GWINNETT COUNTY
DEPARTMENT OF WATER RESOURCES

SANITARY SEWER
PUMP STATION AND FORCE MAIN
DESIGN & CONSTRUCTION STANDARDS
FOR DEVELOPER INSTALLED SYSTEMS

REVISED MARCH, 2011

AUTHORITY AND SCOPE

The Sanitary Sewer Pump Station and Force Main Design & Construction Standards for Developer Installed Systems, states current policy and procedures of the Gwinnett County Department of Water Resources for extensions of the sanitary sewer system by private development and for development by other governments. Included herein are design standards, submittal policy, construction requirements, inspection and acceptance procedures, and other pertinent information relating to extensions of and replacements to the sanitary sewer system.

The responsibility and the authority to publish and to periodically update these standards are delegated to the Director of the Department of Water Resources in accordance with the Gwinnett County Code of Ordinances Section 114-90. Failure to comply with these standards is subject to enforcement including but not limited to cease-and-desist orders and administrative fines as well as civil or criminal enforcement as stipulated by the Code of Ordinances.

Effective on March 1, 2011.

Lynn Smarr, Acting Director

Date

Changes may be made to these standards at any time without prior notification. Readers are advised to find a current copy of these standards on the Gwinnett County web site. Standards for Sanitary Sewer may be obtained separately and are not included herein.
GWINNETT COUNTY DEPARTMENT OF WATER RESOURCES

SANITARY SEWER
PUMP STATION AND FORCE MAIN
DESIGN & CONSTRUCTION
STANDARDS
FOR DEVELOPER INSTALLED
SYSTEMS

Revised

March 2011
INTRODUCTION

The “Sanitary Sewer Pump Station and Force Main Design and Construction Standards for Developer-Installed Systems” state current policy and procedures of the Gwinnett County Department of Water Resources (GCDWR). Included herein are design standards, submittal policy, construction requirements, inspection and acceptance procedures, and other pertinent information. These Standards are issued and revised pursuant to the authority established by Gwinnett County code. Failure to comply with these Standards constitutes an infraction of the Code of Ordinances of Gwinnett County and may result in penalties or prosecution.

Specifications for Sanitary Sewer Standards may be obtained separately and are not included herein.

Changes may be made to the Sanitary Sewer Pump Station and Force Main Design and Construction Standards for Developer-Installed Systems at any time without prior notification. A current copy of these standards can be found on the Gwinnett County website.
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GWINNETT COUNTY DEPARTMENT OF WATER RESOURCES

SANITARY SEWER PUMP STATION AND FORCE MAIN DESIGN & CONSTRUCTION MANUAL

PURPOSE

The purpose of this manual is to aid the design engineer and contractor alike, in the design and construction of sanitary sewer pump stations to meet all Gwinnett County Department of Water Resources standard requirements. The sections and standard detail drawings included have been removed from the Sanitary Sewer Standards and this document now becomes the Sanitary Sewer Standards pertaining to Pump Stations and Force Mains.

APPROVAL OF PUMP STATION AND FORCE MAIN

The developer / owner must first meet with the Operations / Infrastructure Support Division (OISD) Division Director or designee. The (OISD) Division Director or designee must give approval for the design of a pump station and/or force main in Gwinnett County. If approved, a letter of approval will be sent to the Developer/ Owner and will include any associated fees that may be applicable. (These will be determined by the (OISD) Division Director or designee). A copy of this letter will be sent (via email) to the P & D Water and Sewer Review (WSR) department and GCDWR Engineering and Construction (E & C) department for information purposes. The P & D (WSR) department will record this information in a database so that it can be referenced during final plat sign off. The GCDWR (E & C) department will inform the inspections department and the DWR Operations department that a pump station and force main is beginning to be designed and will be located in Gwinnett County.

PUMP STATION AND FORCemain DESIGN SUBMITTALS

After the developer / owner receives approval for a pump station and force main design they must hire a Professional Engineer (registered in the state of Georgia) to review the GCDWR Pump Station and Force Main Design and Construction Standards and prepare a design submittal for review. After the developer/owner and engineer have determined what equipment is to be installed they will make the following submittal for approval. The submittal must include but is not limited to the following:

1. Plan design of the pump station layout (including grading around station and elevations.)
2. Force main plan and profiles including length, size and type. Begin at the Pump Station 0+00. Station 0+00 shall be set at the outside wall where the force main leaves the pump station wetwell (see Details PS-14 and PS-19).
3. Manufacturers’ details and specifications for the pumps, generator and transfer switch.
4. “Sanitary Sewer Pump Station Design Data” calculation form (See B1-B6) Examples (Ex3 – Ex8).
5. A copy of the entire force main profile beginning at the pump station must include the discharge point, air release valves, plug valves, elevations and stations labeled clearly. (see Example Ex1 – Ex2)
6. Pump and system curves shall be submitted as part of the design drawings.
Three (3) complete sets of the design drawings shall be submitted for review to the P&D Water and Sewer Review (WSR) Department. They will send 1 set to the GCDWR (OISD) and 1 set to GCDWR (E & C) Department for review. Allow at least four weeks from time of submittal for the review. The review comments will be returned to the Engineer to be addressed. After all corrections have been made and approved, the design Engineer will submit five (5) sets of the drawings to the P&D Water and Sewer Review (WSR) department. The design drawings will be stamped “Approved” by the OISD Division Director or designee and will be distributed as follows: Two (2) copies will be returned to the submitting Engineer, Two (2) copies will be sent to the GCDWR (E& C) Department and one (1) copy will be retained by the P & D (WSR) department. The contractor, for the developer may then obtain a "Construction Permit" for the installation of the pump station and the force main by presenting to the P & D (WSR) Permitting Clerk an approved set of drawings. Current permit fees will apply.

NOTE: THE INSTALLER OF THE PUMP STATION AND/OR FORCE MAIN MUST BE AN APPROVED GCDWR CONTRACTOR (SEE APPENDIX FOR APPLICATION FOR APPROVED CONTRACTOR’S LIST).

NOTE: A “CONSTRUCTION PERMIT” MUST BE OBTAINED AND A PRE-CONSTRUCTION CONFERENCE MUST BE HELD WITH THE DEPARTMENT OF WATER RESOURCES E & C INSPECTOR AND THE CONTRACTOR BEFORE ANY WORK MAY BEGIN!

PUMP STATION INSTALLATION

Because manufacturers’ delivery times of the pumps, control panels, cellular units, and peripheral accessories may vary widely, it is recommended that orders be placed for the equipment as soon as design approvals are received to avoid untimely delays at the time of final plat submittal for the development. Approval of the development is contingent upon complete acceptance of the pump station and force main. It is also recommended that application for the utility service (i.e. - electric, water, telephone and gas, if applicable) to the pump station be made as early as possible. Experience has shown that receipt of utility service is often a major source of pump station completion delay.

NOTE: PUMP STATIONS, FORCE MAINS, AND ALL RELATED APPURTENANCES MUST BE INSTALLED IN A PROFESSIONAL MANNER AND IN ACCORDANCE WITH ALL APPLICABLE BUILDING CODES, CONSTRUCTION STANDARDS, FEDERAL, STATE AND COUNTY REGULATIONS, ETC.

1.10 PUMP STATIONS

1.10.1 Pump stations will only be permitted when gravity sewer is unavailable to the property. Unavailable shall generally be interpreted to mean more than 5,000 feet down gradient, but this distance can be increased or decreased by GCDWR (OISD) Division Director or designee based upon actual field conditions, and the size of the project involved.

1.10.2 The developer shall furnish, install, dedicate and provide a one year warranty from the date of acceptance the entire pump station/force main system to Gwinnett County Department of Water
Resources (GCDWR). The system will be designed by the developer's engineer (Professional Engineer registered in the State of Georgia). The design must be reviewed and approved by the GCDWR Operations Infrastructure Support Division (OISD) Division Director or designee.

The designer shall consult with the GCDWR (OISD) Division Director, or designee, during the design of the system. The system shall be designed with all components sized to meet the development's flows adjusted for peaks. The developer may elect to size the system to meet future phases of his/her project or may upgrade the system at a later date to serve additional phases. Any such upgraded capacity shall be reserved for the developer (subject to availability of treatment capacity) for a period of three (3) years from date of final acceptance of the system. The reserved capacity shall only include the number of lots or commercial flow quantity as identified on plan submittals approved by GCDWR (OISD) Division Director or designee. The agreement for reserved capacity shall be in writing and approved by the (OISD) Division Director or Designee. Pump station equipment and force mains are manufactured in certain discrete sizes. The difference in capacity between the development's projected flow and the discrete size selected for the developer's project is not to be considered as belonging to the developer. Any such "extra" capacity beyond that reserved for the original developer becomes available for the county to utilize at its discretion. The developer may relinquish his reserved pumping capacity at any time by notifying the GCDWR (OISD) Division Director or Designee in writing.

The designer shall locate the pump station to drain the largest possible sub-basin(s) associated with the proposed development, which may mean that the pump station is actually located off-site. The GCDWR (OISD) Division Director or designee will investigate the service impact associated with future Gwinnett County needs within the sub-basin, and the potential installation of additional force mains required to serve the sub-basin that will drain to the pump station. If, in his/her opinion, an additional or larger force main(s) is to be installed concurrently with the developer's project the County may elect to participate in the design and installation of the force main. The County will pay for the cost of the additional main(s) or increase in the size of the developer/owners force main and additional pump station capacity as a betterment, (see section of Gwinnett County Sewer Design & Installation Standards concerning County Participation).

Generally, a pump station will not be allowed to be installed downstream from an existing pump station. GCDWR (OISD) Division Director or designee may, at their discretion, require that a gravity line be installed to carry flow from the existing pump station to the proposed pump station thus eliminating the existing pump station. GCDWR (OISD) Division Director or designee may, at their discretion, and in conjunction with the GCDWR Operations Division Director allow the developer to move some or all of the existing equipment and reuse it if practical. If the reuse of equipment is allowed, the developer must coordinate with the GCDWR Pump Station Operations Manager and assume complete responsibility for the handling of all flows during the transition period.

