

Technical Specification 023

WASTEWATER PUMP STATIONS WITH SUBMERSIBLE PUMPS

1.0 General

- a) It is the intent of this specification to ensure that sewer pump stations that are permitted as public infrastructure and constructed in the service area of Brunswick County meet or exceed all applicable county requirements and all local, state, and federal rules and regulations as applicable.
- b) The Engineer should refer to the following guidance documents regarding pump station design and permitting:
 - 1) Brunswick County's Waste Water Pumping Station Design Guidelines.
 - 2) Brunswick County's Drawing Submittals required for a Sewer Pump Station in Brunswick County.
 - 3) North Carolina Department of Environmental Quality Minimum Design Criteria for the Fast Track Permitting of Pump Stations and Force Mains
 - 4) North Carolina Administrative Code, Title 15A, NCDEQ / DWQ, Subchapter 2T, Section .0100 through .1600, Waste Not Discharged to Surface Waters.
- c) County staff will assist the Engineer and the utility contractor as necessary to answer questions concerning pump station design, permitting, and construction.
- d) All conduits shall be Schedule 80 PVC unless otherwise approved.
- e) All conduit entries into electrical or SCADA / RTU panels shall utilize Myers watertight hubs, or approved equal.
- f) No conduit fittings (LB, LR, LL, Cs, or Ts) are allowed between panels - all conduits shall be installed as shown on County Pump Station Standard Details.
- g) All pump station components shall be installed as shown on the Brunswick County Pump Station Standard Details – no exceptions without prior approval of County Engineering and / or Public Utilities staff.

2.0 Pump Station Wet Wells and Pump Station Influent Manhole

- a) Pump station wet wells and the pump station influent manhole adjacent to the pump station shall be precast polymer concrete sections conforming to ASTM C 478 as manufactured by Armorock, Meyer Polycrete, or approved equal. Riser section joints shall be bell and spigot / ship-lap design seamed with butyl mastic

and / or rubber gaskets (ASTM C 990) so that on assembly the wetwell and / or manhole base, riser(s), and top sections make a continuous and uniform manhole structure. All fasteners, wedge anchors, bolts, hooks, etc., within the wetwell shall be Type 316 stainless or better – no mild steel will be allowed in wet well.

- b) Connections for jointing pipe to the wet well and influent manhole shall be cast or cored into either the base or riser sections and shall conform to ASTM C923. Flexible manhole sleeves or boots shall be utilized and made of high quality synthetic rubber terminating in a substantial serrated flange of the same material. The flange shall be secured to the wall of the wet well to form a tight water-stop seal. Penetrations shall not be allowed in the joints of the wetwell.
- c) Wetwell vent cap:
 - 1) 4” - Josam Vandal-Proof Vent Cap, Model 26704 or Smith, Model 1748
 - 2) 6” - Josam Vandal-Proof Vent Cap, Model 26706 or Smith, Model 1748
 - 3) Wetwell vent cap shall be factory coated with one (1) primer coat and two (2) top coats of the manufacturer’s standard hi-build, two-part epoxy paint to a minimum of twelve (12) mils dry film thickness.
- d) Float cable holders:
 - 1) Use six (6) hooks, 316 stainless steel
 - 2) Mount with 316 stainless steel anchors
 - 3) Approved products: Halliday Product Series J4A Cable Holder, Type 316 stainless steel or approved equal
- e) Interior coating of existing wetwells and influent manholes:
 - 1) Coat interior surfaces of wetwell with Raven 405 Epoxy System, Zebron 386, Duramar 1030 Sewerkote, or approved equal.
 - 2) The interior surface of the wet well shall be clean, dry, and free of all oil, grease, or other contaminants as required by the lining product manufacturer:
 - a) Coatings shall be installed at one hundred and twenty (120) mils nominal thickness. Contractor shall verify thickness during installation by the use of a wet film thickness gauge.
 - b) Coatings shall be tested for pinholes using approved spark test method (high voltage holiday detection equipment). The installation contractor will correct any defect found during the test. The installation contractor shall provide a one-year warranty to the County for materials and workmanship.

