

TOWN OF PITTSBORO

STANDARD SPECIFICATIONS

SECTION 5

SANITARY SEWER PUMP STATIONS

01. **GENERAL:** The work specified in this section includes all labor, materials, accessories, equipment and tools necessary to construct and install sanitary sewer pump stations, pumps, motors, electrical equipment and all appurtenances and accessories necessary to provide a complete and properly functioning sewer pump station. The Scope shall also include completion of site work, grading, access roadways and fencing.
02. **CRITERIA:** Before the Town of Pittsboro will approve a sewer pump station, the Town may require submittal of an alternative analysis comparing construction costs for the most feasible gravity sewer route to serve the project and the construction cost for an adequately designed pump station. The alternatives analysis shall include an annual operating budget for the proposed pump station including costs for routine maintenance, water for wash downs, fuel for backup generators, electricity costs for running pumps and area lights, mowing, etc. Pump stations will be considered only if construction costs for a gravity connection are greater than 2.5 times that of a pump station adequately sized and designed to the basin build-out. The Town of Pittsboro shall approve pump stations only if an alternate gravity route is not feasible.

The Owner/Engineer shall demonstrate that the receiving system has ample capacity to accept the discharge from the proposed lift station and force main. Force main discharges shall be designed to prevent scour or erosion of the receiving structure.

03. **STANDARDS:** All materials shall conform to applicable industry standards including American Society for Testing and Materials (ASTM), American Water Works Association (AWWA), Ductile Iron Pipe Research Association (DIPRA), American Association of State Highway and Transportation Officials (AASHTO), and American National Standards Institute (ANSI) as well as the requirements of Town of Pittsboro.
04. **LOCATIONS/EASEMENTS:** Pump stations shall be constructed in dedicated public easements or property deeded to Town of Pittsboro along with a dedicated access easement to the pump station site. Easements shall be dedicated to the Town of Pittsboro. Access easements shall be minimum 20 feet width. Pump station easements shall extend at least 10 feet outside the fence surrounding the pump station. The entire easement shall be maintainable; i.e., the site shall be on high enough ground to be well drained and level enough to permit full access by a vehicle and mower. An all-weather access drive shall be provided with a turn-around area adequate for large maintenance and seepage pump trucks. Site preparation, grading, planting and visual screening shall be per applicable Town of Pittsboro Zoning Ordinances.
05. **PUMP STATION REQUIREMENTS:** Along with 15A NCAC 2T .0200 (Waste Not Discharged to Surface Waters) and companion document "Minimum Design Criteria

for Pump Stations and Force Mains”, the following minimum requirements must be met in the design and construction of sanitary sewer pump stations and in order to obtain Town of Pittsboro approval for construction.

- A. Location and Capacity:** Pump stations shall be sited and/or graded such that the rim of the wet well and the surface components of the pump station are above the 100-year flood elevation. Wet wells shall be sized to be able to receive the build-out flow of the basin in which the pump station is to be constructed. Where applicable, pump stations shall be provided with easements as described above.
- B. Site Grading and Preparation:** Pump station sites shall be graded so that localized runoff is away from the wet well. Grading shall be performed to prevent standing or pooling water on the pump station site. The fenced-in area shall be dressed with minimum 4 inches of ABC stone, compacted and graded smooth. An all-weather access drive shall be provided with a turn-around area adequate for large maintenance and seepage pump trucks. Site preparation, grading, planting and visual screening shall be per applicable Town of Pittsboro Zoning Ordinances.
- C. Wet Well Capacity:** Wet wells shall be sized to be able to receive the build-out flow and the ultimate pump size required for the natural drainage basin in which the pump station is to be constructed.
- D. Wet Well and Valve Vault Construction:** Wet wells and vaults shall be pre-cast concrete, minimum 6-foot diameter, manufactured in accordance with ASTM C478, minimum compressive strength 4,000 psi. Joints shall be sealed with butyl rubber mastic per ASTM C990. The exterior of the joints shall be sealed completely with 6-inch butyl mastic tape. The interior of the joints shall be sealed neatly with non-shrink grout.