1.10.3 Site development plans and profiles must show:

a. Gravity system and connection to pump station (single influent only).

b. Force main design showing connection to existing system (Length, type, diameter, elevations, station numbers, valve locations, discharge point, existing and proposed utilities including storm drains, ground elevation and any other applicable information for force main installation).

c. District, land lot, address and parcel numbers of the pump station listed in the title block.
d. Property lines, property owners, parcels, road names, pavement width, and right-of-way width.

e. All existing and proposed utilities.

f. Design calculations (see pump station data submittal form) (B1-B6) included on one plan sheet.

g. A single line electrical drawing appropriately labeled showing power distribution for the pump station shall be included on a plan sheet.

h. Plan of the sub-basin, which drains to the pump station, to include contours and projected flow calculations for the entire sub-basin.

i. Plans and construction details for the pump station. Include applicable PS standard drawings PS1-PS29G.

j. All required easements with dimensions. A list of all easements required for the construction of the pump station and/or force main must be included on the cover sheet. The list will include easement size, property owner, land lot number, district number, and parcel number.

k. A list of all utility owners involved with the pump station including, but not limited to, the power company, gas company, and telephone company.

l. Plans shall be signed and stamped by a Professional Engineer (registered in the State of Georgia).

1.10.4 The Engineer’s pump station submittal package shall include:

a. Pump submittal with shop drawings and specifications including Wetwell Elevations.

b. Valve information and shop drawings.

c. Generator submittal with specifications and shop drawings, along with automatic transfer switch specifications and shop drawings.

d. Communication equipment submittal.

e. Single line electrical drawing showing power distribution for station.

f. Stamped by a Professional Engineer registered in the State of Georgia.

g. Site development plan and profile.

h. Preliminary surge (water hammer) analysis results shall be included for all force mains. If the preliminary estimate of the surge pressure exceeds 150 psi then a comprehensive surge analysis shall be conducted and results shall be submitted.

Surge analysis calculations results shall be submitted along with a statement by a Professional Engineer (registered in State of Georgia) that the surge (water hammer) for the proposed pumping station and force main will be within acceptable limits.
1.10.5 Pump stations shall be one of the following:

a. Flygt pumps are available from ITT, Inc.

b. Smith and Loveless pumps are available from Smith & Loveless, Inc.

c. KSB Submersible Pumps

d. Ebara Submersible Pumps - PSI Environmental

e. Flow serve Pumps - Carter VerPlank

1.10.6 All pumps must be supplied with a certified pump test curve from the manufacturer. All pumps must be able to pass a 3” solid.

1.10.7 Pump flows in a duplex station at peak capacity that result in velocities greater than 4 fps within the force main require that the force main size be increased to the next available size. Any deviation from this standard shall require approval from GCDWR (OISD) Division Director or designee prior to any submittals being delivered to GCDWR (OISD) department.

1.10.8 Required easements that are not being recorded on a final plat, (which includes all off-site easements), must be submitted to the Planning and Development Water and Sewer Review (WSR) section and must be on GCDWR’s standard easement form. All easements must be approved prior to plan approval.

1.10.9 T.V. and inspection fees shall be required for all gravity sewer lines according to the current fee schedule. Fees shall be submitted to the (WSR) section of planning and development department and are required prior to plan approval.

1.10.10 Based on pump design operating point, wet well shall be designed to provide available NPSH (NPSHa) with a margin of safety over the published Required NPSH (NPSHr) value based on Hydraulic Institute (HI) standards.

Following margins of safety are suggested:

NPSHa > 1.3 NPSHr, if the design operating flow is within the pump’s Preferred Operating Range (POR, 70% to 120% of the pump’s best efficiency point flow)

NPSHa > 1.8 NPSHr, if the design operating flow is in the pump’s Allowable Operating Range (AOR)

1.10.11 Pump selected shall be the most efficient pump available at the desired station design point as recommended by the pump manufacturer.

1.11 STATION LAYOUT

1.11.1 A buffer shall be placed around each pump station site. The buffer will extend 60 feet outside the fenced-in station. This buffer is required in residential subdivisions, and shall be indicated on the final plat. In addition, a permanent easement, dedicated to Gwinnett County, shall be provided to include the required fenced-in area, with an additional 5½ feet extending beyond the fence on all sides.
sides. A minimum access easement of 30’ wide is required for access to the pump station. This easement can be combined with the 20’ wide sewer easement or other utility easement.

1.11.2 A turnaround will be required. **For access roads less than 50’ a turnaround will be determined on a case-by-case basis.** Access roads shall require turnaround 40’ off the fence and 40’ deep with a 15’ radius to the driveway.

1.11.3 Concrete or asphalt is acceptable for driveway and turnaround.

1.11.4 Site plan to show finished grade contour lines (2’ intervals) in and around pump station and access road. Spot elevations shall be provided on station pad to show proper drainage (no storm runoff/drainage will be allowed to enter the pad-site and wetwell). Storm runoff/drainage will need to be diverted away from the pump station during construction. Provide a 14’ wide gate on 4’ diameter posts (see Detail PS 12 or PS 17). On all design plans and as-builds show a separate pump station site plan detail with access road and turnaround and a separate proposed structural vault detail.

1.11.5 Earth slopes around the pump station created by “fill” that are steeper than 3 to 1 must be stabilized with "rip-rap."

1.11.6 Backfill shall be placed and compacted in 8-inch lifts (maximum) in horizontal layers 8 inches (maximum) in depth. All fill shall be compacted minimum to neither 95% of maximum dry density at not less than 2% below nor more than 2% above the optimum moisture content as determined by ASTM D 698. A minimum of two compaction tests taken at every five feet of backfill around the wetwell is required. A **certified letter of compaction and/or subgrade suitability** shall be provided to the GCDWR E & C Inspector prior to pouring the station pad.

1.11.7 Site plan to show all existing and proposed utilities. **All utility meters must be properly mounted outside of fenced station. If gas is required gas pipe must be buried underground.**

1.11.8 Water meters and backflow devices shall be set at the right of way.

1.11.9 A copper **portable water service with an acceptable** double check valve backflow RPZ prevention device must be provided. A **frost-proof yard hydrant must be installed with 50’ of 3/4” nylon reinforced garden hose with brass nozzle provided.**

1.11.10 Install a 120 V high-pressure sodium security light on a 20’ breakdown pole with automatic eye and pole lowering winch. **Pole must be painted architectural brown (see Detail PS-4).**

1.12 **PUMP STATION PAD**

1.12.1 A minimum **4-inch** thick reinforced concrete pad shall have 0.5% fall away from station in all directions. Concrete must extend 6” past fence post all the way around fence. Reinforcing steel shall be used in the slab. Appropriately sized reinforcing steel shall be used in the slab. Asphalt is not acceptable for the pad.

1.12.2 Pump station pads for Duplex, pump stations with 50 hp pumps or smaller shall be 31’ x 41’ minimum in size. Pump station pads for Duplex pump stations with pumps greater than 50 hp shall be 51’ x 51’ minimum in size. Triplex pump station pad sizes must be submitted for approval by GCDWR E & C inspector. The contractor shall notify the GCDWR E & C inspector
48 hours prior to pouring the station’s concrete pad. The GCDWR E & C inspector must be on site during concrete pour.

1.13 **PUMP STATION FENCE**

1.13.1 Fenced areas for all stations are to be a minimum 30’ x 40’. Fences are to be installed using 8-foot high #4 chain link wire with top rails and bottom tension wires, 3 strands of barbed wire at the top on angled extension arms, posts in 3’ of concrete spaced 10’ apart, and PVC fence slats (color: architectural brown). (See Detail PS-12A and PS-17 for pump station layout) Access road is to be paved 15 foot width minimum. The turnaround shall begin at 20’ from the fence, be 20’ deep and 20’wide with a 15’ radius to the driveway (refer to 1.112 for larger pump station turn around requirements).

1.14 **SPARE PARTS REQUIRED**

1.14.1 Provide one spare air and vacuum relief valve for every 5 ARV’s installed. If applicable, a minimum of 1 spare ARV per force main is required.

1.14.2 For Smith & Loveless above ground suction pump (AGSL), provide two extra sets of seals per model of pump, one vacuum pump, five float switches, one motor starter with overload block, two complete sets of pump O&M manuals, and other spare parts as required by GCDWR E & C inspector during review phase.

1.14.3 For submersible pump stations, provide five float switches or one probe, one phase monitor relay, one motor starter with overload block, two complete sets of pump O&M manuals, and other spare parts as required by GCDWR E & C inspector during review phase. Spare parts will be based on design of pump station.

1.14.4.1.1 If a submersible transducer and controller are used, a spare must be provided.

1.14.4.1.2 Provide two (2) hatch keys for wet well and valve vault hatch locking devices.

1.15 **WETWELL/CHECK VALVE VAULT**

1.15.1 The wetwell shall be sized to prevent excessive cycling of the pumps. Starts shall be limited to one start per ten minutes unless otherwise recommended by the engineer and/or the pump manufacturer. Size shall be as recommended by the pump supplier and shall be approved by the GCDWR (OISD) Division Director or designee during design submittal, (Minimum 8-foot diameter). Hatch doors shall be sized by the pump supplier to allow adequate clearance to easily remove the pumps.

1.15.2 Check valve vaults shall be 6’ x 6’ precast concrete with 4” and 6” piping. Vault size shall be 8’ x 8’ for piping 8” and above. All valve vaults shall have a minimum 48” x 48” double leaf aluminum hatch and all hatches shall have metal safety grates.