f) Wet well access hatch:

- 1) All access hatches shall include the Protective Grating Panel option by Halliday Products, Inc., or Safe Grate System by R.L. Carlson.
- 2) Fabricate access hatch from welded aluminum sections.
- 3) Opposite opening, dual hinged door access covers of one (1) inch aluminum treadplate – hatch must provide full clearance over both pumps for easy removal of the pumps.
- 4) Upper surface flush with wetwell top.
- 5) Fitted hatch with recessed latch.
- 6) Stainless steel safety chain or nylon coated stainless steel wire rope.
- 7) All hardware shall be Type 316 stainless steel.
- 8) Type 316 stainless steel supports bracing with a self-locking hinge mechanism.
- 9) Minimum loading rate for hatch covers: 150 lbs per sq. ft. live load.
- 10) Acceptable manufacturers: Halliday Products, or R.L. Carlson.

g) Other wet well appurtenances:

- 1) Comply with Brunswick County Waste Water Pump Stations Standard Details – contact County staff with any questions.

3.0 Submersible Pumps and Associated Equipment

- a) Approved pumps: Myers, Barnes, Flygt, Fairbanks Morse, ABS, or approved equal.
- b) Provide a factory authorized representative throughout duration of startup and performance testing. Factory representative shall remain on site until startup and performance testing has been accepted by Brunswick County.
- c) Required spare parts:
 - 1) Provide the following minimum spare parts to Brunswick County:
 - a) One complete set of pump seal assemblies
 - b) One complete set of pump bearings
 - c) One complete set of pump wear rings

- d) For non-Flygt pumps: one seal failure relay
 - e) One pump alternator
 - f) One set of each type of fuse used in duplex pump control panel and also in the SCADA / RTU panel
 - g) For pump stations with RVSS (softstart): one softstart motor starter
 - h) For pump stations with VFDs: one VFD motor starter
 - i) For pump stations with FVNR (across the line): one FVNR motor starter and one solid state overload module for the FVNR starter used
 - j) For pump stations built by a developer provide one (1) spare pump
- 2) Package all spare parts in one container and clearly identify on the container labeling the pump station the parts are for. Seal tightly and properly protect for long term storage. The utility contractor shall deliver the spare parts to the Brunswick County Public Utilities Field Operations Center warehouse at Supply, North Carolina.
- d) Warranty:
- 1) The pump manufacturer shall warrant the pump units being supplied against defects in workmanship and material for a period of five (5) years for normal use, operating, and service. The warranty shall be in printed form and apply to all similar units.
- e) Pumps:
- 1) General:
 - a) ANSI (125) lb standard cast iron flange fitting or cast with volute.
 - b) Pump components: cast iron, ASTM A48, Class 30.
 - c) All exposed fasteners and washers: Type 316 stainless steel.
 - d) Pump lift handle: Type 316 stainless steel.
 - e) Coating:
 - 1) Required on all components coming into contact with sewage.
 - 2) Pump exterior: PVC epoxy primer and a chlorine rubber paint finish.

- 2) Impeller:
 - a) Double shrouded non-clog type.
 - b) Gray cast iron, Class 30, balanced dynamically to 0.5"
 - c) Coated with one coat of alkyd resin primer.
 - d) Provide wear ring consisting of a replaceable stationary ring made of brass, drive fitted to the volute inlet.
 - e) Sliding fit between the impeller and the shaft with one key.
- 3) Volute: Single piece, non-concentric design.
- 4) Shaft: ANSI Type 420 stainless steel.
- 5) Bearings:
 - a) Two (2) permanently lubricated bearings.
 - b) B-10 bearing life of fifty thousand (50,000) hours.
 - c) Upper bearing: single deep groove ball bearing.
 - d) Lower bearing: two (2) row angular contact ball bearings.
- 6) Watertight seals:
 - a) Nitrile rubber o-rings.
 - b) Fittings: accomplish sealing by metal-to-metal contact between machined surfaces.
 - c) Gaskets, elliptical o-rings, grease or other devices are not acceptable.
- 7) Mechanical seals:
 - a) Tandem mechanical shaft seal system.
 - b) Operate the upper of the tandem set of seals in an oil chamber.
 - c) Upper seal set: one stationary tungsten carbide ring soldered to a holder of stainless steel and one positively driven rotating carbon ring to function as an independent secondary barrier between the pumped liquid and the stator bearings.