Interior surfaces of wet wells shall be completely coated with an approved epoxy liner system. Epoxy system shall be 100% solids, solvent-free two-component epoxy resin with select fillers to minimize permeability and provide sag resistance per the following minimum requirements:

Hardness, Shore D	ASTM D-2240	88
Tensile Strength	ASTM D-638	>7000 psi
Flexural Strength	ASTM D-790	>10000 psi

Epoxy liner shall be Raven 405, manufactured by Raven Lining Systems or approved equal.

Wet well top shall include an integrally cast aluminum access hatch, sized and positioned properly for the easy removal and installation of largest size pumps expected to be needed at the site.

Adequate wet well ventilation shall be included. Ventilation shall be through the top of the wet well, not the side. Vent pipe shall be of stainless steel or aluminum, including the screen. Vent shall be installed flush with bottom of wet well top, not protruding into wet well.

The valve vault shall be of adequate size to house all piping, equipment and appurtenances, providing minimum 12-inch clearance between vault walls and all working parts and all flange bolts. The valve vault shall be constructed so that flooding of the vault will not occur. The vault top shall include an integrally cast aluminum access hatch, such as by Halliday Products, sized adequately for service/removal/replacement of equipment.

- E. Access Hatches:** Access hatches shall be of high quality aluminum construction and possess an integral extruded aluminum channel frame incorporating a continuous concrete anchor and a 1-1/2 inch drainage coupling to be piped to "daylight" to allow proper drainage. Access hatches shall be by Halliday Products or an approved equal.
- F. Pump Hoist:** A pump hoist shall be provided at each pump station. The hoist shall be tall enough to remove the pumps fully from the wet well. The hoist and crank shall be sized to lift at least 2 times the weight of the pumps installed in the new pump station or 2 times the weight of largest size pump expected to be needed at the site. The hoist and all associated parts, mechanisms and accessories shall be of stainless steel.
- G. Pumps:** Pump stations shall be of the duplex submersible design. Each pump shall operate on a **dual guiderail system**.

Each pump individually shall be capable of pumping 2.5 times the average daily flow being accepted by the pump station. Design considerations shall be shown for pumping build out capacity of the natural drainage basin. Pump on/off levels shall be set such that the pumps cycle between 2 and 8 times per hour. Controls shall include an alternating relay switch (with LED indicator) such that the pumps alternate between cycles. Run time meters for each pump shall be included.

Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. All exposed nuts or bolts shall be type 304 stainless steel construction. All metal surfaces coming into contact with sewage, other than stainless steel or brass, shall be coated with a factory applied epoxy coating system.

Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile or Viton rubber O-rings. Seal shall be obtained by controlled compression of rubber O-rings without the requirement of a specific torque limit. Rectangular cross sectioned gaskets requiring specific torque limits

to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

- i. **Cooling System:** Each unit shall be provided with an adequately designed cooling system. The water jacket shall encircle the stator housing; thus, providing heat dissipation for the motor regardless of the type of installation. Impeller back vanes shall provide the necessary circulation of the cooling liquid through the water jacket. The cooling media channels and ports shall be non-clogging. Provisions for external cooling and seal flushing shall also be provided. The cooling system shall provide for continuous pump operation in liquid temperature of up to 104°F.
- ii. **Cable Entry Seal:** The cable entry seal system shall provide a competent watertight seal without specific torque requirements. The cable entry shall be of the poured seal cap type. The cable entry junction chamber and motor shall be separated by a terminal board, which shall seal off the pump/motor interior.
- iii. **Motor:** The motor and the pump shall be produced by the same manufacturer and UL and FM approved. The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31. The stator shall be heat-shrink fitted into the cast iron stator housing.

The motor shall be designed for continuous duty handling pumped media of 40°C (104°F) and capable of up to 15 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of cast aluminum. Thermal switches set to open at 125°C (260°F) shall be embedded in the stator lead coils to monitor the temperature of each phase winding. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel. The junction chamber shall be sealed off from the stator housing and shall contain a terminal board for connection of power and pilot sensor cables using threaded compression type terminals. Wire nuts or crimp-type connectors shall not be accepted.

