



City of Villa Rica
Wastewater Department
571 West Bankhead Hwy
Villa Rica, GA 30180

WEST PLANT
(770) 459-7015

NORTH PLANT
(770) 459-8302

MICHAEL KAUFFMANN

Lift Station Requirements

Lift stations must be designed by a Professional Engineer licensed by the State of Georgia and comply with the following City standards:

1. Design calculations, signed by a Professional Engineer, must be submitted to the City for review and shall contain the following computations:
 - a. Capacity at peak flow
 - b. System head - tabulated and plotted on pump performance curve
 - c. Cycle time - including starts per hour for peak flow and average flow conditions
 - d. Buoyancy calculations
 - e. Storage volume - show volume of storage available in the even of a power outage
2. Drainage basin flow shall be calculated for the natural drainage basin area flowing into the proposed lift station. Flow calculations shall be based upon acreage, usage per established zoning, anticipated densities and development type if there is evidence of potentially greater wastewater flow being generated in excess of established zoning.
3. The lift station influent line invert shall be set so that all upstream gravity flow into the lift station can be achieved. The influent pipe shall be sized at a minimum slope per "10 State Standard" for basin flow with a peaking factor of 3.0 (or greater as specified by the City). This influent pipe shall be connected to a manhole located 5 feet outside the pump station fence.
4. The lift station shall be sized based upon the anticipated upstream flow that will be realized in a seven-year period of basin development. The amount of development in a basin is judgmental and will be determined by the City.
5. The wet well shall be sized for peak flow conditions using a peaking factor of 3.0 (or greater as specified by the City). The allowable number of pump cycles per hour shall be determined by dividing the pump manufacturer recommended pump starts per hour by 1.3. The wet well shall have a plugged stub so that an additional wet well can be installed and interconnected when future flows dictate additional wet well storage. The stub out shall be at least as large as the influent pipe.

6. Pumps must be submersible pumps as manufactured by FLYGT, unless otherwise specified by the City. Pump control and level sensing equipment must be manufactured by FLYGT. Level sensing equipment shall be a transducer type capable of measuring depth over the full range of expected and unexpected pumping conditions. Access panels, guide rails, and related equipment shall be manufactured by FLYGT. Access panels shall have an internal grate which prevents accidental falls while the main lid is open. Three complete sets of O & M manuals and keys shall be provided for the pumps and all keyed panels.
7. The lift station shall sit on a plot at least forty feet by forty feet square. This plot should be at least 150 feet away from any area designated for public use or recreation and 100 feet away from the nearest home or business. The City will consider locations closer than this with a vegetative barrier on a case by case basis. The area inside the fence line shall be filled in with gravel to a depth sufficient to allow for vehicle access and sufficient drainage during rain events.
8. The lift station layout shall be such that a driveway will access the pump loading point. The lift station access drive shall be paved. The pump station driveway slope shall not exceed 10%. Drives shall be a minimum 12 feet wide inside a 20 foot right-of-way using eight inches deep crusher run per Georgia D.O.T. standards. The sub-base shall be compacted to 95% standard proctor per ASTM D698 standards. A turn-around shall be provided outside the front gate.
9. The pump station layout shall be configured so the station can be expanded to the ultimate size to pump the ultimate upstream flow. Initial and future land requirements including access for the pump station shall be obtained by the developer and donated to the City in fee simple.
10. The force main shall be sized for a minimum of two feet per second flow with the pump station operating at minimum flow. All force mains shall be ductile iron pipe. Force mains shall have concrete thrust blocks as required at all bends. All fittings shall be mechanical joints. Air release valve locations and sizes shall be as required by the City. Sewer force mains must be marked by tape to identify the pipe as a sewer force main in order to prevent accidental water service taps.
11. Pump motors shall be sized for the ultimate basin flow. Pumps shall be sized when possible so that ultimate basin flow conditions can be achieved by increasing impeller size.
12. Surge valves shall be utilized when force main surges are in excess of 150 PSI. Surge valves shall be mechanical and shall be field adjustable from 0 to 100% of the rated pressure capacity.
13. Either cushion swing check valve or hydraulic activated pump plug valves shall be used on the pump discharge as directed by the City. Pump check valves shall have adjustable rapid closure in the event of power failure. An accumulator system shall be utilized to actuate plug check valves in the event of water pressure failure. The accumulator shall operate all valves through two complete open and closing cycles. Check valves shall be located in a separate dry pit with a concrete bottom. The pit access panel shall be manufactured by Flygt and shall be a minimum of two and a half feet square. This pit should drain into the pump station.