- d) Lower seal set: a stationary ring soldered to a holder of stainless steel and a positively driven rotating ring, both of tungsten carbide.
 - 1) Hold each interface in contact by its own spring system.
 - e) Seals shall require neither maintenance nor adjustment, and shall be easily inspected and replaced.
 - f) All seal hardware shall be stainless steel.
- f) Pump motor:
- 1) General:
 - a) Submersible type, designed for continuous duty, suitable for Class I, Division I application, and capable of sustaining a minimum of twelve (12) starts per hour. Motor shall be 3- phase, 60 cycles with the exception that motors (10) HP and less may be single phase if approved by County Engineering.
 - b) Integral motor and pump.
 - c) Air filled, squirrel cage induction, shell type design, Class F insulation system, Class F materials rated for continuous duty in 40°C (104°F) liquids.
 - d) Cast iron motor frame and end shields.
 - e) Stainless steel hardware and shaft.
 - f) Service factor: 1.15 minimum.
 - g) Minimum efficiency rating of 90%.
 - h) Minimum power factor rating of 85%
 - i) Stator:
 - 1) Heat-shrink fitted to shaft.
 - 2) Dip and bake in Class F varnish.
 - 3) Do not use bolts, pins or other fastening devices requiring penetration of the stator housing.
 - 4) Aluminum rotor bars and short circuit rings.
 - j) Each motor shall be equipped with sufficient length of type SEOW flexible power cable to reach the pump control junction box

termination without splices. The cable shall be double sealed and properly sized for the motor horsepower.

- 2) Cable entry water seal system:
 - a) Single cylindrical elastomeric grommet, flanked by stainless steel washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the entry body containing a strain relief function, separate from the function of sealing the cable.
 - b) Bear assembly against a shoulder in the pump top.
 - c) Separate the cable entry junction chamber and motor by a stator lead sealing gland or terminal board to isolate the motor interior from foreign material gaining access through the pump top – the use of epoxies, silicones, or other secondary sealing systems is not allowed.
- 3) Provide pre-lubricated motor bearings:
 - a) Minimum B-10 life of fifty thousand (50,000) hours.
- 4) Thermal protection:
 - a) Motor rated thermally to NEMA MG1-12.42.
 - b) Three thermostatic switches (one in each phase) in the stator windings.
- 5) Junction chamber:
 - a) Seal from the motor by elastomeric compression seal (o-ring).
 - b) Connect between the cable conductors and stator leads with threaded compressed type binding, post permanently affixed to a terminal board.
- 6) Seal protection:
 - a) Provide moisture detection device integral with pump/motor assembly.
- g) Discharge connection:
 - 1) Permanently installed discharge connection system.
 - 2) Pump(s) automatically connect to the discharge connection elbow when lowered into place and must be easily removable for inspection or service.