1.15.3 *Where practical, only one influent pipe will be allowed into the wetwell.* Having more than one influent line will require prior approval from the GCDWR (OISD) Division Director or designee. Influent invert elevation shall be located as close to the wet well invert as possible and shall not be higher than 4 feet above the “Pump Off” elevation. The influent gravity sewer from the last
manhole to the wetwell shall be increased in size to the next available size above what is required from design flows to allow for future expansion of the pump station.

1.15.4 Storage shall be provided above the high-level alarm equal to three (3) hours at design flow. Storage volume is calculated to be that volume between the high-level alarm and the lowest point of overflow (including basement elevations regardless of backflow valves in service lines). Said storage may consist of any combination of line capacity, manhole capacity, and wetwell volume. No corrugated metal pipe may be utilized for storage.

1.15.5 Additional concrete storage tanks may be precast or poured-in-place. Poured-in-place concrete shall include the appropriate reinforcement as designed by a structural engineer (registered in the state of Georgia). Design calculations stamped by a structural engineer (registered in the state of Georgia) must be submitted with the plans.

1.15.6 The maximum number of storage vaults should be limited to two per pump station without prior approval from the GCDWR E & C inspector.

1.15.7 Check valves used on submersible stations shall be Val-Matic "Swing Flex" with backflow actuator available from Charles Finch Company or Flygt sure shut swing check valve with backflow actuator.

See Section 1.20 for plug valve specifications.

1.15.8 All pump stations shall have a plug valve installed at the following locations: on the discharge pipe of each pump, on the vertical bypass piping inside the pump station fence, and on the force main no less than 3’ outside the pump station fence. A valve key for each valve shall be provided to the GCDWR E & C inspector. An 18” square precast concrete pad shall be provided around each valve cover for buried valves.

1.15.9 A System Development Charge (SDC) and O&M Charge may apply to station installations. This will be determined by the OISD Division Director or designee prior to approval to construct a Pump Station or Force Main.

1.15.10 All piping in the wetwell and check valve vault is to be flanged pipe to flanged pipe. No Uni-flange, or Mega-flange types will be allowed. Solid sleeve flex joint shall be used between the wetwell and valve vault per Detail PS-13.

1.15.11 Floats and probes shall be installed at the closest accessible location.

1.15.12 Steps are to be removed and grouted from the wetwell and check valve vault before station is accepted by the GCDWR E & C inspector.

1.15.13 Wetwells and discharge manholes are to be coated with an epoxy coating before the station is accepted by the GCDWR E & C inspector.

a. The coating shall be 100% solids high build epoxy coating formulated for application within a sanitary sewer environment.

b. The coating thickness shall be a minimum of 100 mils in one or two multi-pass coats.

c. The coating color shall typically be white or off white.

d. The cured epoxy resin system shall conform to the following minimum structural standards:
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<tbody>
<tr>
<td>Compressive Strength (ASTM D-695)</td>
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<tr>
<td>Flexural Strength (ASTM D-790)</td>
<td>13,000</td>
</tr>
<tr>
<td>Tensile Stress (ASTM D-638)</td>
<td>7,000</td>
</tr>
<tr>
<td>Flexural Modulus (ASTM-790)</td>
<td>500,000</td>
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e. The epoxy coating shall be Mainstay DS-5 by Madewell Products Corporation, Raven 405 by Raven Lining Systems, Cor-Cote SC (Sewer Coat) by Sherwin-Williams or approved alternate.

1.15.14 On submersible type pump stations the access ladder for the check valve vault shall be an OSHA approved type ladder. The ladder must extend from the hatch to 1' above the floor inside the vault and extend 2' above the hatch when fully extended. Submersible stations must also be equipped with a personnel safety hatch for the wetwell and valve vault. Safety hatch shall be a metal grate with safety latch. Safety hatches can be obtained from the following manufacturers/representatives:

a. Flygt pumps are available from ITT/Inc.
b. U.S. Foundry
c. Halliday Products

1.15.15 All pump stations shall comply with applicable codes in NFPA 820. Consult with GCDWR OISD Director for details.

1.15.16 All applicable County pump station detail drawings must be included on 22” x 34” pump station submittal. County detail drawings are available on disk for a fee.

1.15.17 Contractor is responsible for installation and maintenance of all erosion control measures until expiration of one-year warranty period. Contractor shall remove silt fence and other non-permanent erosion control measures at that time or before if directed by County.

1.16 ELECTRICAL SPECIFICATIONS

1.16.1 General:

1.16.1.1 The pump station shall be supplied with a single pump station control panel (PSCP) which shall house the pump starters and protection equipment as well as the pump station control and remote telemetry equipment.

1.16.1.2 All work and materials shall comply with the National Electrical code and applicable local regulations and ordinances. Where required by applicable codes, cabinet assemblies, materials and equipment shall be approved, identified, labeled or listed by Underwriters Laboratories.

1.16.1.3 The cabinet shall be designed to absorb vibrations or mechanical movement from the motor starts or other active equipment. These movements shall not cause undue vibrations in the control panel. As a minimum any size 3 or greater starters shall include additional stiffeners or other vibration dampening equipment.
1.16.2 Communication Method

1.16.2.1 The Pump Station control Panel (PSCP) shall be evaluated for AT&T cellular communication by the contractor. Using the actual location and finished floor elevation of the PSCP location, the contractor shall conduct a site survey to determined the Received Signal Strength Indicator (RSSI) (ideal value of -75 dBM to -100 dBM) on 3G Modems or most current compatible technology using the carrier AT&T. Interference with trees, construction, mountains or simply distance from the tower could be problematic. The results of the site survey shall be submitted to the GCDWR E & C Inspector who will in turn provide it to the Pump Station Scada Manager for determination of the feasibility of cellular communication at the pump station site. After the conclusion of the field site survey the GCDWR Pump Station Scada Manager will make a determination if cellular communication is feasible. At the GCDWR Pump Station Scada Manager’s discretion the GCDWR Pump Station Scada Manager may undertake the cellular telemetry evaluation.

a. If cellular communication is determined to be feasible the contractor shall include a cellular modem, antenna, and other necessary equipment for successful communication with the PSCP. The GCDWR Pump Station Scada Manager will supply the contractor with antenna height, and location instructions. The contractor shall supply, install, and configure the equipment to achieve satisfactory cellular communication. As a minimum this equipment will include a cellular modem, antenna, and antenna cable.

b. If cellular communication is determined to be unavailable the contractor shall include an Ethernet modem in the panel. The Ethernet modem shall be an Allen Bradley 9300-RADES or approved equal.

1.16.3 Power:

1.16.3.1 Three-phase power shall be provided for all pumps. No phase converters or single-phase power allowed. The power source may be 208, 240, or 480 volts.

1.16.3.2 When main fused disconnect switch or main circuit breaker is used, it shall meet the following requirements:
   a. Be of a type that can be locked in the on or off position.
   b. The switch shall be U.L. listed for service entrance.
   c. The enclosure shall be NEMA 4X stainless steel
   d. The switch must be mounted inside the fenced area of the station.
   e. If a fused switch is used for main disconnect, fuses shall be RK 5.

1.16.4 Conduit:

1.16.4.1 All conduits shall be galvanized rigid conduit with threaded couplings. No threadless couplings shall be allowed.

1.16.4.2 All conduit runs shall be buried under or within in the slab. No conduit runs or junction boxes are to be installed inside or on top of wet well. Splicing of cables inside the wet well will not be permitted.

1.16.4.3 Separate conduits shall be supplied for analog, discrete, communication, and power signals.
1.16.5 Control Panel:

1.16.5.1 GENERAL REQUIREMENTS.

a. All equipment furnished under this section shall be selected for its superior quality and intended performance. Equipment and materials used shall be subject to review and shall comply with the following requirements.

b. Unless specified otherwise, electrical power supply to the instrumentation equipment will be unregulated 120 volts ac at the locations noted on the one-line and functional diagrams. All transmitted electronic analog instrument signals shall be 4-20 mA dc, unless noted otherwise, and shall be linear with the measured variable.

c. Cabinet Construction and Interior Wiring: In accordance with the National Electrical Code (NEC), state and local codes, and applicable sections of NEMA, ANSI, UL, and ICECA.

d. Control panel shall be fabricated at the system integrator’s panel shop. No field fabrication is allowed.

e. Cabinet shall be built to UL 508 standards and bear UL listing mark stating “LISTED ENCLOSURE CONTROL CABINETS”.

1.16.5.2 SYSTEMS RESPONSIBILITY:

a. SYSTEM INTEGRATOR: All instrumentation and industrial electronic systems shall be furnished and installed under the supervision of a single systems integrator which is regularly engaged in the design and installation of such systems of similar scope and complexity. The contractor is responsible to the developer/owner for the performance of all systems. Acceptable system integrators are as follows:

1) M/R Systems, Norcross, GA
2) C2I, Smyrna, GA
3) Global Control Systems, Smyrna, GA
4) Revere Control Systems, Birmingham, AL
5) Turbitrol, Austell, GA
6) Sta-con, Apopka, FL
7) Smith and Loveless, Lenexa, KS

1.16.5.3 For pumps 30 HP or greater:

a. Use soft starters with 120 VAC coil control.

b. Must have soft stop capability.

c. Must include integral bypass contactor.

d. Isolation contactor is not required unless specified by the engineer.

e. Must have overload protection capability.

f. Must display current.

g. Soft start display shall be remotely mounted on inner door of cabinet, as shown on PS-29A
1.16.5.4 Enclosure:

a. Enclosure Type: NEMA 4X.

b. Materials: Type 316 stainless steel.

c. Metal Thickness: 14-gauge, minimum.


e. The enclosure shall have a lockable handle on the outside of each door.

f. Cabinet shall be sized to allow access around all the instruments for ease of operation and maintenance. The Cabinet shall be designed to prevent overheating of instruments with an ambient air temperature of 100 degrees Fahrenheit with 100% humidity (non-condensing). Air conditioner units will not be allowed.

g. Cabinet shall include a heater unit with thermostat control for protection of cabinet equipment. Heater shall be designed for an ambient air temperature of 10 degrees Fahrenheit with 100% humidity (non-condensing).

h. Control panel shall be a 72”H x 36”W x 18”D NEMA 4x stainless steel enclosure with a single dead front door. The control panel shall be laid out as shown on the included detail PS-29A. If additional space is required to house this equipment the panel depth may be increased or a 72”H x 72”W x 18”D double door configuration may be utilized with the telemetry equipment housed in the left hand door and pump starters and protection equipment behind the right door as shown in detail PS-29A.

i. Factory applied white TGIC polyester urethane powder coating electrostatically applied to all outside and inside surfaces.

j. Manufacturers: Hoffman Engineering Co., Saginaw, or Approved equal

1.16.5.5 Inner Door Indicators and Lights: As shown on figure PS-29A, the following items shall be mounted on the inner door of the PSCP:

a. Pump Hand-Off-Auto switch

b. Pump Run Light (Red)

c. Pump Failure Light (Amber)

d. Pump Stop Light (Green)

e. Flygt MAS unit operator interface (if applicable)

f. Soft Start operator interface (if applicable)

g. Pump stations shall have a six digit non-resettable elapsed time meters for each pump to show individual pump running time to the 1/10th of an hour.

h. Engraved lamicoid nameplate with RTU number and station name.