The motor shall have a voltage tolerance of plus or minus 10%. The motor shall be designed for operation up to 40°C (104°F) ambient and with a temperature rise not to exceed 80°C. A performance chart shall be provided upon request showing curves for torque, current, power factor, input/output

kW and efficiency. This chart shall also include data on starting and no-load characteristics.

The power cable shall UL and FM approved and sized according to the NEC and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall be oil resistant chloroprene rubber. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet. Power cable length for each pump shall be sufficient for each pump to operate in either position in the wet well.

The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

- iv. **Bearings:** The pump shaft shall rotate on at least two bearings. Motor bearings shall be permanently grease lubricated. The upper bearing shall be a single roller bearing. The lower bearing shall be a two row angular contact ball bearings to compensate for axial thrust and radial forces. Single row lower bearings are not acceptable.
- v. **Mechanical Seal:** Each pump shall be provided with a tandem mechanical shaft seal system consisting of two independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro dynamically lubricates the lapped seal faces at a constant rate. The lower (primary) seal unit shall contain corrosion resistant silicon-carbide rings. The upper (secondary) seal unit shall contain silicon-carbide seal rings. Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment.

Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside. The seal system shall not rely upon the pumped media for lubrication.

- vi. **Pump Shaft:** Pump and motor shaft shall be the same unit. Shaft couplings shall not be acceptable. The pump shaft shall be of carbon steel C1035 and shall be completely isolated from the pumped liquid.
- vii. **Impeller:** The impeller(s) shall be of gray cast iron, Class 35B, dynamically balanced, and double shrouded non-clogging design having a long through let without acute turns. The impeller(s) shall be capable of handling solids, fibrous materials, heavy sludge and other matter found in wastewater. Impellers shall be full-vaned, not vortex. Mass moment of inertia calculations shall be provided by the pump manufacturer upon request. Impeller(s) shall

be keyed to the shaft, retained with an expansion ring and shall be capable of passing a minimum three (3) inch diameter solid. All impellers shall be coated with an acrylic dispersion zinc phosphate primer.

viii. Wear Rings: A wear ring system shall be used to provide efficient sealing between the volute and suction inlet of the impeller. Each pump shall be equipped with a brass or nitrile rubber coated steel ring insert that is drive fitted to the volute inlet. The pump shall also have a stainless steel impeller wear ring heat-shrink fitted onto the suction inlet of the impeller.

ix. Volute: Pump volute(s) shall be single-piece grey cast iron, Class 35B, non-concentric design with smooth passages large enough to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified.

The Owner shall provide the following spare parts at a minimum: any and all special tools required for maintaining or working on the pump, name of the authorized motor rewind shop for the supplied pump motor, impeller trimmed same as original equipment, mechanical seal, wear ring, etc.

Pumps approved for use by the Town of Pittsboro are Flygt, Fairbanks Morse, Goulds and Homa.

H. Motor Starters: Square D NEMA-rated motor starters shall be used. Furnish and install across the line type magnetic motor starters, unless otherwise required by pump manufacturer and approved by the Engineer. Motor starter shall be sized and provided by pump/motor manufacturer or supplier and warranted by same. Starter shall be 3 pole, with three electronic overloads, for 480V three phase motor. There shall be provided a red run indicator light, a three position "Hand/Off/Auto" selector switch and a run-time meter. Cover shall also include yellow "seal fail" and "thermal overload" lights for each pump.

I. High Level Alarms: High level floats and indicators shall be set per the standards of 15A NCAC 2T .0200. Pump station controls shall be configured to initiate a horn/buzzer and light beacon in the event of high wet well levels. The control panel shall be configured such that the high water alarm initiates an auto dialer to alert the Town of Pittsboro of the high water situation. A placard with an emergency phone number for a contact person with the Town of Pittsboro shall be placed in plain view on the pump station site.