- 3) Accomplish sealing of the pump unit to the discharge connection elbow by a simple linear downward motion of the pump.
 - 4) Stainless steel sliding guide bracket to be an integral part of the pump unit.
 - 5) Guide the entire weight of the pumping unit by no less than two guide bars and press tightly against the discharge connection elbow with metal-to-metal contact. The weight of the pump shall bear against an accurately machined fitting to seal the mating surfaces against leakage when seated.
 - 6) A diaphragm, o-ring or other devices to achieve sealing of the discharge is not acceptable.
 - 7) No portion of the pump shall bear directly on the floor of the sump.
- h) Discharge elbow:
- 1) Gray cast iron: ASTM A48, Class 30
 - a) Vertical leg: ANSI Class 125 lb. flange.
 - b) Provide integral cast iron base.
 - c) If necessary size elbow with a reducer to reduce the maximum velocities and to match the discharge piping diameter.
- i) Guide rails (per pump):
- 1) Provide two (2) lengths of Schedule 40, Type 316 stainless steel pipe, with diameter as specified by the manufacturer.
 - 2) Type 316 stainless steel bottom and top pilot brackets.
 - 3) The utility contractor shall demonstrate to County staff the smooth and easy operation of pump removal by sliding the pumps up and down the rail system as part of the pump station operational drawdown test.
- j) Pump guides:
- 1) Attach to pump volute with stainless steel hex head cap screws.
- k) Lift chain:
- 1) Provide each pump and motor with Type 316 stainless steel lifting chain sized per manufacturer's recommendations – minimum (1/4) inch welded stainless steel link chain.
 - 2) Length to reach top of station plus an additional three (3) feet.

- 3) Attach upper end of chain to wetwell access frame with Type 316 stainless steel clip and stainless steel eye nut.
 - 4) Connect chain to pump using Type 316 stainless steel screw pin and shackle.
- 1) Hardware:
 - 1) All bolts, machine screws, nuts, washers, and lock washers for complete assembly of wet well access cover, guide rails, and discharge elbow to be Type 316 stainless steel.

4.0 Duplex Pump Control Panel

- a) Refer to Brunswick County Pump Station 1 – 50 HP Standard Electrical Details for a complete Bill of Material listing for all required duplex pump panel components for pump stations with across the line and / or soft starters.
- b) All furnished SCADA and pump controls shall be 100% compatible with the existing Brunswick County Utilities system. This shall include, but not limited to, all SCADA radios, PLCs, VFDs, enclosures, soft starters, NEMA contactors, network switches, and user interface touch screens. Materials specified in County Technical Specifications and Standard Details provide full system compatibility, adequate parts availability, wiring and communications compatibility, meet current dimensional requirements, and require minimum additional staff training and software.
- c) Enclosure:
 - 1) Acceptable vendors:
 - a) R. S. Integrators, Inc.
 - b) Lord and Company, Inc.
 - c) R. L. Haire Electric and Control, Inc.
 - d) Custom Control Unlimited, Inc.
 - e) Curry Controls, Inc.
 - 2) NEMA 4X, dead front enclosure, 304 stainless steel, gasketed with drip shield, factory applied white paint finish for heat reflection, listed to UL698A – *Industrial Controls Panels Relating to Hazardous Locations*.
 - a) Provide for support frame mounting with exterior flanges.
 - 3) Single 3-point lockable latch with pad locking provisions.

- a) Attach with stainless steel screws.
- 4) Removable aluminum inner swing panel:
 - a) Minimum thickness of (0.125) inch
 - b) Continuous stainless steel piano type hinge
 - c) Minimum horizontal swing of ninety (90) degrees
 - d) Removable painted steel back panel:
 - 1) (0.125) inch minimum thickness.
 - 2) Attach to enclosure on collar studs.
 - 3) Do not use self-tapping screws.
 - e) Engraved nameplates on door mounted hardware – attach with outdoor rated adhesive – no screws or penetrations into panel allowed.
- d) Motor starting and control components:
 - 1) For pumps 1 – 50 HP, provide NEMA rated reduced voltage solid state starter (RVSS – aka “soft starts”) as shown on the 1 – 50 HP Standard Details. Starters for smaller pumps may be a full voltage non-reversing (FVNR) starter with approval from County Engineering.