1.16.5.6 Control power transformer(s) shall be installed inside the panel in the motor control section. The transformer shall be sized at 125% of the rated load and rated for machine tool service.

1.16.5.7 PSCP shall include physical barriers inside panel to prevent accidental access between telemetry and pump control areas of the panel.

1.16.5.8 Wiring within Cabinets shall meet the following requirements:
a. Wires for AC circuits shall be 600 volt, Type THHN stranded conductor copper and shall be sized for the current to be carried, but not smaller than No. 16 AWG.
b. Wires for analog signal circuits shall be 300 volt stranded copper and shall be twisted shielded pairs not smaller than No. 16 AWG.
c. Wires for other DC circuits shall be 600 volt, Type THHN stranded copper not smaller than No. 16 AWG.
d. Wiring shall be numbered and tagged at each termination on both ends.
e. Wiring for special signals such as communications, digital data and multiplexed signals shall use manufacturer's standard cables.
f. All control wiring shall be stranded. No solid wire shall be allowed, except that the telemetry may be 22-gauge multi-pair telephone cable.
g. Restrain by plastic ties or wire management system
h. Hinge Wiring: Secure at each end so that bending or twisting will be around longitudinal axis of wire. Protect bend area with sleeve.
i. Arrange wiring neatly, cut to proper length, and remove surplus wire.
j. Provide abrasion protection for wire bundles that pass through holes or across edges of sheet metal.
k. Provide wire labels at both ends of terminated wire.
l. If cellular communications is deemed to be unavailable, provide one RJ-11 telephone jack in the control panel. Phone wire from telephone interface to jack to be gel filled direct burial cable.

1.16.5.9 Connections to Compression Clamp Type Terminals:

a. Strip, prepare, and install wires in accordance with terminal manufacturer's recommendations.
b. Wires installed in a compression screw and clamp, maximum of one for field wires entering enclosure, otherwise maximum of two.
c. Splicing and tapping of wires, allowed only at device terminals or terminal blocks.
d. Separate analog and dc circuits by at least 6 inches from ac power and control wiring, except at unavoidable crossover points and at device terminations.
e. Arrange wiring to allow access for testing, removal, and maintenance of circuits and components.
f. Plastic Wire Duct Fill: Do not exceed manufacturer's recommendations.

1.16.5.10 Terminal blocks:

a. Provide sufficient terminations to accommodate both present and future needs. Wire spare PLC module I/O points to their Cabinet's terminal blocks. Provide 300 volt screw clamp compression, dead-front barrier type terminal blocks with current bar providing direct contact with wire between the compression screw and yoke. Provide yoke, current bar and clamping screw constructed of high strength and high conductivity metal. Use yoke that guides all strands of wire into the terminal. Use current bar providing vibration-proof connection. Supply terminals that allow connection of wire without any preparation other than stripping. Rail mount individual terminals to create a complete assembly.
Provide terminal constructed such that jumpers can be installed with no loss of space on terminal or rail.

Size all terminal block components to allow insertion of all necessary wire sizes and types. Supply terminal blocks with marking system allowing the use of UL approved terminal blocks manufactured by Allen Bradley, Cutler Hammer, Phoenix Contacts or approved equal.

1.16.5.11 Grounding: Cabinets isolated copper grounding bus for all signal and shield ground connections. This ground bus shall be grounded at a common ground point. The signal grounding system shall meet National Electrical Code requirements.

a. Each analog loop shall be grounded at a single point for the loop. This single point shall be at location of the DC power supply for the loop.

b. Each analog loop shall have its wire shields connected to ground at a single point for the loop.

c. Discrete signals between Cabinets shall be dry isolated contacts rated for 5 amps continuous at 120 V AC.

1.16.5.12 Network cables will be as required for a complete and operational system.

1.16.6 Electrical Transient Protection:

1.16.6.1 Protect all elements of the PSCP against damage due to electrical transients induced in interconnecting lines by lightning and nearby electrical systems. As a minimum, provide surge suppressors at the following:

a. At any connection at AC power to PSCP.

b. At the radio transmission line bulkhead entrance.

c. At analog or digital monitoring or controls (DI, DO and AI).

d. Output of DC power supply.

e. Ethernet cables.

1.16.6.2 Suppressor on 120 V AC Power Supply Connections:

a. Construction: First stage high energy metal oxide varistor and second stage bipolar silicon avalanche device separated by series impedance. Grounding wire, stud or terminal provided.

b. Occurrences: Suppressor tested and rated for a minimum of 50 occurrences of IEEE 587 Category B test waveform.

c. Clamping voltages: 350 volts or less for first stage, 210 volts or less for second stage.

d. Response: 5 nanoseconds maximum.

e. Recovery: Automatic

f. Continuous operation: 5 amps minimum at 130 volts AC for suppressor on power supply for one (1) 4-wire transmitter or receiver, 20 amps minimum otherwise.

g. Temperature range: -20 degrees C to + 85 degrees C.

h. Manufacturers: EDCO HSP-121 or approved equal.
1.16.6.3 Suppressor on Analog Signal Lines:

a. Construction: First stage high energy metal oxide varistor and second stage bipolar silicon avalanche device separated by series impedance. Grounding wire, stud or terminal provided.

b. Test waveform: Linear 8 microsecond rise in current from zero amps to a peak current value followed by an exponential decay of current reaching for half the peak value in 20 microseconds.

c. Surge rating: Suppressor tested and rated for a minimum of 50 occurrences of 2000 amp peak test waveform.

d. DC clamping voltage: Twenty to forty percent above operating voltage for circuit. Clamping voltage tolerance less than plus or minus 10 percent.

e. Response: 5 nanoseconds.


g. Maximum loop resistance: 18 ohms per conductor.

h. Temperature range: -20 degrees C to + 85 degrees C.

i. Approved vendor Edco PC-642 or SRA-64 Series or equal.

1.16.6.4 A surge suppressor shall be provided at the power service entrance installed to the main service disconnect switch. The surge suppressor shall be UL 1449 for a surge current level of 20 ka and connected to the line side of the main disconnect. The surge suppressor shall have voltage characteristics to match the power service.

a. The surge suppressor shall be in the PSCP enclosure and shall provide line to line, line to neutral, line to ground and neutral to ground protection modes as applicable for the power service.

b. The surge suppressor shall be provided with an integral disconnect separate from the main breaker. Minimum surge current rating shall be 100KA per mode, 200KA per phase per NEMA LS-1. The surge suppression system shall be duty cycle tested to survive 20KV, 10KA, IEEE C62.41 category surge current with less than 5% degradation of clamping voltage. The surge suppressor shall have minimum repetitive surge capacity of 2500 impulses per mode and 5000 impulses per phase. Status indicating lights and form ‘C’ dry alarm contacts shall be provided.

c. The surge suppressor shall be U.L. listed and labeled under UL1449 and UL1283. Acceptable manufacturers are Liebert, Current Technologies, or United Power.

1.16.6.5 A phase monitor shall be provided in the pump control panel. The pump operation shall be inhibited when an open phase/phase reversal condition is detected. A contact of the phase monitor shall also be wired to the PLC for remote indication of the open phase/phase reversal condition.

1.16.7 CORROSION PROTECTION:

a. Corrosion-Inhibiting Vapor Capsule
b. Manufacturers: Northern Instruments; Model Zerust VC, Hoffmann Engineering; Model A-HCI.

1.16.8 Cabinet Fabrication:

1.16.8.1 Power Distribution within Cabinets:
   a. One 120 V AC, 60-Hz feeder circuits.
   b. Make provisions for feeder circuit conduit entry.
   c. Furnish terminal board for termination of wires.
   d. Provide 120 VAC Circuit Breaker in each cabinet for incoming AC Power.

1.16.8.2 Signal Distribution:
   a. Within Cabinets: 4 to 20 mA dc signals may be distributed as 1 to 5V dc.
   b. Outside Cabinets: Isolated 4 to 20 mA dc only.
   c. All signal wiring shall be twisted shielded pairs.

1.16.8.3 Signal Switching:
   a. Use dry circuit type relays or switches.
   b. No interruption of 4 to 20 mA loops during switching.
   c. Switching Transients in Associated Signal Circuit:
   d. 4 to 20 mA dc Signals: 0.2 mA, maximum.
   e. 1 to 5V dc Signals: 0.05V, maximum.