J. Pump Station and Wet Well Appurtenances: Materials and equipment used on pump station sites, especially those within wet wells, shall be quality stainless steel and aluminum materials manufactured for outside use and use within corrosive environments. Galvanized and carbon steel materials will not be accepted where better quality stainless steel, aluminum or other corrosion/rust resistant materials are available. Wet well components shall be located and installed such that normal

routine maintenance activities may be performed without the necessity of physically entering the wet well.

Within wet wells, stainless steel materials shall be used wherever possible, such as for rails and chains, nuts and bolts, connectors, etc.

Above ground equipment shall be constructed or enclosed to protect from weather. NEMA (3R or better) enclosures shall be used for electric and control panels. Electrical components including conduit shall be designed and installed in accordance with NEC and NEMA standards for outdoor installations.

Pump guide rails shall be Schedule 40 stainless steel and shall be installed straight and plumb. The Contractor shall be required to demonstrate removal and replacement of each pump prior to the Town of Pittsboro accepting the work as complete. Pump removal and replacement shall be performable with reasonable ease using the hoist provided.

- K. Pump Station and Discharge Piping and Fittings:** All piping and fittings within pump stations and discharge structures shall be ductile iron, conforming to the same standards as those for water distribution. Piping shall be specified to match the hydraulic conditions of the pump station; i.e., the appropriate Class or Pressure Class of pipe shall be used. Fittings shall be appropriately and adequately restrained.

Uni-flanges shall NOT be used in wet wells. Dresser couplings shall not be used in wet wells without the written approval of the Town of Pittsboro. If Dresser couplings are approved, standard mechanical joint Dressers shall be used.

A minimum 4-inch quick disconnect fitting for connecting bypass pumping equipment shall be integral to the design and construction of discharge piping. Quick disconnect fittings shall be located such that they are easily accessed for use. Quick connect fittings shall be installed in the valve vault. The bypass piping shall connect to the discharge force main downstream from the isolation valve and check valve.

- L. Piping Connections to Wet Wells:** All piping connections to wet wells shall be performed in a manner consistent with standards for piping connections to manholes. Preferably, wet wells shall be ordered with factory fabricated and booted holes for piping connections. If field connections must be made, then holes shall be professionally cored and piping shall be booted or professionally grouted securely into place.

- M. Controls and Control Panels:** Pump controls shall be housed in a stainless steel NEMA 3R enclosure with locking hasp. The panel shall include a 3-pole circuit breaker for each pump and a magnetic contactor with quick trip ambient compensated overload block for each pump. Incoming power shall be 480 volt,

3 phase, connected to a terminal strip at the panel entry. Control power shall be 120 volts. If required, provide a properly sized control power transformer with primary over current protection. Individual 20 amp single pole breakers shall be provided in the panel for the pump controls and condensation heater. All circuit breakers, selector switches, pilot lights and control devices shall be visible and operable from an interior dead front panel.

Note: Lower voltage circuits for accessories including but not limited to alarm dialer (if required), utility receptacles, generator battery charger and block heater, area and panel lights, etc. shall be provided on a separate 120 volt branch (mini power zone). If required to form the mini power zone, provide a properly sized transformer with primary over current protection. These circuits shall not be served by the control transformer.

All electrical and control panels shall be equipped with permanent, weatherproof labels attached with stainless steel screws. Adhesive labels shall not be accepted.

- i. **Float Switches:** Provide 24 volt intrinsically safe DC power for the four float switches mounted in the wet well. Float switch activation shall energize 24 volt DC coil relays in the pump control panel. These relays shall seal in the float position and shall be used for control operations, panel door pilot lights and reporting to the alarm dialer, telemetry or SCADA system.
- ii. **Alternating Pumps:** The lead pump shall be alternated after each pump cycle. The lead pump shall be started when the "Lead Pump On" float is activated and shall run until the level drops below the "Pumps Off" float switch. If the inflow wastewater continues to rise to the "Lag Pump On" float level, the second pump shall be started, and both pumps shall run until the level drops below the "Pumps Off" float switch.

The "High Water Alarm" float shall be positioned below the "Lag Pump On" float, as indicated on the plans. When the "High Water Alarm" is activated, a flashing red light on top of the panel shall be energized. The "High Water Alarm" shall be wired to the alarm dialer, telemetry or SCADA system to initiate an alert of the alarm situation.