Acceptable products:

 - a) Square D Altistart 48 Series with bypass contactor
 - b) Square D Altistart 22 Series
 - c) Danfoss MCD 3000 Series
 - d) WEG
 - 2) For pumps larger than 50 HP the motor starters shall either be reduced voltage solid state (RVSS) or variable frequency drives (VFD).
 - 3) Acceptable products:
 - a) RVSS – same as Section 4.d)1).
 - b) VFD:
 - 1) Square D Altivar 61 Series

- 2) Danfoss Aqua Series
- 3) WEG
- c) Use motor starter contacts easily replaceable without removing the starter from its mounted position.
 - 1) Provide common power failure relay.
 - 2) Provide under voltage release and overload protection on all three phases.
- 4) Motor circuit breaker and operating mechanism:
 - a) Provide thermal magnetic circuit breaker having a minimum symmetrical RMS interrupting rating based on available fault current calculations.
 - b) Provide pad lockable operating mechanism on each motor circuit breaker.
 - c) Pump stations with pumps larger than 50 HP require an electrical building with pump disconnect switches mounted on the outside wall of the building within line-of-sight of the pump station wetwell.
- 5) Pump control electrical components:
 - a) Provide “H-O-A” (Hand – Off – Auto) switches for each pump.
 - b) UL rated, heavy duty, 600 VAC, NEMA 4X, oil-tight switches.
Acceptable products: Square D Class 9001 SK.
 - c) “Hand” position not to override motor overload shutdown.
 - d) Provide the following components with the panel:
 - 1) Pilot run light for each motor
 - 2) Condensation heater
 - 3) High level alarm indication light, **flashing** – same light will show **solid** for pump failure
 - 4) Alarm bell silence
 - 5) Duplex receptacle, 120 VAC, 20A, with in use cover
 - 6) Control relays
 - 7) Remote alarm terminals
 - 8) “Seal failure” indicator lamp

- 9) “High temperature” indicator lamp
 - 10) “Power on” indicating lamp
 - 11) Temperature failure reset
 - 12) Seal failure reset
 - 13) Area light control switch – mounted on area light pole
 - 14) Alarm horn – high wetwell level condition
- 6) Pump alternator relay:
- a) Provide electrical/mechanical industrial design, Class 47
 - 1) Acceptable product: Telemecanique CA2SKE2067
- 7) High temperature shutdown:
- a) Provide high temperature shutdown for each motor utilizing the temperature switches embedded in the motor windings on applicable pumps. Flygt pumps utilize a common seal failure / temp relay.
 - b) Under high temperature conditions the switch shall open, de-energize the motor starter and stop the pump motor.
 - c) Automatic reset type.
- 8) Moisture detector control (seal failure):
- a) Provide for each pump a switch sensor to detect moisture in the stator chamber.
 - b) Detection of moisture by the sensor shall not disrupt the motor starting circuit of the pump.
 - c) Motor shall remain operative until the seal failure problem is corrected and the control circuit is manually reset.
 - d) Flygt pumps utilize a common seal failure / temp relay.
- 9) Overload reset device:
- a) Operable without opening the inner swing panel – for pumps with RVSS (softstart) and VFD controllers this will require the programmer keypad to be mounted on the aluminum inner door.

- 10) Step Down Transformer
 - a) For 277/480 VAC sites only – NEMA 3R, 10kVA, transformer, 240/120 output, mounted on the outside of the pump control panel, with primary and secondary circuit breakers – refer to county standard details
- 11) Square D circuit breakers (Type QOU) breaker for:
 - a) Main double pole transformer supply
 - b) Control power and condensate heater
 - c) Duplex ground fault protected receptacle
 - d) Security area light
 - e) RTU power supply
 - f) Standby generator block heater
 - g) Standby generator battery charger
 - h) Siemens Odor Control Unit
 - i) Heat Trace for backflow prevention device
 - j) Spare # 1
 - k) Spare # 2
- 12) 3- position selector switch for alarm horn and light – OFF / LIGHT / HORN & LIGHT – setting switch to OFF must silence both the horn and light.
- 13) Flasher for alarm light - light to flash until acknowledged.
- 14) Transient Voltage Surge Suppressor (TVSS).
- 15) Provide power terminals and control terminals as noted on Pump Station Standard Detail sheets.
- 16) Design control sequence so that panel is functioning automatically again after a power failure and manual reset is not necessary.
 - a) Provide a time delay relay, user adjustable, 0 – 60 seconds, to prevent both pumps from starting simultaneously after a power failure – the “lag timer”.

