

Sewer Lift Station Requirements

(Revised January 2024)

Authority

All sewer lift station designs must meet the design requirements of the North Carolina Department of Environment Quality “Minimum Design Criteria for the Fast-Track Permitting of Pump Stations and Force Mains”, adopted in June 2000, and 15A NCAC 02T.0300, in addition to the criteria developed by the City of Greensboro Water Resources Department.

General:

1. Gravity sewer extensions shall be utilized to provide services to all incorporated properties and growth tier properties for the City of Greensboro. Sewer pump stations are not allowed to service areas that can be serviced by gravity and will require special approval from the Water Resources Department.
 - a. The overall public benefit to a lift station and future basin planning is considered when determining the allowance of a public lift station. The design engineer and the developer must seek approval of the sewer pump station prior to submitting a plan through the Technical Review Committee (TRC) by requesting a service feasibility from the Water Resources Department.
2. Private lift stations shall not serve more than one property. Private lift stations are only allowed where gravity sewer exists adjacent to a property, but is not deep enough to serve all of the property. Private lift stations may be allowed where an existing condition could present a health hazard. Private lift station force mains are not permitted to tie into public force mains. Private force mains are not allowed in public right-of-way.
3. All public and private lift stations and force mains shall be permitted through the State of North Carolina. The City of Greensboro requires public and private lift stations and force mains that tie-in into the City of Greensboro system to be submitted to the Water Resources Department for approval. Detailed site plans and lift station specifications and drawings must be submitted to the City of Greensboro. All lift stations to be publicly and privately owned shall meet the State requirements. Publicly owned lift stations must meet the requirements outlined in this document by the City of Greensboro. A copy of all State permit submittals and final permits must be given to the Water Resources Engineering Division.
4. Detailed shop drawings and submittals shall be required on all lift station items to be publicly owned and maintained. Shop drawings shall be submitted to the Water Resources Engineering Division prior to the start of construction. Only approved materials shall be utilized on public lift stations. The Water Resources Department has 14 days to review shop drawings.

5. Provide a minimum of two hard copies and one bookmarked electronic copy of operations and maintenance manuals for all pumps and equipment prior to ownership transfer of the lift station to the City.
6. A pump draw down test and testing of all lift station equipment and communications is required for all new, retrofitted, and upgraded lift stations. These tests will take place prior to the ownership transfer of the lift station to the City. Water Resources Operations Division must witness and approve equipment start up prior to ownership transfer of the lift station.

Lift Station Sizing

7. Public lift stations must be sized appropriately to accommodate the total area of the sewershed, Future build-out conditions must be considered.
8. A calculation package shall be submitted to the Water Resources Engineering Division with the pump station construction plans and include at a minimum the calculations below for both lift station start-up flows and build-out flows. This must be submitted during TRC review.
 - a. Map with the contributing basin flow indicated
 - b. Peak and average daily flow calculations (start-up flows and build-out flows)
 - c. Total dynamic head calculations
 - d. Receiving sewer downstream calculations
 - e. System curve and pump curve analysis with operating points
 - f. Pump station flotation/buoyancy.
 - g. Minimum and maximum force main velocities
 - h. Pump station and force main detention times
 - i. Cycle times and proposed level settings
 - j. NPSH calculations.
9. Peaking flows applied to public lift stations shall be appropriate to the type of basin the lift station is serving. Although the State minimum peaking factor is 2.5, Greensboro typically experiences peaking factors of 4.0 or greater for most residential basins. Coordinate with the Water Resources Engineering Division to determine the appropriate peaking factor. The City does maintain flow records for all public lift stations.
10. The City of Greensboro will perform a wet weather modeling analysis of the receiving sewers downstream of the proposed lift station and force main. The engineer shall independently evaluate the capacity of the receiving sewers at the discharge location to determine that the system can handle the flow. Flow allocation permitting shall be completed by the Engineer and submitted to the Water Resources Engineering Division for approval.