- iii. **Time Delay Relays:** The pump control panel shall have adjustable 0.1 to 1 minute time delay relays to prevent simultaneous restarting of pumps after a power outage.
- iv. **Thermal Switches:** Each pump shall have thermal switches in the windings of each pump. The pump control panel shall be designed to interrupt the control power to the pump starter to stop the pump when one of the thermal switches opens. The panel shall also have pilot lights in the panel door to indicate the high temperature conditions. The "Thermal Overload Alarm"

shall be wired to the alarm dialer, telemetry or SCADA system to initiate an alert of the alarm situation.

- v. **Seal Chamber Moisture Detection:** Each pump shall be equipped with a sensing system to detect moisture in the seal chamber. When moisture is detected in the seal chamber, a pilot light in the panel door shall be energized. The “Seal Failure Alarm” shall be wired to the alarm dialer, telemetry or SCADA system to initiate an alert of the alarm situation.
- vi. **Elapsed Time Meters:** Elapsed time meters shall be provided in the pump control panel to record pump run times. A relay or auxiliary contacts shall be provided for each pump that will be energized when the starter is closed. These contacts shall be used for the elapsed time meters and the pump run lights in the panel door.
- vii. **H-O-A Switches:** H-O-A switches shall be provided for each pump. A three-way switch shall be provided to control the pump alternations with the positions, “Pump 1 Only”, “Duplex Alternation” and “Pump 2 Only”. The switch shall allow the operator to select Pump 1 or Pump 2 only to respond to the “Lead Pump On” float switch or to have both pumps alternate as lead pump. The switch will normally remain in the “Duplex Alternation” position unless one pump is out of service.
- viii. **Indicator Lights:** Provide a red “run” light for each pump. Provide a yellow “seal fail” light for each pump.
- ix. **Alarm Buzzer and Light:** A weatherproof buzzer and flashing red light shall be provided on the pump control panel exterior to indicate an alarm situation. An alarm “Normal-Test-Silence” switch shall be provided to allow the operator to test the buzzer/light and to allow the buzzer to be silenced even if the alarm situation is present.
- x. **Lightning Protection:** The pump control panel shall be equipped with a lightning arrester. The arrester shall be silicon oxide varistor type, having current rating of 60,000 amperes and 1500 joules. The case material shall be PVC and the arrester shall be designed for panel service entrance voltage.
- xi. **Phase Failure Relays:** Each starter shall be provided with overload and phase failure protection. Devices shall be located between the control transformer and the starter. Each device shall monitor all 3 phases. Phase failure relays shall be Square D. The pump control panel shall have pilot lights in the panel door to indicate phase failure of pump(s). The “Phase Failure Alarm” shall be wired to the alarm dialer, telemetry or SCADA system to initiate an alert to the Owner of the alarm situation.

- xii. External Wiring Connections:** The pump control panel shall be pre-wired so that all external wiring connections can be made on a terminal strip located at the top or bottom of the panel with appropriately sized terminals. Terminal strips shall be located at least 4 inches from the walls of the panel box. A schematic wiring diagram shall be attached to the panel door interior.
- xiii. Condensation Heater:** A condensation heater shall be provided inside the pump control panel on its own 15 amp circuit.
- xiv. Alarm Dialer:** The alarm dialer shall be RACO Verbatim (8 inputs and 4 outputs) or approved equal. The alarm dialer shall initiate an auto dialer to alert of the following events: 1) high water in the wet well; 2) pump thermal overload; 3) pump seal failure; and 4) phase failure.
- xv. Conduit Seal Offs:** Conduit connections shall be professionally sealed so as to permanently prevent sewer gases, vapors and moisture from entering control panels or junction boxes. An approved explosion-proof sealant resistant to corrosive sewer gases and vapors shall be used to create a poured seal at all connections.
- xvi. Emergency Power and Automatic Transfer Switch:** The control panel shall be integrated with an automatic transfer switch to activate the emergency power generator in the event of a power outage, under voltage, overvoltage, phase reversal or phase loss.
- xvii. Panel Rack and Rain Hood:** Controls panels shall be constructed with an aluminum panel backboard and weather hood covering. The sides and top of the hood shall consist of 1/8-inch aluminum sheets; the back of the hood shall consist of a 3/16-inch aluminum sheet. The top front edge of the rain hood shall incorporate a gutter or no-drip edge. The rain hood and electrical/control enclosures shall be mounted to the posts using 1-5/8" Uni-strut channels and Uni-strut hardware.