- 17) Provide a terminal board for connection of line, pump leads and level sensors and controls as shown on the Pump Station Standard Details. This will require the use of Austin Stainless Steel Junction boxes located as shown on the Standard Details.
- 18) Provide elapsed time meter for each motor.
 - a) Six digits, non-resettable.
 - b) Indicate total run time in hours and tenths.
 - c) Approved manufacturer: ENM 750B212 Counter, 120 VAC, 6 ½ digit or equal
- 19) Provide high water alarm signal from:
 - a) Ultrasonic controller and float switch (> 50 HP pump stations).
 - b) Float switch (1- 50 HP pump stations).
 - c) Ultrasonic signal shall be 4 – 20 mA signal.
 - d) Float signal shall be an alarm contact switch.
 - e) Front panel mounted 3 position selector switch: OFF / LIGHT / HORN & LIGHT – the OFF selection will silence both the alarm and light.
 - f) Alarm light:

Mount above panel using an approved fitting to maintain NEMA 4X rating of enclosure, ie, use a Meyers Hub or approved equal.

 - 1) Acceptable products: Edwards part # 102PMBS-N5, 102LSSIN-N5, 102LSST-N5, 102LM-R.
 - 2) Alarm Horn:
 - a) 120 VAC, weatherproof housing, mounting lugs, conduit tap, mountable on side of control panel using an approved fitting to maintain NEMA 4X rating of enclosure, i.e., use a Meyers Hub or approved equal, Edwards part # 876-N5 or approved equal.
 - b) Horn and flashing light will operate simultaneously on a wetwell high level alarm condition.
 - c) All other alarm conditions shall activate a solid light but horn will not sound.

- 20) Control relays:
- a) General purpose plug-in tube base type.
 - b) Din rail mounted relay sockets.
 - c) Acceptable products: Idec or Square D.
- 21) Electrical schematic:
- a) Provide three (3) laminated electrical schematic diagrams of the pump controls including terminal board connections.
 - 1) Permanently mount one (1) schematic diagram on the inside of the enclosure door.
 - 2) Include one (1) schematic diagram on inside panel door document pouch.
 - 3) Provide one (1) schematic diagram to Brunswick County's Pump Station Division representative.
- 22) Wiring:
- a) Factory wired completely, except for power supply, motor, temperature switches and moisture sensor, connections, and mercury float switches. Submersible transducer to be used as primary level control on pump stations larger than 50 HP. Provide power terminal strips for emergency float switches.
 - 1) Comply with applicable standards of National Electric Code NFPA 70.
 - 2) Color code and number as indicated on factory wiring diagram.
 - 3) Control wire: MTW 90 degrees C #14 AWG.
 - b) Electrically ground all components to a common ground screw mounted on the removable back panel.
 - c) Group all wiring in plastic wire troughs except wiring from the 14-gauge back plate to the door shall be done in separate bundled harnesses for control circuits.
 - d) Provide sufficient motor lead wiring and level control wiring to make connections in the junction box.

- e) All conduit connections to electrical panels shall utilize a watertight fitting such as a Meyers Hub to maintain the NEMA 4X rating of the enclosure.
 - f) All conduits to be Schedule 80 PVC and must be terminated inside a Myers watertight hub or approved equal at all panel penetrations.
- 23) Float switch and motor power cable:
- a) Provide (4) floats: OFF, LEAD ON, LAG ON, and HIGH LEVEL

Acceptable manufacturer: Connery part #2902-B1S2CL-50 or equal.
 - b) Provide cable of adequate length to terminate in control panel junction box without splicing – typically 50 feet of cable per float and pump/seal/temp.
- 24) Switches, push buttons and indicator lamps: Square D Class 9001 SK
- 25) Station high level alarm light:
- a) Pump control and alarms:
 - 1) Utilize 4 - 20 mA signal from submersible level system (on > 50 HP pump stations) and float switches (on both 1-50 HP and > 50 HP pump stations).
 - 2) Provide individual remote alarm contacts.