1.16.9 Relays:

1.16.9.1 General:
   b. Relay Enclosure: Furnish dust cover.
   c. Socket Type: Screw terminal interface with wiring.
   d. Socket Mounting: Rail.
   e. Provide hold-down clips.

1.16.9.2 Signal Switching Relay:
   a. Type: Dry circuit.
   b. Contact Arrangement: 2 Form C contacts.
   c. Contact Rating: 10 amps at 28V dc or 120V ac.
   d. Contact Material: Gold or silver.
   e. Coil Voltage: As noted or shown.
   f. Coil Power: 0.9 watts (dc), 1.2VA (ac).
   g. Expected Mechanical Life: 10,000,000 operations.
h. Expected Electrical Life at Rated Load: 100,000 operations.
i. Indication Type: Neon or LED indicator lamp.
j. Seal Type: Hermetically sealed case.
k. Manufacturer: Potter and Brumfield; Allen Bradley, Siemens or Cutler Hammer or approved equal.

1.16.9.3 Control Circuit Switching Relay, Non-latching:

a. Type: Compact general purpose plug-in.
b. Contact Arrangement: 2 Form C contacts.
c. Contact Rating: 10A at 28V dc or 240V ac.
d. Contact Material: Silver cadmium oxide alloy.
e. Coil Voltage: As noted or shown.
f. Coil Power: 1.8 watts (dc), 2.7VA (ac).
g. Expected Mechanical Life: 10,000,000 operations.
h. Expected Electrical Life at Rated Load: 100,000 operations.
i. Indication Type: Neon or LED indicator lamp.
j. Push-to-test button.
k. Manufacturer and Product: Potter and Brumfield; Series KUP or approved equal.

1.16.9.4 Control Circuit Switching Relay, Latching:

a. Type: Dual coil mechanical latching relay.
b. Contact Arrangement: 2 Form C contacts.
c. Contact Rating: 10A at 28V dc or 120V ac.
d. Contact Material: Silver cadmium oxide alloy.
e. Coil Voltage: As noted or shown.
f. Coil Power: 2.7 watts (dc), 5.3VA (ac).
g. Expected Mechanical Life: 500,000 operations.
h. Expected Electrical Life at Rated Load: 50,000 operations.
i. Manufacturer: Potter and Brumfield, Siemens or Allen Bradley or approved equal.

1.16.9.5 Power Supplies:

a. Furnish as required power to instruments requiring external dc power, including two-wire transmitters and dc relays. Regulated dc power supplied for instrument loops shall be provided. Power supplies shall be suitable for an input voltage variation of +/- 10 percent, and the supply output shall be fused or short-circuit protected. Output voltage regulation shall be as required by the equipment supplied.
b. Convert 120V AC, 60-Hz power to dc power of appropriate voltage(s) with sufficient voltage regulation and ripple control to assure that instruments being supplied can operate within their required tolerances.
c. Provide output over voltage and over current protective devices to protect instruments and power supplies from damage due to power supply or external failure.
d. Enclosures: NEMA 1.
e. Mount such that dissipated heat does not adversely affect other components.
f. Supply indicating-type fuses for each dc supply line to each individual two-wire transmitter and mount so fuses can be easily seen and replaced.
g. Include fused push-to-test circuitry for each push-to-test indicating light.
h. Provide internal cabinet light. Light shall be 100-watt fluorescent bulb and shall be operated by a door switch.
i. Provide service outlet with a breaker protected 120-volt, 15-amp, GFCI duplex receptacle and weatherproof enclosure on the outside of the “mini power center” box or support.

1.16.10 Control Equipment:

1.16.10.1 The PSCP shall include an Allen Bradley Micrologix 1200 PLC, associated I/O, and a PanelView Plus 600c local operator interface.

1.16.10.2 The County will provide a standard PLC & HMI application program for the pump station PLC and HMI. Contractor will setup the software for the pump station, including configuring device ranges, IP address, motor current range, wet well level, set points and other settings, for a complete and operational PSCP.

1.16.10.3 Allen Bradley Micrologix 1200 PLC (1762-L40AWA)
a. 24 Digital Inputs, 120 VAC
b. 16 Digital Outputs, relay outputs

1.16.10.4 Analog Input Module (Allen Bradley 1762-IF4)
a. Inputs 4 differential 4-20 mA

1.16.10.5 Analog Input and Output Module (Allen Bradley 1762-IF2OF2)
a. Inputs 2 differential 4-20 mA
b. Outputs 2 single ended 4-20 mA

1.16.10.6 Allen Bradley PanelView Plus 600 Color with keypad and touch screen (2711P-B6C20A)
a. Screen: 5.5 inch
b. Combination touch and keypad
c. Ethernet Communication
d. RS-232 Communication
e. Power: 120 VAC

1.16.10.7 NET-ENI Communication Module: (Allen Bradley 1761-NET-ENI)

1.16.10.8 Programmable Logic Controller Functional Requirements: PLC Inputs and Outputs (I/O) are shown below. Provide inputs, outputs, functions, or operations required to provide a completely operational system. Note that this list does not show the PLCs diagnostic fault detection points which are nevertheless required.

1.16.10.9 Digital Inputs
a. DI-1 - Pump 1 Auto Mode (1=Auto, 0=Manual)
b. DI-2 - Pump 1 Run (1=On, 0=Off)
c. DI-3 - Pump 1 Fault (1=Fault Alarm, 1=Normal)
d. DI-4 - Spare
e. DI-5 - Pump 2 Auto Mode (1=Auto, 0=Manual)
f. DI-6 - Pump 2 Run (1=On, 0=Off)
g. DI-7 - Pump 2 Fault (1=Fault Alarm, 1=Normal)
h. DI-8 - Spare
i. DI-9 - Level Switch High High (LSHH) (0=Alarm, 1= Normal)
j. DI-10 - Level Switch High (LSH) (0=Alarm, 1= Normal)
k. DI-11 - Level Switch Intermediate 1 (LSM1) (0=Alarm, 0= Normal)
l. DI-12 - Level Switch Low (LSL) (0=Alarm, 0= Normal)
m. DI-13 - Level Switch Low Low (LSLL) (0=Alarm, 1= Normal)

1.16.10.10 Digital Outputs

a. DO -1 – Pump 1 Run (1= On, 0=Off)
b. DO -2 – Pump 2 Run (1= On, 0=Off)
c. DO -3 – Chemical Feed Pump 1 (1= On, 0=Off) [if available]
d. DO -4 – Chemical Feed Pump 2 (1= On, 0=Off) [if available]
e. DO -5 – Odor Control (1= On, 0=Off) [if available]
f. DO -6 – Pole Lights (1= On, 0=Off) [if available]
g. DO -7 – Spare
h. DO -8 – Spare
i. DO -9 – Spare
j. DO -10 – Spare
k. DO -11 – Spare
1.16.10.11 Analog In
a. AI – 1 Wet Well Level
b. AI – 2 Flow Discharge [if available]
c. AI – 3 Pump 1 Motor Current
d. AI – 4 Pump 2 Motor Current
e. AI – 5 Discharge Pressure [if available]
f. AI – 6 Generator Fuel Level [if available]
g. AI – 7 Spare
h. AI – 8 Spare

1.16.10.12 Analog Out
a. AO – 1 Spare
b. AO – 2 Spare
c. AO – 3 Spare
d. AO – 4 Spare

1.16.10.13 The developer’s contractor shall provide all PLCs and associated equipment and cables to form a complete and functional controller with SCADA cellular monitoring, control and data logging capability as required for this project.

1.16.10.14 Furnish and install all cables for interconnecting all components of the PLC inside the Cabinet. These cables shall include cables to network bridge, power supplies, central processing unit.

1.16.10.15 Furnish all network cables needed to interface all applicable PLCs with network.

1.16.11 Uninterruptible Power Supply (UPS):

1.16.11.1 Provide UPS system, sized for 15 minutes backup time under 150% Cabinet load (including all loop-powered instruments).

1.16.11.2 UPS shall be ferro-resonant type and shall include contact outputs for low battery, loss of utility power, and UPS operating.

1.16.11.3 UPS shall contain a network management card capable of communicating status parameters via Ethernet using Simple Network Management Protocol (SNMP).

1.16.11.4 Manufacturers: Allen Bradley 1609-U500NHC or equal.

1.16.12 Submersible Level Transducer:

1.16.12.1 Provide a submersible level transducer for measurement of the wet well depth.
1.16.12.2 The transducer shall be of the solid-state head-pressure sensing type, suitable for continuous submergence and operation and shall be installed in accordance with manufacturer's instructions. The bottom diaphragm face of the sensor shall be installed at elevation recommended by the manufacturer. The sensor shall be mounted using a stainless steel cable system in a location and as shown on the Contract Documents. The level sensing equipment shall be provided with a digital indicating meter to be mounted above grade, adjacent to the wet well.

1.16.12.3 The liquid levels in the wet wells shall be measured by submersible level transducers designed for hydrostatic level measurement. The system shall convert the hydrostatic pressure of a column of liquid into a level proportional signal.

1.16.12.4 The system shall be as follows:
   a. FM approved intrinsically safe, Class I, II, III; Division 1, Groups AG; Class I, Division 1.
   b. Cable Probe, P.E. coated, 316 stainless steel, with mounting clamp.
   c. Measurement Range: specified in the respective Tower table for the pump station
   d. Service: Domestic sewage.
   e. Output: 4 to 20 mA with display at transmitter.
   f. Measuring Cell Tube: 316 stainless steel
   g. Seals: Welded sensor (elastomer-free).
   h. Cable Clamp: 316 stainless steel with plastic clamping jaws
   i. Environmental Protection: NEMA 4X, aluminum housing.
   j. Manufacturer: Endress & Hauser Model DB53A.