The service panel hood shall shelter, at a minimum, the transfer switch, pump station control panel, main breaker, alarm dialer and auxiliary outlets. Hood shall provide a minimum 7-foot clearance. Braces, clamps and connectors shall be stainless steel with plastic washers. Posts shall be 4-inch round galvanized fence posts with maximum 4-foot spacing.

- N. Junction Boxes:** Electrical connections or junction boxes shall not be placed within vaults or wet wells. Junction boxes shall comply with NEC. Conduit shall be professionally sealed so as to permanently prevent sewer gases, vapors and moisture from entering control panels or junction boxes. An approved sealant resistant to corrosive sewer gases and vapors shall be used to create a poured seal at all connections.

Power and control cable connections between the control panel and the wet well shall include a junction box on the outside top or side of the wet well lid. The power cord and control cable junction box shall be stainless steel, NEMA 3R or better and mounted to the concrete structure with Uni-strut channel and hardware. Kellam grips shall be used below the box to restrain the power cord.

O. Power Supply for Sewer Pumps: The desired power supply to pump stations is 4-wire, 3-phase, 480 volt. Where 480 volt power is not available, the Engineer shall coordinate with Progress Energy to obtain the most robust 3-phase power available. In no case shall single phase power be allowed for pumps.

P. Emergency Power Generator: Diesel-powered emergency power generators shall be provided, housed in an outdoor-rated enclosure. The generator shall provide sufficient amperage to sequentially start all pumps and operate all equipment onsite. An integral automatic transfer switch, by the generator manufacturer, shall be supplied and integrated into the control systems.

A diesel fuel tank shall be integrally constructed with the unit and sized for a minimum run time of 24 hours under full load.

The Town of Pittsboro reserves the right to require that the generator be sized to provide adequate power for the build-out pumping capacity expected at the site.

Generators approved for use by the Town of Pittsboro are Caterpillar and Onan.

Q. Potable Water Source: Pump stations shall include a 1-inch potable water service on site. The water service shall be metered and shall be constructed to the standards cited in Water Main Construction specifications. The water service shall terminate with a frost-proof yard hydrant. The hose bib shall be installed inside the pump station fenced area. The meter box shall be installed immediately outside the pump station fence. An approved double backflow preventer shall be included in an approved insulated fiberglass enclosure. The cost for obtaining a metered service from the Town of Pittsboro shall be the responsibility of the Owner.

R. Fencing: The site shall be fully encompassed by a 6-foot tall chain link security fence. Fencing shall be 2-inch mesh fabric of 9-gauge, hot dipped galvanized wire with minimum 1.2 oz. per sq. foot zinc coating. Posts shall be standard O.D. steel pipe (Schedule 40) as follows:

Line posts 1-1/2" weighing not less than 2.72#/foot

Corner & gate posts 3" weighing not less than 5.76#/foot

Top rails, braces, and frames 1-5/8" weighing not less than 1.12#/foot

Posts shall be hot dip zinc coated not less than 1.8 oz. per sq. foot. Fence shall be constructed with a bottom tension wire, fastened every 2 feet. Three strands of zinc-coated 12-1/2 gauge wire with 14 gauge 4-point barbs every 5 inches shall be

installed at the top of the fence and gate using heavy pressed steel supporting arms.

A double swinging, 12-foot wide gate shall be installed providing easy access from to the pump station site and pump hoist.