A sump with an automatic sump pump may be approved if it can be shown a drain would be inappropriate. Both the valve pit and the wet well should be constructed in a manner which prevents ground water from entering the pits.

14. Dual electric feeds shall be provided from the utility grid when available.
15. Building architecture shall be per the requirements of the City. For pump station with pumps in excess of 120 hp, motor starters, motor control centers, and miscellaneous electric controls shall be housed in a building. Pump control panels for stations below 120 hp shall be pedestal mounted in a NEMA 4 enclosures.
16. Lift Stations shall have telemetry installed to monitor power failure and generator status, wet well levels and alarm conditions, pump failure, seal failure, hour meter readings, and other sensing points as required by the City. Telemetry shall be capable of turning pumps on and off, acknowledging and resetting alarms, and resetting starters.
17. Lift stations shall have a six foot high security fence. The security fence shall have the following properties:
 - a. One-piece galvanized fence fabric of No. 9 gauge (0.148 inch) steel wires of 2 inch mesh.
 - b. End, corner, gate, and pull posts with a minimum 2.875 inch O.D. steel pipe rated at 5.79 pounds per linear foot.
 - c. Line posts spaced a maximum of 10 feet on center with a minimum 2.375 inch O.D. steel pipe rated at 3.65 pounds per linear foot.
 - d. Top rail of 1.66 inch O.D., 2.27 pounds per linear foot, manufacturer's longest lengths, with expansion type couplings, approximately 6 inches long, for each joint.
 - e. Manufacturer's standard tension wire system, finished to match the fabric, should be provided at the bottom.
 - f. Provide manufacturer's standard adjustable brace at the end and gate posts and at both sides of corner and pull posts, with horizontal brace located at mid-height of fabric, using 1.66 inch O.D. pipe for horizontal bracing, and truss line to posts with 0.375 inch diameter rod and adjustable tightener.
 - g. One weathertight closure cap should be provided for each tubular post with openings to permit passage of top rail.
 - h. Manufacturer's standard barbed wire supporting arms, metal and finish to match framework, with provision for anchorage to posts and attaching 3 rows of barbed wire to each arm. Supporting arms may be either attached to posts or integral with post top weather cap and must be capable of withstanding 250 pounds of downward pull at outermost end. Provide one for each post with a single 45 degree arm for 3 strands barbed wire.