1.16.13 Cellular Modem
   a. Digi Connect WAN 3G – AT&T (DC-WAN-T302A)
   b. Ports – 1 Rs-232 DB-9; Up to 230 Kbps throughput; Hardware and Software flow control
   c. RJ-45 10/100 Mbps 10Base-T (auto-sensing; Full or Half Duplex
   d. USB Type A connector
   e. Network Protocols – UDP/TCP, DHCP
   f. Status LEDs – Ethernet, Power On, Cellular link/activity, signal strength bars or digital display
   g. MS Internet Explorer configurable

1.16.14 Antenna:
   a. Digi (DC-ANT-DBHG) or equal
   b. Dual Band High-Gain Cellular Antenna
   c. 14” tall antenna with magnetic mount

1.16.15 Coax Cable:
   a. 14’ cable, 50 Ohm SMA male connector
   b. 2dbi gain low band
c. 4dbi gain high band

1.16.16 Coax Extension Cable

a. 3’ Coax extension cable with SMA male connectors on either end
b. 3/8” LMR400 Coax cable (50 Ohm, shielded, weatherproof coax) or equal

c. 3” Coax extension cable with SMA male connectors on either end

1.16.17 Surge Suppressor:

a. TerraWave Gas Protector (TW-LP-SMA-J-BHJ) or equal
b. Gas discharge tube lightning surge suppressor
c. Up to 0 - 6 Ghz operation
d. SMA female connections on either end
e. 50 Ohm impedance
f. < 0.9 bD insertion loss
g. Operating Temperature Range -40°F to 185°

1.16.18 Combustible Gas Detector:

1.16.18.1 Pump station shall include a combustible gas detector capable of detecting the presence of LEL gases.

a. Instrument Function: Ambient air pollution monitor
b. Instrument Description: Combustible gas catalytic detector (single-point)
c. Signal Output: A contact for gas level alarm indication and a 4 to 20 mA dc analog signal.
d. General: The gas detector system shall consist of a sensor, a transmitter, a relay module, and a power supply. The sensor shall be remotely mounted in the area to be monitored. Up to fifty feet of cable shall be permitted between the sensor and the transmitter. The sensor, transmitter and relay module shall share the same power supply. The gas detection system shall have the capability to detect an over-range condition. This condition shall be indicated on the transmitter LCD display and the output shall be locked at the maximum valve. All components of the system shall be approved for mounting in Class I, Division 1, Group C and D hazardous locations. All components of the system shall also be designed to meet NEMA 4X requirements. All components of the system shall also be capable of operation in an ambient temperature range of -4 to +122 degrees F.

e. Sensor: The sensor shall employ the principle of catalytic oxidation. As the combustible gas and air mixture comes in contact with the sensor, the combustible gas in the mixture is burned catalytically, raising the temperature of the sensor. As the temperature of the sensor rises, so does its electrical resistance producing a change in output. When specified, the sensor shall be provided with a duct mounting kit. The kit shall allow the sensor to operate at velocities up to 60 mph.

f. Transmitter: The transmitter shall be microprocessor-based. Combustible gas concentration shall be continuously indicated, on a front-panel meter, in percent of lower explosive limit (LEL) of the specified gas. The display shall be visible from a minimum of 5 feet and shall be present at all times, and will not require being turned ON or OFF. This readout shall be 3½ digit Liquid Crystal Display (LCD). The transmitter shall display a warning when the sensor is nearing the end of its useful life. Calibration shall be by
means of a non-intrusive calibration system. The calibration values, and zero and span, shall be set without opening the transmitter enclosure. The transmitter shall not be affected by ambient light either natural or man-made.

g. Relay Module: Dual alarm set points, fully adjustable over the calibrated range of the monitor shall be provided. Indicating lamps shall provide positive indication of normal operation, concentration above lower set point (warning), and concentration above higher set point (danger). Contact outputs shall be provided for unit trouble and each set point. Contacts shall be normally open and shall open when an alarm condition exists. A normally energized trouble relay shall be provided. The trouble relay shall de-energize and the contact shall open when a system fault is detected. Unless otherwise specified, the system shall be calibrated for methane gas. The warning set point shall be 20 percent lower explosive limit and danger set point shall be 25 percent lower explosive limit.

h. Power Supply: The power supply shall accept nominal 120 V, 60 Hz power from the station power distribution. This power is not regulated, wave forms may be distorted, and significant amounts of electrical noise may be present. The power supply shall provide all necessary power for all of the components of the gas detection system.

i. Installation: The sensor shall be installed in the location accessible by the operator and in clear view of the wet well. The gas detection system shall be installed in accordance with the manufacturer's instructions and the specified functional requirements. Test: The combustible gas detector shall be factory tested by the manufacturer prior to shipment. The manufacturer shall provide three certified copies of the test report. After installation, the unit shall be field tested.

j. Cable: The signal cable between the sensor and the transmitter shall be provided by the instrument manufacturer. A sufficient length of cable shall be provided for installation of a continuous run between the sensor and the electronics package.

k. Application: Unit shall be setup to indicate an alarm at 5% above normal gas levels.

l. Calibration: instrument shall be calibrated onsite using manufacturer's recommended technique.

m. Approved Manufacturers: MSA Ultima, Sensidyne Sensalert, or equal.

1.16.19 Indicating Lights:

1.16.19.1 AC indicating lights shall be the push-to-test transformer type with LED lamps. They shall be heavy-duty, with NEMA rating to match enclosure type. The escutcheon and lens color shall be as specified. DC indicating lights shall be LED type. DC lamps may be tested as a group using a common lamp test button.

1.16.19.2 Unless otherwise specified, indicating lights shall be equipped with colored lenses in accordance with the following schedule:

<table>
<thead>
<tr>
<th>Color</th>
<th>Function</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Run, open valve</td>
<td>Equipment operating, motor running</td>
</tr>
<tr>
<td>Green</td>
<td>Ready, closed valve</td>
<td>Equipment ready, end of cycle</td>
</tr>
<tr>
<td>White</td>
<td>Normal condition</td>
<td>Control power on, status OK</td>
</tr>
<tr>
<td>Amber</td>
<td>Abnormal condition</td>
<td>Failure of equipment or abnormal status, fault condition</td>
</tr>
</tbody>
</table>
1.17 GENERATOR SPECIFICATIONS

1.17.1 The standby generator shall be rated for continuous standby service for the station’s full load demand. This shall include running both pumps with staggered startups.

1.17.2 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.

1.17.3 The entire standby generator set shall have a manufacturer's warranty for a minimum period of one year from the date of acceptance.

1.17.4 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.

1.17.5 Generator shall be supplied with all auxiliary systems necessary for operation (i.e. - batteries, battery charger, block heater, etc.).

1.17.6 The standby power system shall include an automatic transfer switch. Transfer switch shall be rated for 100% of full load of the main disconnect switch. 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.

1.17.7 Generator shall be load tested at 100% full load on site for a period of four hours using resistive load banks. Notify GCDWR E & C Inspector prior to test, and provide certification letter from the manufacturer.

1.17.8 Two complete sets of O & M manuals and keys shall be provided for generator and automatic transfer switch.

1.17.9 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. Connections for remote monitoring of function and failure must be provided.

1.17.10 Pump stations are required to have continuous standby power. Generators rated 125 KW and below are to be installed to operate on natural gas. All gas piping and connecting equipment shall be installed in accordance with the Georgia State Amendments to the Standard Gas Code, latest edition. All gas supply lines must include a drip loop as well as all other equipment required for a safe and complete hook-up. If gas is unavailable, a letter of exception must be obtained from GCDWR. Contractor shall coordinate with the natural gas utility company for appropriate gas meter size based on peak gas generator consumption.

1.17.11 Generators above 125 KW shall be diesel powered with 100 gallons minimum fuel storage capacity or 24-hour operating time, which ever 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.
1.17.12 Generators can be obtained from the following manufacturers/representatives:
   a. Cummins-Onan
   b. Kohler
   c. Caterpillar
   d. Generac

1.17.13 Transfer switches shall be in NEMA-4 enclosures obtained from the manufacturer of the generator.

1.17.14 Transfer switches shall be configured to switch back when power is restored to the station. Transfer switch shall be monitored by the PLC.

1.17.15 A generator ground grid must be provided as per Detail PS-21.

1.17.16 Generator set must be bermed and drained as shown on Detail PS-22. Berm must be designed to contain 110% of fuel tank volume. Berm volume calculations must be shown on pump station submittal drawings.

1.18 CELLULAR EQUIPMENT – See Section 1.16

1.19 FORCE MAINS

1.19.1 Force mains will not be approved to flow downhill into the receiving manhole. After the proposed force main passes over the last high point along its route a new gravity sewer line must be installed to convey the flow downhill to the existing sewer system. Exceptions to this requirement may be granted on a case by case basis if in the opinion of GCDWR (OISD) Division Director or designee there is no benefit to the county for having gravity sewer in the particular location involved.

1.19.2 Provide one spare air and vacuum relief valve for force main. (See spare parts 1.15.1)

1.19.3 Within the proposed development, the force main shall be located in a 10’ utility easement immediately outside the proposed right-of-way.

1.19.4 The top quarter of the force main pipe shall be painted green.

1.19.5 Requirements:
   a. **Size:** Minimum size for force mains shall be 6-inch diameter. A 4-inch diameter force main may be used if prior approval is obtained from GCDWR. (OISD) Division Director or designee prior to construction.
   b. Multiple diameter force mains must be pre-approved by GCDWR (OISD) Division Director or designee prior to construction.
   c. Force mains shall be designed so as to minimize the number of Air Release Valves. Force main shall have a minimum of 5 feet of cover. The force main bury depth shall be
varied up to a maximum of 10 feet where deemed necessary by the design engineer to eliminate Air Release Valves.

d. D.I.P. (Ductile Iron Pipe) shall be utilized on all force mains. Pipe class shall be such that the “manufacturer’s allowable working pressure” is either a minimum of twice the design working pressure, or one and one half times the design surge pressure, whichever is the greater.

e. The inside of the force main shall be coated with Protecto 401 ceramic epoxy or approved equivalent as required below:

- All force main segments where force main will be exposed to air during stationary or operating conditions (e.g., downstream of high points)
- Within 20 feet on each side of all high points.

f. Pressure-Testing: force mains shall be subjected to a test pressure equal to 150 percent of the total dynamic head for a minimum of two hours. The test shall be performed using potable water. (Use of a fire Hydrant requires a fire hydrant meter to be purchased from Gwinnett County Department of Water Resources). The entire force main pressure test must be witnessed and approved by the GCDWR E & C Inspector. The test will be performed from the check valve vault to the dump manhole. No leakage will be allowed.