5.0 Pump Station Area Lighting

- a) Enclosed and gasketed 400-watt Metal Halide light fixture with photo-electric cell and manual on/off switch and pole mounted per pump station Standard Details including pole foundation detail.
 - 1) Light: Lithonia Part # KAD400MR212PERPE1SPD04LP1CSWA.
 - 2) Light Pole: Lithonia Part # SSS255GDM19DDB.
- b) Light circuit to be protected by dedicated 120VAC, 20A, 1P, circuit breaker in control panel with a weatherproof switch with an in – use cover on the pole – refer to County Standard Details.

6.0 Discharge Force Main Pressure Gauge and Pressure Transducer

- a) Provide a pressure gauge on the common discharge force main inside the valve vault downstream of the tee – refer to Pump Station Standard Details – gauge shall be oriented and angled upward for ease of viewing from the vault opening:

- 1) Range - nearest available upper range above pump shut off head- typically this is either 0 – 100 psig or 0 – 200 psig.
- 2) Provide rounded type, stainless steel case, stainless steel bourdon tubes, glycerin filled, (1/4) inch NPT male bottom connection, stainless steel rack and pinion movement, white dials and black figures, and threaded ring case.
- 3) Gauge accuracy: within two (2) percent of the total scale range
- 4) Provide diaphragm isolators on all gauges – diaphragm material must be resistant to chemicals in the line being measured
- 5) Discharge Pressure Gauge and Pressure Transducer:
(Refer to Pump Station Pump Station Standard Details)
 - a) Pump stations that discharge to gravity sewer:

Install a (1/4) inch Type 316 stainless steel shutoff valve with Viton seals and (1/4) inch stainless steel piping connections – ball valve to be Whitey or approved equal.
 - b) Pump Stations that connect directly to an existing forcemain:

Install a (2) inch corporation stop and saddle on the common force main with a Type 316 stainless steel cross mounted to the corp stop. Install (2) inch stainless steel ball valves, with Viton seals, Whitey or approved equal, on each leg of the cross. On top of the cross install a pressure transducer as follows: Wika model IS-20, Range: 0 – 200 psi, Output 4 – 20 mA, 2-wire supply 10-30 VCD, pressure connection: G1/2B flush with original; electrical connection: vented cable NEMA 6, IP68, zero span, cable length 100', include diaphragm seal, Wika, Type 990.36, with (1/2) inch NPT. On the left side of the cross install the required pressure gauge per this section.
 - c) Refer to Pump Station Standard Details – Pressure Gauge and Pressure Transducer detail.

7.0 Primary Level Control Systems (Pump Stations > 50 HP)

- a) Level control system to be Dwyer Submersible transducer for pump stations with RVSS (softstart) pump controllers and VFD controllers.
- b) Refer to Brunswick County SCADA / RTU Standard Details for additional information on level control systems for pump stations > 50 HP.

8.0 Backup Level Control System (Pump Stations > 50 HP)

- a) Use four (4) float switches:
 - 1) Single action design, integrally weighted floats.
 - 2) Capable of withstanding water penetration under 25 feet of water.
 - 3) Micro switch type – Connery part # 2902-B1S2CL- 50 or approved equal.
 - 4) Seal in a polypropylene housing.
 - 5) Not less than fifty (50) feet of cable with polypropylene cord grips and mounting hardware.

- b) Provide for both pumps on and off operation:
 - 1) Refer to Brunswick County SCADA / RTU Standard Details.
 - 2) Design floats control circuitry so that the operation of the pumps under backup control is not contingent upon the operation of the submersible level controller or PLC.
 - 3) The backup floats will function as: OFF, Pump 1 ON, Pump 2 ON, HIGH LEVEL ALARM.
 - 4) In Float Backup Mode the pumps will not alternate as in normal operation mode.
 - 5) Provide for additional pumps (eg, a 3 pump station) accordingly.