- i. Provide 2 strand twisted barbed wire with 4-point barbs spaced not more than 5 inches on center, of metal and finish matching fabric.
- j. Provide stretcher (tension) bars of one piece length to full height of fabric, with minimum cross-section of 3/16 inch x 3/4 inch. Provide one stretcher bar for each gate and end post, and two for each corner and pull posts, except where fabric is integrally woven into post.
- k. Provide stretcher bar bands with a minimum thickness after galvanizing of 0.078 inch and minimum width of 3/4 inch. Space not over 15 inches on center to secure stretcher bars to end, corner, pull, and gate posts.
- l. Provide a double gate at least 12 feet wide. Fabricate perimeter frames of gates of minimum 1.90 inch O.D. pipe from metal and finish to match fence framework. Assemble gate frames by welding. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware, and accessories.
 - i. Provide same fabric as for fence. Install fabric with stretcher bars at vertical edges and at top and bottom edges. Attach stretcher bars to gate frame at not more than 15 inches on center.
 - ii. Install diagonal cross-bracing consisting of 3/8 inch diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.
 - iii. Extend end members of gate frames 1 foot above to member and prepare to receive 3 strands of barbed wire. Provide necessary clips for securing wire to extensions.
- m. Provide the following gate hardware and accessories for each gate, galvanized per ASTM A153, with finish to match fabric.
 - i. Provide hinges of size and material to suit gate size, non-lift-off type, offset to permit 180 degree gate opening.
 - ii. Provide a forked type latch.
- n. Provide U-shaped tie wires, conforming to diameter of pipe to which attached, clasp pipe and fabric firmly with ends twisted at least two full turns. Bend ends of wire to minimize hazard to persons or clothing. Tie fabric in line posts, with wire ties spaced 12 inches on center. Tie fabric to rails and braces, with wire ties spaced 24 inches on center. Tie fabric to tension wires, with hog rings spaced 24 inches on center.
- o. Provide concrete consisting of Portland cement, ASTM C 150, aggregates, ASTM C 33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 2500 psi, using at least four sacks of cement per cubic

yard, 1 inch maximum size aggregate, maximum 3 inch slump, and 2% to 4% entrained air.

Under no circumstances should installation and erection of the fence begin before final grading is completed.

There should be a double gate at least twelve feet wide positioned in such a manner that will allow a lift vehicle full access to both pits. The gate may only swing outward provided it will not enter a public right-of-way at any point in its swing radius. Whether designed to swing inward or outward, nothing within or outside the lift station should exist or be positioned in such manner as will interfere with the full opening radius of the gate.

NOTE: The above concrete specification will comprise the minimum standard for all concrete used in lift station construction except as otherwise specified in the City's building code.

18. Lift stations shall have a security light with a light sensor control allowing automatic activation at night time. In addition, a manual off switch shall be provided either within the control panel or in a waterproof, securable switch box attached to the light pole. The light pole shall be sixteen to twenty feet high and shall be located within the pump station fence.
19. A potable water supply line with a double-check backflow preventer is required on all lift stations. The water supply line must be capable of delivering a minimum of 20 gpm through a freeze-protected yard hydrant which must also be provided. The hydrant must be located within the lift station fence.
20. A wet well vent pipe with a bird screen is required on all lift stations.
21. All sewer lift stations shall have a minimum capacity of 2 hours detention time during peak flows. In addition, stations shall have either additional wet well storage for a total capacity of 24 hours at a reduced flow rate of 200 gpd per house or shall have a standby electrical generator with an electronic transfer switch that will automatically switch the station to generator power when the electric utility power system fails. The generator shall self-test at least once per week by running under load for a minimum of 30 minutes.
22. The level control systems, telemetry and generator and all associated equipment shall be of a brand, type and configuration acceptable to the City and compatible with the City's existing sewer lift stations.
23. The following is a listing of minimum requirements for generators:
 - a. The standby generator shall be commissioned in accordance with NFPA 110 Standards. Provide factory test, startup by a supplier authorized by the manufacturer, and on-site testing of the system.
 - b. The generator shall be housed in a weatherproof enclosure. Quiet site soundproofing shall be provided to reduce noise to 68 dB at a distance of 7 meters for natural gas

powered generators and 70 dB at a distance of 7 meters for diesel powered generators. The City will determine the generator fuel type on a case-by-case basis.

