and building force main to the point of connection with the LRWRA owned collector force main or gravity main sewer shall be the responsibility of the property owner.
Furthermore, should the discharge of the building force main is to connect to a public force main, the property owner must demonstrate that the proposed individual grinder pump system and associated piping can adequately operate against the system pressure of the public force main. If requested by LRWRA, the provision of pump system curves and calculations by a Professional Engineer licensed in the state of Arkansas may be required.
- E. The station shall be a complete factory-built and tested grinder pump unit(s), each consisting of a grinder pump core suitably mounted and anchored, tank, electrical quick disconnect (NEMA 6P), pump removal harness, discharge assembly/shut-off valve, check valve assembly, electrical alarm assembly and all necessary internal wiring and controls. All electrical connections from the grinder pump, alarm panel, and electrical supply must be approved by the City of Little Rock Building Code Division/Electrical Section.
- F. Grinder pump stations shall be complete with all appurtenances and form an integral system. The equipment shall be a product of a company experienced in the design and manufacture of sewage grinder. The company shall submit detailed installation and user instructions for its product.
- G. The Contractor shall submit to LRWRA for review and approval a sets of shop drawings, detailed specifications, and performance characteristics for all of the equipment and fixtures to be furnished and installed. The Shop Drawings and equipment data shall be submitted with a cover letter; Contractor's stamp of approval; and, if requested by

LRWRA, an Engineer of Record's stamp of approval indicating that the design was reviewed, checked, and approved. LRWRA will review the submittal and render a decision in writing as to the acceptability of the equipment.

- H. The Wet-Well/Tank of the integrated Grinder Pump System shall be a design made of High Density Polyethylene (HDPE) or Fiberglass Reinforced Plastics (FRP) construction and shall have a minimum volume of 100 gallons at High Level Pump activation. The Tank shall be designed for direct burial and withstand exposed external soil and hydrostatic pressures. The tank shall be furnished with a factory installed PVC inlet flange to accept a 4.50" OD (Residential) or 6.625" OD (Commercial) connecting inlet pipe. The Tank shall include a lockable cover assembly for watertight operation with a load rating of 150 lbs per square foot. The cover shall also include an integral 2-inch by 10 foot vent. The station shall have all necessary penetrations factory sealed and tested. No field penetrations shall be acceptable.
- I. The grinder pump discharge piping shall be equipped with a factory installed, gravity operated, flapper-type integral check valve. The check valve must provide full-ported passageway when open. All metallic components of the check valves shall be 300 series stainless steel.
- J. The Grinder Pump System shall incorporate an Alarm Panel in a NEMA 4X, UL-listed enclosure suitable for wall or pole mounting in a nearby conspicuous location. The Alarm panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. The alarm circuit shall include an external audible, a visually illuminated alarm, push-to-run switch, and High Level alarm operation. The High Level alarm operation shall activate the audible and visual alarms upon liquid levels exceeding the High-High level in the wet-well and activate the redundant pump starting system. The audible and visual alarms will remain on until the liquid level in the wet-well drops below the "off" level switch. All electrical connections from the grinder pump, alarm panel, and electrical supply must be approved by the City of Little Rock Building Code Division/Electrical Section.
- K. Upon initial installation and before occupancy, the home-owner/builder shall notify LRWRA for a field and open trench inspection of the individual grinder pump system, service line influent piping, low pressure private force main, and connection to the public

sanitary sewer main. Furthermore, the operation of the grinder pump system must be verified before approval by LRWRA. The operational test shall consist of filling the wet-well with clean water, activation of the pump, verifying sufficient drawdown, verifying the visual and audible alarms occur at High-High wet-well liquid levels, and that check valves are functioning such that pumped out liquids do not return into the wet-well. Upon successful completion of the grinder pump system operational test, LRWRA shall provide documentation that the system is approved for use.

END OF SECTION 02000