To schedule a test the contractor shall notify the GCDWR E & C Inspector at a minimum of 48 hours in advance. The inspector shall determine the test pressure and gauge location. The contractor shall remove, valve off, or otherwise protect any equipment that might be damaged by the pressures used in the test. All piping shall be securely anchored prior to the test. Pipe laid in trenches shall be backfilled. Joints, fittings, and valves may be left exposed to be examined during the test.

Before applying the test pressure, all air shall be expelled from the pipe. If air release valves are not available at high points, the contractor shall make necessary taps and insert plugs after the test has been completed. The approval of the force main installation and pressure test by the GCDWR E & C inspector shall become a part of the overall pump station/force main system approval. Prior approval must be obtained from GCDWR E & C Inspector before tapping.

The contractor shall bear the complete cost of the test including temporary plugging and blocking, water usage and the repair of all leaks.

If a section of the force main fails the pressure test the contractor will be required to pay a re-inspection fee as determined by GCDWR E & C Inspectors prior to each additional retest required.

g. Air Release Valves: Force Mains shall have an air release valve (see Detail PS-10) at each high point as required by GCDWR

h. On force mains exceeding 2,500 feet in length, one (1) plug valve shall be strategically located along each 2,500-foot segment away from high points to facilitate future repairs. See Section 1.20 for plug valve specifications.
i. Each valve shall be supplied with an operator handle inside and outside of the station.

j. Buried valve operator must be extended to 6-inches from grade.

k. Force main velocities shall be a minimum of 2.5 fps and maximum of 4 fps. Any deviation from this standard shall require approval from GCDWR (OISD) Division Director or designee prior to any submittals being delivered to GCDWR (OISD) department.

1.20 PLUG VALVES

1.20.1 Plug valves shall be non-lubricated, resilient-seated, eccentric valves. Plug valves shall conform to the latest revision of ANSI/AWWA C517-05. All materials shall be new. Plug valve body and cover shall be composed of cast iron in conformance with either ASTM A126 Class B or ASTM A48 Class 40. All buried valves shall have mechanical joint ends conforming to ANSI/AWWA C111/A21.11, and all exposed valves measuring 4 inches in diameter and larger shall have Class 125 flat face flanged ends, at a minimum, conforming to ANSI B16.1 or ANSI/AWWA C110/A21.10. At a minimum, valves measuring 4 inches to 12 inches in diameter shall have 175 psig bodies, and valves measuring 14 inches and greater in diameter shall have 150 psig bodies. For specific installation locations where the Total Dynamic Head (TDH) plus the surge pressure exceeds the minimum pressure ratings above, Class 250 flat face flanged ends and a 400 psi (for 3-inch to 12-inch valves) or 300 psi (for 14-inch and greater valves) valve body shall be provided.

<table>
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<tr>
<th>Nominal Valve Diameter (inches)</th>
<th>Lay Length (inches)</th>
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<tbody>
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<tr>
<td>12</td>
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</table>

1.20.2 Plug shall be a solid one-piece casting composed of cast iron covered with a resilient elastomer; two-piece plugs or plugs with internal cavities shall NOT be acceptable. Plug face shall be covered with either EPDM or Neoprene; plug facings composed of natural rubber, Viton, or Nitrile shall NOT be acceptable. Seats shall be composed of either 95 percent nickel alloy or Type 316 stainless steel; seats composed of thermosetting epoxy or fusion bonded nylon shall NOT be acceptable. Screwed-in seats shall NOT be acceptable.
1.20.3 Plug valves shall have a minimum % port area of 67% using the nominal pipe diameter as the basis of measurement. Port area shall be the minimum cross-sectional area within the valve perpendicular to the flow, expressed in square inches; valves shall have a port area exceeding the following minimum requirements.

<table>
<thead>
<tr>
<th>Nominal Valve Diameter (inches)</th>
<th>Minimum Port Area (inches²)</th>
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</thead>
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<td>30</td>
<td>494.50</td>
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<tr>
<td>36</td>
<td>712.50</td>
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</tbody>
</table>

1.20.4 Radial shaft bearings shall be permanently lubricated, sleeve-type, sintered, oil-impregnated bearings composed of either Type 316 stainless steel in accordance with ASTM A-743, Grade CF-8M, or oil-impregnated bronze in accordance with ASTM B-127. Non-metallic radial thrust bearings shall NOT be acceptable. Thrust bearings/washers shall be composed of Type 316 stainless steel, Teflon, Nylon 11, or Nylatron. Shaft seals shall be either the U-cup type or multiple V-ring type and shall be composed of either EPDM or Neoprene; shaft seals shall be self-adjusting and repackable without removing the bonnet or actuator from the valve or removing the valve from the line. Plug valve and connecting pipe shall have the capability to be pigged without the use of special equipment.

1.20.5 Plug valves and operators shall be installed according to the manufacturer’s recommendations for conveying fluids with high solids concentrations. For horizontal installations, the plug valve shall be installed so that the plug face is pointing upwards when the valve is open and the plug face is facing the pump when the valve is closed. For vertical installations, the plug valve shall be installed so that the plug face is pointing to the side when the valve is open and the plug face is pointing upwards when the valve is closed. All plug valves shall be installed horizontally with right angle operators pointing up to allow operation from grade.

1.20.6 Above-ground valves 6 inches in diameter and smaller shall have manual lever operators, unless otherwise specified or noted on the Drawings. Above-ground valves 8 inches in diameter and larger shall be manually hand wheel operated through totally enclosed worm gear actuators, unless otherwise specified or shown on the Drawings. Manual operators for plug valves mounted above 6 feet from the operating floor shall be equipped with worm gear chain wheel actuators. All buried valves shall be provided with totally enclosed worm gear actuators, 2-inch square AWWA operating nuts, and valve boxes. All valves shall be provided with mechanical travel stops for the open and closed positions and shall rotate 90 degrees from fully open to fully shut. Gear actuators shall be designed to produce the required operating torque with a maximum rim pull of
80 pounds on a hand wheel / chain wheel and with a maximum input of 150 foot-pounds on 2-inch operating nuts. Actuator components between the input and the open and closed position stops shall be designed to withstand, without damage, a rim pull of 200 pounds for hand wheels / chain wheels and an input torque of 300 foot-pounds for 2-inch operating nuts.

1.20.7 Valves shall be either directly cast with or provided with a corrosion-resistant nameplate stating, at a minimum, the valve serial number, manufacturer, size, maximum shutoff pressure, and design pressure rating. The seat end shall be clearly indicated on the valve exterior relative to half of the body containing the plug/seat interface.

1.20.8 Plug valve manufacturer shall submit certified Shop Drawings showing the principal dimensions, construction, and materials used for all parts of the valve and actuator; certified Shop Drawings shall clearly indicate the minimum dimensions encountered within the valve port when the plug valve is fully open. Plug valve manufacturer shall certify that the plug valve(s) furnished are capable of operating in continuous duty service under the pressure and flow conditions at each installation location. Prior to valve shipment, plug valve manufacturer shall provide a written affidavit to the engineer attesting that the plug valve(s) furnished comply with the requirements of the County specifications, comply with the applicable portions of ANSI/AWWA C517-05, and match what is shown on the Shop Drawings. Each valve shall be hydrostatically tested and tested for bubble tightness at the factory after the operator has been mounted and adjusted, and manufacturer shall provide written certification of test conformance to the engineer prior to valve shipment.

1.20.9 All internal and external ferrous components and surfaces of the valves, with the exception of stainless steel and finished or bearing surfaces, shall be shop painted with two (2) coats (10 mils minimum dry film thickness) of the manufacturer’s premium epoxy for corrosion resistance. Damaged surfaces shall be repaired in accordance with the manufacturer’s recommendations.

1.20.10 Valves shall be manufactured by DeZurik, Val-Matic, Henry Pratt, or approved equal.

1.20.11 Plug valves shall be installed so that the flow is against the face of the plug in the closed position and so that the plug rotates to the top of the pipeline in the open position.

1.21.1.1 CONSTRUCTION

A. The contractor shall maintain on the project site an updated set of record drawings. These drawings must be the latest revision and match that of the project inspector.

B. The developer/owner’s engineer shall submit as-built drawings upon completion of construction and acceptance of the station by the County. Surveying shall be performed by the engineer to assure elevations and placement of appurtenances on as-builts are correct.

Note: Any deviations from the approved plans during construction must have approval from GCDWR E & C Inspectors prior to the deviation being made. A “REQUEST FOR EXCEPTION/CHANGE TO PUMP STATION CONSTRUCTION” form as found in these specifications must be completed and submitted to the GCDWR E & C Inspectors for approval. The E & C Inspector will make sure that all appropriate approvals are received.
1.22 AS-BUILT PLANS

NOTE: PLEASE SEE DEVELOPER PUMP STATION AND FORCE MAIN - AS-BUILT CHECK LIST

1.22.1. Pump Station and Force main as-built plans must be submitted to the Planning and Development (WSR) Department prior to scheduling a startup. As-built plans must be approved by both the Planning and Development (WSR) Department and the GCDWR (E & C) Department prior to conducting a start up. An exception to this procedure can only be made if approval is given by the OSID Division Director or designee. Allow four weeks for review.