- c. The entire standby generator set shall be warranted for a period of five years from the date of commissioning.
- d. Outdoor weather-protective housing with critical grade exhaust muffler shall be installed. The housing shall have hinged side access doors and a rear control door. All doors shall be lockable. All sheet metal shall be primed for corrosion protection and finish painted with the manufacturer's standard color. Vibration isolators as recommended by the generator set manufacturer shall be provided. The generator must be mounted far enough away from obstructions to allow all doors to be opened 90 . All conduits and gas lines shall be installed underground. Equipment shall be installed on concrete housekeeping pads. Equipment shall be permanently fastened to the pad in accordance with manufacturer's instructions and seismic requirements of the site.
- e. Generator shall be supplied with all auxiliary systems necessary for operation (i.e. batteries, battery charger, block heater, etc.).
- f. Engine mounted, thermostatically controlled, coolant heater(s) shall be required for each engine. Heater voltage shall be as shown on the project drawings. The coolant heater shall be UL499 listed and labeled.

The coolant heater shall be installed on the engine with silicone hose connections. The coolant heater installation shall be specifically designed to provide proper venting of the system. The coolant heaters shall be installed using quarter turn ball valves to isolate the heater for replacement of the heater element. The quarter turn ball valves shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss.

An AC power connection box shall be provided for a single AC power connection to the coolant heater system.

The coolant heater(s) shall be sized as recommended by the engine manufacturer to warm the engine to a minimum of 100F (40C) in a 40F ambient, in compliance with NFPA110 requirements, or the temperature required for starting and load pickup requirements of this specification.

- g. The generator set shall operate at 1800 rpm and at a voltage of: 460 volts AC, three phase, four wire, 60 hertz. Voltage regulation shall be plus or minus 1.0 percent for any constant load between no load and rated load. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 0.5 percent.

Frequency regulation shall be isochronous from steady state no load to steady state rated load. Random frequency variation with any steady load from no load to full load shall not exceed plus or minus 0.25%. An electronic governor system shall provide automatic isochronous frequency regulation.

- h. The generator set shall be provided with a mounted main line circuit breaker, sized to carry the rated output current of the generator set on a continuous basis.
- i. The standby power system shall include an automatic transfer switch. Transfer switch shall be rated for 100% of full load. This switch shall be provided with indicators for all phases of operation and be equipped with a fully programmable timer for exercising the equipment. The switch must be selectable for load or no load. The switch shall be configured with in-phase transition or neutral delay.
- j. The generator shall be load tested at 100% full load on site for a period of four hours using resistive load banks. Notify the City inspector prior to test, and provide certification letter from the manufacturer.
- k. Three complete sets of O & M manuals and keys shall be provided for the generator and the automatic transfer switch.
- l. The generator control system must include a programmable control device to allow automatic start-up and test functions. Test functions can be programmed for daily, weekly or monthly testing. (This will be in the transfer switch) Connections for remote monitoring of function and failure must be provided.
- m. Pump stations are required to have continuous standby power. Generators shall be diesel powered with 100 gallons minimum fuel storage capacity or 24-hour operating time, whichever is greater. Fuel storage shall be accomplished by the use of corrosion-resistant double wall sub-base fuel tank only, no underground storage will be allowed. A leak detection device shall be provided in the interstitial space for sensing fuel leakage. The device contact shall be connected to the generator control panel terminals for telemetry.
- n. Generators can be obtained from the following manufacturers/representatives:
 - i. Caterpillar
 - ii. Cummins-Onan
 - iii. Kohler
 - iv. Baldor

The generator manufacturer shall provide a 60-month comprehensive warranty to include parts and labor. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, etc.
- o. The generator set shall be serviced by a local service organization that is trained and factory certified in generator set service. The supplier shall maintain an inventory of critical replacement parts at the local service organization, and in service vehicles. The service organization shall be on call 24 hours per day, 365 days per year.
- p. Transfer switches shall be in NEMA-4 enclosure obtained from the following manufacturers/representatives:
 - i. Cummins-Onan
 - ii. ASCO

- iii. Hubbell
- iv. GE Zenith

- q. The transfer switches shall be configured to switch back when power is restored to the station.

- r. A generator ground grid shall be provided. The ground grid design shall be in accordance with the National Electric Code (NEC) and subject to City approval.

- s. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than 4 hours in duration. Training date shall be coordinated with the facility owner.