Lift Station Type

11. Public lift stations shall be submersible style. A suction lift or a flooded suction may be approved on a case –by-case basis.
12. All wet wells shall be filleted to provide for direction of settled solids towards the pump intakes.

Materials and Equipment

13. Pumps: Acceptable pump manufacturers include Sulzer, Fairbanks-Morse, KSB, Flygt, Gorman-Rupp or as approved by the Water Resources Department.
14. Coordinate reliability criteria with the City of Greensboro for all public lift stations. All public lift stations shall be fitted with an emergency standby generator with an automatic transfer switch or a diesel engine bypass pump.
 - a. The automatic transfer switch panel shall be stainless steel.
 - b. Emergency standby generators are required for all lift stations over 15,000 gallons per day. For lift stations less than 15,000 gallons per day, install a means of connection for a portable power source or pump as determined by the Water Resources Department.
 - a. Generator: Cummins, Kohler or approved equal
 - b. Bypass Pump: Godwin, Gorman-Rupp or approved equal
 - c. Final design and specifications of the generator/pump unit shall be approved by the Water Resources Department. At a minimum, the specifications shall include size, voltage, and fuel source. Generator shall be sized for full load at max pumping capacity. Generator fuel tank sizing shall be for 100% load for continuous operation for 48 hours. When available to the site, the generator/pump fuel shall be natural gas. If unavailable, a propane-fueled or diesel fuel generator will be accepted.
 - d. All generators and bypass pumps shall be supplied with an enclosed/internal exhaust system. Enclosure is to be sound-attenuated. The generator shall have a battery charger, block heater, dry contact fault and run relays.
15. Control Building: Lift station controls shall be housed in an enclosed building. The building materials shall be approved by the Water Resources Department.
16. All exterior materials shall be stainless steel or aluminum. This includes, but not limited to, hardware, panels, junction boxes, struts, and conduits, unless otherwise directed by the Water Resources Department.
17. Gate valves shall be required on inlet pipes up to 18 inches; mains exceeding 18” will require a stainless steel slide gate, unless otherwise directed by the Water Resources Department.
18. All isolation valves shall be gate valves.

19. All wire shall be copper.
20. Provide spare pump seals. Other spare items may be required based on station sizing and manufacturers recommendations.
21. For lift stations that exceed 700 gpm, provide a flow meter on the discharge.
22. Provide a material handling plan of pumps and/or equipment to be approved by the Water Resources Department.

Instrumentation and Controls

23. Lift Station control panel(s) shall include, at a minimum, the following items:
 - a. LED Indicator Lights
 - i. Green: Pump Run
 - b. Inner door with mounted controls
 - c. Phase Monitor
 - d. As required by Water Resources, a visual display on outside of panels.
 - e. All wires are to be labeled and numbered with heat shrink labels.
 - f. All contacts and relays shall be pin-type. Blade-type is not allowed.
 - g. All panel labels are to be engraved phenolic.
 - h. Visual alarm shall be LED strobe type and red in color.
 - i. Audio alarm with a silence button located in an accessible location.
 - j. Provide one spare set of each type of fuse and relays. Other spare items may be requested depending on the station size, type, and components.
 - k. Exterior panel material must be stainless steel.
 - l. All electrical panels must have an electrical study performed and proper labeling in accordance with the NFPA 70E for Electrical Safety in the Workplace.
24. Communications:
 - a. SCADA system approved by the Water Resources Department.
 - b. Provide radio antenna and complete a cell reception study.
 - c. Channel signals shall be coordinated with Water Resources but should include 8 channels at a minimum. Run, wet well status, power failure, and pump trouble signals to be determined by the Water Resources Department.

Site and Location

25. Lift station property and access road must be deeded to the City of Greensboro.
26. The lift station wet well must be located a minimum of 150 feet from any buildings or homes. A minimum buffer zone of 40 feet should be established between the lift station fence and the property line.
27. Pump stations must be designed to minimize noise and odor to the surrounding area.