9.0 Cushioned Swing Check Valves

- a) Cast iron body with bronze seating ring and stainless steel shaft for attachment of weight and lever with non-corrosive adjustable air cushioned shock chamber – install in valve vault such that the operating levers of both check valves face each other on the inside of the vault – not between the check valve and side of valve vault.
- b) Mount the cushioned chamber to the side of the valve body with piston operating in the chamber which will prevent valve closing without any hammering action.
- c) Shock absorption by air: adjustable closing speed
- d) Approved manufacturer: G. A. Industries, Inc.
- e) Ferrous surfaces of check valves shall be factory coated with one (1) primer coat and two (2) top coats of the manufacturer's standard hi-build, two-part epoxy paint to a minimum of twelve (12) mils dry film thickness.

10.0 Plug Valves

- a) One on each discharge pipe to permit either or both pumps to be isolated from the header. Plug valve shall be located inside the pump station valve vault.
- b) Use non-lubricated, tapered type, semi-steel body, flanged ends, ANSI 125 lbs. standard.
- c) Use drip tight shutoff plug mounted in stainless steel bearings.
- d) Provide (1/8) inch thick hand welded in overlay, no less than 90% nickel content on all surfaces contacting the plug face.
- e) Seat to be raised from the valve body and machined to a smooth finish.
- f) Provide bolted bonnet design:
 - 1) Allow repacking without removing the bonnet or actuator, packing should be adjustable.
 - 2) Packing to be replaceable, under pressure, valve open or closed with pressure on either side of the plug.
 - 3) O-ring seals or non-adjustable packing not acceptable.
- g) Plug valves shall have a two (2) inch square operating nut. Valves shall be positioned within the vault such that the operating nut is accessible with a valve wrench through the valve vault access hatch opening
- h) Approved manufacturer: DeZurik, Milliken, GA Industries, or approved equal
- i) Ferrous surfaces of plug valves shall be factory coated with one (1) primer coat and two (2) top coats of the manufacturer's standard hi-build, two-part epoxy paint to a minimum of twelve (12) mils dry film thickness.

11.0 Water Service at Pump Station

- a) Provide a one (1) inch service line and yard hydrant - protected by an approved backflow prevention device per pump station standard details
- b) Siemens Odor Control units, if required, will also require a water source that can be supplied by installing a tee on the one (1) inch service line downstream of the approved backflow prevention device – refer to pump station standard details.

12.0 Pump Station Fence and Access Gates

- a) Pump station shall have a single personnel access gate and a double vehicular access gate installed per county pump station standard details.

13.0 SCADA / RTU Antenna Tower

- a) Refer to Brunswick County Antenna Standard Detail.
- b) Minimum standard tower is the Rohn 65G, unguyed, self-supporting forty (40) foot tall tower, or approved equal. Actual tower height depends upon the radio signal strength as measured at the pump station site. Rohn towers taller than sixty (60) feet must be down guyed per Rohn requirements.
- c) Follow Rohn manufacturers foundation requirements
- d) Radio signal strength must be (-) 80 dBA or better for County acceptance – contact Brunswick County Public Utilities / Instrumentation and Electrical Division for assistance with radio signal strength analysis.

14.0 SCADA / RTU

- a) All SCADA / RTU panels shall conform to and be compatible with all existing and current Brunswick County SCADA systems as determined by County Engineering and Utilities Departments.
- b) Refer to 1 – 50 HP Pump Station SCADA / RTU Standard Detail drawings for pump stations up to 50 horsepower.
- c) Refer to Larger than 50HP Pump Station SCADA / RTU Systems Standard Detail drawings for pump stations larger than 50 horsepower
- d) Refer to Brunswick County Technical Specification TS 034: SCADA Control System for Sewer Pump Stations