- S. Force Mains:** Force mains shall be minimum 3-inch diameter and shall be sized in conjunction with the pump station pumps. Force mains shall be sized to maintain a minimum 5 feet per second flow velocity and shall not be subject to excessive head loss in the pipeline. Force mains shall be sized with consideration of the build out capacity of the natural drainage basin potentially served by the pump station.

Force main materials and construction shall be to the same standards as set forth in Water Main Construction specifications. Adequately sized combination air/vacuum release valves shall be placed at the high points along the force main.

- T. Odor Control and Spill Containment:** Approved odor control facilities shall be provided at pump stations with greater than 2,500 feet of force main. Chemical feed storage tanks shall be constructed or provided with adequate spill containment considerations.

- U. Lighting:** Adequate area lighting shall be provided at the pump station site. The lamp shall be mounted on a pole at least 15 feet high. The pole and mounting method shall be in accordance with the lamp manufacturer's recommendation and normally recognized standards such as those of Progress Energy. The lamp shall be a box-style lamp, casting light downward and limiting light spread, consistent with the Chatham County lighting ordinance.

The area light circuit shall be include a photocell and a toggle switch. The switch shall be located at the panel rack on the 120V circuit. The switch wiring and switch enclosure shall be weather proof and shall meet the minimum NEC requirements.

- 06. START-UP PROCEDURES and WARRANTY:** Authorized representatives from each major equipment supplier shall be on site for pump station start up. The attached check list shall be adhered to during start-up. No pump station shall be placed in service until ALL start-up checklist items are adequately addressed.

When all checklist items are addressed, the Owner must petition the Town of Pittsboro Board of Commissioners for final acceptance. Final approval and acceptance of the pump station must be issued by the Town of Pittsboro Board of Commissioners.

A one-year warranty period will commence upon the final approval and acceptance of the sewer pump station by the Town of Pittsboro. The pump station shall run and operate in a manner acceptable to the Town of Pittsboro during the warranty period. Any malfunctions or deficiencies cited during the warranty period shall be corrected immediately by the Owner/Contractor. At the discretion of the Town of Pittsboro,

significant malfunctions or deficiencies cited during the warranty period may warrant the re-starting or extension of the warranty period. It shall be the responsibility of the Owner, Contractor and Engineer of Record to guarantee the acceptable operation of the sewer pump station during the warranty period.

SEWER PUMP STATION START-UP CHECK LIST

- Demonstrate removal and installation of each pump using the supplied hoist.
Provide all equipment and accessories (grip eye, etc.)..... _____
- Demonstrate smooth operation of all access hatches.
Provide all accessories (hatch lock keys, etc.) _____
- Run lead pump - manual..... _____
- Run lead pump - lead float _____
- Run lag pump - manual..... _____
- Run lag pump - lag float _____
- Demonstrate pump off float _____
- Demonstrate normal float control sequence _____
- Demonstrate alternating relay function _____
- Demonstrate alarm float operation (light, buzzer, and alarm dialer)
- Confirm phone connection (dial tone),
dialer programming and test function of alarm dialer..... _____
- Demonstrate ATS function under simulated power loss condition _____
- Perform generator load bank test; provide certified results _____
- Demonstrate lead pump operation under generated power _____
- Demonstrate lag pump function (with lead pump running) under generated power ... _____
- Demonstrate generator exercise programming (set for "now" to demonstrate,
then program for time selected by Public Works Director) _____
- Perform drawtests. Demonstrate that pumps are operating on the published curve.
Provide certified results with flow and head plotted on curve..... _____
- Measure amperage draw on each power leg feeding pumps.
Demonstrate phase balance _____
- Demonstrate proper voltage in key locations of the electrical system,
particularly "low voltage" areas..... _____
- Demonstrate function of hood light, area light _____
- Provide inspection approvals from county inspector..... _____
- By law, Engineer's Certification (including calculations and as-built drawings)
must be submitted to the State before the station can be put in service.
Provide copy of report and as-built drawings..... _____
- Provide as-built drawings of both the pump station site and the electrical schematic.
Electrical schematic shall represent all as-built conditions and field alterations _____
- Provide all operation and maintenance manuals and contact information _____
- Provide Deed for Pump Station site _____