28. No portion of the site shall be within the floodway zone. All parts of the station and the access roadway shall be located 2 feet above the 100-year floodplain elevation as shown on the effective FEMA FIRM maps.
29. The access road shall be a minimum of 20-feet wide, compacted with a 12-inch layer of fresh clean ABC stone. A vehicle turn-around area must be provided that can accommodate a City combo truck. On stations requiring the use of a crane to pull pumps and other equipment, the turn-around provisions and access points shall be revised accordingly.
30. A driveway gate shall be provided at the road access to the lift station. Meet City of Greensboro Standard Detail #120.

Security

31. The lift station site, including all slabs, equipment, and utilities shall be enclosed in a security fence. All items located within the fenced area shall be at least five feet from the fence.
32. Surround the lift station site with a fence and locked gates. Gates shall be a minimum of 12-feet wide or as required by the City of Greensboro for access of the largest vehicle for maintenance staff. The fence shall be an 8 foot galvanized chain link fence with three strands of barbed wire or razor wire along the top for a total height of 9 feet. Gate and fence design shall meet relevant ASTM standards.
33. The station shall include adequate outdoor and indoor lighting to facilitate normal and emergency operation and maintenance activities. Provide a minimum of one LED security light mounted on a pole at least 15 feet above the ground, or as directed by the Water Resources Department. Adequate light shall be provided above door entrances and over outside equipment and the wet well.
34. Provide a red strobe and horn on building. Located in a spot that is visible from the driveway.
35. Provide an address sign on the front of the building visible from the driveway. In addition to the sign on the building, provide an address sign on the entrance gate to the lift station.

Water Service Connections

36. For sites where City water is available, a freeze-proof yard hydrant and a ¾ inch hose bib shall be provided at a convenient location for washing down the wet well.
37. Remote lift station sites shall be furnished with a 6-inch drilled well delivering 20 gpm, a water tank with a 35 gpm draw down capacity, and a system pressure of 60 to 100 psi. Guilford County Environmental Health shall be consulted for all well drilling activities.

38. All City water services shall include a meter setter, meter box, and RPZ. RPZ shall be provided in an approved above ground enclosure and shall have a 120V ground fault interrupter receptacle inside the RPZ enclosure. A main water shut off valve shall be inside the lift station fence. The water service size shall be based on the size of the wet well.

Lift Station Site Piping

39. Provide a gate valve on the force main between the valve vault and emergency bypass connection to allow the lift station to be isolated from the force main, unless otherwise directed by the Water Resources Department.
40. For all lift station site piping within the lift station fence, warning tape shall be installed 12” above the pipe indicating buried pipe below.
41. Provide an emergency bypass connection inside the fence but located downstream of the isolation valve. Bypass pumping connection shall be accessible.
42. Each pump shall have a designated gate and check valve. Check valves shall have external lever arms.
43. When surge relief is needed for the lift station, a pressure transient evaluation should be completed. Surge relief valves shall be sized and shown on Drawings.
44. All exposed piping, above ground piping, and other external non stainless steel hardware shall be adequately coated for corrosion protection with a black epoxy paint.

Force Mains

45. Force mains shall pump uphill. Gravity shall be installed to the ridgelines.
46. Force mains shall be ceramic epoxy lined ductile iron pipe (Protecto 401) or C900 PVC. Tracer wire shall be installed with all non-metallic pipe installation.
47. High spots on the force main should be avoided. In locations where this is not feasible, an air release or combo air vacuum/release valve shall be installed in a vault. The vault shall have a 3’ x 3’ corrosion resistant hatch. The vault shall be epoxy coated. Provide vault steps with a 3-foot extendable grab pole.. All valves and plumbing materials must be stainless steel. Ventilation of vault shall be considered on a case-by-case basis. Approved air release valve manufacturers include Crispin, ARI, Htec, or as approved.
48. As required and specified by the Water Resources Department, isolation valves should be placed at intervals along the force main.



49. Force mains shall be discharged in the lower portion of the manhole. Provide epoxy coating of the discharge manhole when a force main discharge is 8" or larger. A downstream corrosion evaluation may be required by the Water Resources Department.