1.22.2. Pump Station and Force main as-built plans must include a signed and dated stamp of a Professional Engineer (registered in the State of Georgia). Updated design calculations must also be submitted with as-builds.

1.22.3. Pump Station and Force main as-built drawings must reflect the structures as they are actually installed. The as-builds should be completed from the approved construction drawings and revisions provided by the contractor and verified by the survey provided by the certifying engineer.

1.22.4. A single line electrical drawing showing power distribution for the station must be included in the as-built drawings.

1.22.5. If any changes were made to the force main route, wetwell depth, or pumps after the submitted plans were approved, new design calculations must be submitted with the as-built plans.

1.23 START-UP/ACCEPTANCE

1.23.1. A force main test must be complete and accepted by GCDWR E & C Inspectors prior to scheduling a startup (see Force mains 1.20.5.e).

To schedule a start-up call the GCDWR E & C Inspector - a minimum of 24-hours in advance. Pre-start-up check sheet must be signed, completed and received by GCDWR E & C Inspector 24 hours before start-up.

1.23.2. All utilities must be working (i.e. - water, electric, telephone and gas if applicable). No station will be accepted without a phone line. The check sheet can be faxed to the GCDWR E & C inspector.

1.23.3. Personnel on site: General Contractor or Developer, Electrical Contractor, Pump Manufacturer and GCDWR E & C Inspector, Project Manager and Pump Station Personnel, Design Engineer and Electrical Engineer.

1.23.4. Submersible pumps must be pulled at the time of start-up.

1.23.5. Generator must run both pumps simultaneously.

1.23.6. A start-up letter is required from the pump manufacturer.
1.23.7. All spare parts and O&M manuals shall be brought to the start-up as well as O & M Manuals for pumps and generator. Keys for the generator shall be left in the transfer switch (see 1.15 spare parts).

1.23.8. A draw down test performed by the design engineer will be required at start-up. Water for testing will be provided at Contractor’s expense. This may require refilling the wetwell several times.

1.23.9. Concrete Testing: Mix design must be submitted to the Design Engineer for approval.

1.23.10. All utility information should be brought to start-up. This includes account numbers and phone numbers. Any letters or test performed which require written documentation should also be available (i.e. letter of compaction, 4-hour load bank test on generator, etc.). (See specs for details.)

1.23.11. P & D (WSR) may “sign-off” on the final subdivision plat without the pump station being complete under the following conditions.

a. The developer has made reasonable and diligent effort to design order and complete the station.

b. A hold shall be placed upon certificates of occupancy and/or building permits.

c. The developer must present a “cash” bond equal to the value of the incomplete work or a letter of credit equal to twice the value of the incomplete work as determined by GCDWR OISD Division Director or designee.

A partial acceptance of the pump station may allow some use of the station prior to final acceptance. All conditions must have prior approval of the GCDWR OISD Division Director and the Field Operations Division Director. Under no circumstance will the station be allowed to accept flow prior to the installation of the phone line.
# PUMP STATION STANDARD DRAWINGS INDEX

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DESIGN CALCULATIONS

NOTES:
A PRECONSTRUCTION CONFERENCE MUST BE HELD WITH THE GWINNETT COUNTY
DEPARTMENT OF PUBLIC UTILITIES AND THE CONTRACTOR OF RECORD BEFORE
ANY WORK MAY BEGIN.

DESIGN CRITERIA:
FLOW PER SINGLE FAMILY RESIDENCE—200 GPD FOR ONE (1) BEDROOM APT.
-300 GPD FOR TWO (2) BEDROOM APTS.
-400 GPD FOR OTHER RESIDENTIAL

PEAK FACTOR = 2.5
DESIGN FLOWS _______ AVERAGE _______ PEAK
STATIC HEAD _______ FT
PUMP DESIGN TDH _______ GPM @ ____ FT

FORCE MAIN DIAMETER ______________
FORCE MAIN VELOCITY (2.5 F.P.S. MIN.) ______________
HIGH ALARM ELEVATION ______________
LOWEST OVERFLOW ELEVATION ______________
STORAGE VOLUME ______________
STORAGE TIME AT DESIGN FLOW ______________

PUMPS:
MANUFACTURER ______________
MODEL ______________
______ DIA. IMPELLER
______ DIA. SUCTION
______ DIA. DISCHARGE
______ H.P.
_____ V, _____ φ, _____ WIRE, _____ CYCLE
WETWELL VOLUME: _____ GAL.
PUMP CYCLE TIME: _____ AT MINIMUM ADF
_____ AT MINIMUM PEAK FLOW

GENERATOR:
MANUFACTURER ______________
MODEL ______________
RATING _____ KW __ V ____ FUEL

GWINNETT COUNTY DEPARTMENT OF WATER RESOURCES

JOB TITLE
PUMP STATION
STANDARD DRAWING

DATE
04/05/07

FILE NO.

SCALE: N.T.S.
GWINNETT COUNTY PUMP STATION
START-UP CHECK LIST

Pump Station Name ______________________ Requested Start-up Date ____________

General Contractor/Developer ____________________________

Phone ______________________ Fax ______________________

_______ A Force main Test must be completed and accepted.
_______ A pump draw down test must be completed and accepted.
_______ A certified letter of compaction from a licensed Geotechnical Engineer must be completed and accepted.
_______ The General Contractor/Developer, Electrical Contractor, Pump Manufacturer personnel must be scheduled to be on site at Start-up.
_______ All utilities (i.e. – electric, water, telephone and gas, if applicable) must be installed and working at Start-up.
_______ Submersible pumps will need to be pulled out of the wetwell at Start-up. (The General Contractor is responsible for this.)
_______ Pumps must be able to run off the main power source, as well as off the generator.
_______ All spare part, O & M Manuals and applicable paperwork should be brought to Start-up. (i.e. – 4-Hour load bank test, letter of compaction, utility names and account numbers, etc.)

THESE ITEMS MUST BE COMPLETE PRIOR TO SCHEDULING A START-UP.

When this check off list is complete, it will need to be faxed to The Pump Station Department for Gwinnett County Department of Water Resources. (Fax: 678-376-6729) Jean Evans (Phone: 678-376-7073).

The desired Start-up date should be listed along with a contact name and phone number. If all the items are complete, you will be contacted with a Start-up date and time. Note: If any items that are checked are not complete upon arrival, the Pump Station Start-up will need to be rescheduled and a fee could be assessed for additional trips.

Signature: ______________________ Date ______________________
THE TELEMETRY SYSTEM SHALL BE A “VERBATIM” MODEL VSS—16C WITH POWER AND TELEPHONE LINE CONDITIONER AND WITH COMPUTER COMMUNICATIONS INTERFACE. VERBATIM STARTUP SHALL BE PROVIDED TO GWINNETT COUNTY AT NO COST TO THE COUNTY.

A. CONTACT GCDWR (PUMP STATION MAINTENANCE SECTION 678–376–7027) FOR DETAILED INFORMATION.

B. TELEMETRY TRANSMITTER:

1. FOR SUBMERSIBLE PUMP STATIONS – THE TELEMETRY TRANSMITTER SHALL BE PROVIDED INSIDE THE PUMP CONTROL PANEL SUPPLIED BY PUMP MANUFACTURER. THE 120V POWER WILL BE ROUTED TO A SURGE SUPPRESSOR AND THE ALARM/STATUS CONTACTS INSIDE THE PUMP CONTROL PANEL SHALL BE FACTORY WIRED TO THE TELEMETRY TRANSMITTER.

2. FOR ABOVE GROUND PUMP STATIONS – THE TELEMETRY TRANSMITTER SHALL BE PROVIDED IN A NEMA–4X PANEL. PROVIDE ONE (1) RJ–11 TELEPHONE JACK INSIDE THE PANEL.

C. PROVIDE ONE (1) 5–PAIR, 22 GAUGE MULTI–CONDUCTOR CABLE FROM TELEMETRY TRANSMITTER TO GENERATOR.

D. PROVIDE ONE (1) 5–PAIR, 22 GAUGE MULTI–CONDUCTOR CABLE FROM ABOVE GROUND PUMP CONTROL PANEL TO THE TELEMETRY TRANSMITTER.

E. PROVIDE ONE (1) 5–PAIR, GEL–FILLED DIRECT BURIED CONDUIT FROM TELEPHONE INTERFACE TO ABOVE GROUND PUMP CONTROL PANEL.

F. MAKE NO CONNECTIONS OF FIELD WIRING AT THE TRANSMITTER. TERMINAL CONNECTIONS WILL BE PERFORMED BY GCDWR PERSONNEL.

G. CALL THE BELL SOUTH BUSINESS OFFICE TELEPHONE NUMBER, 770–454–2600, AND ASK FOR TELEPHONE LINE INSTALLATION AT THE LIFT STATION ADDRESS WHICH HAS BEEN APPROVED BY THE GWINNETT COUNTY PLANNING AND ZONING DEPARTMENT. THE BILL SHALL BE PLACED IN THE NAME OF THE DEVELOPER/CONTRACTOR. THE INITIAL CHARGES FOR INSTALLATION SHALL BE BILLED TO THE DEVELOPER.

H. YOU WILL BE ASKED TO PROVIDE THE FOLLOWING REGISTRATION NUMBERS:

1. FCC REGISTRATION: HKS 23J06304–AL–R
2. RINGER EQUIVALENCE: 0.3A
NOTE

EXTERIOR HINGED LIGHT POLE WITH 150 WATT HIGH PRESSURE SODIUM LUMINAIRE, 120 VOLT BALLAST, PHOTOELECTRIC CONTROL, WITH HEAT AND IMPACT RESISTANT LENS. POLE IS TO BE ARCHITECTURAL BROWN AND IS TO BE SUPPLIED WITH LOWERING WINCH.

LUMINAIRE → GE PART # M2RR-15S1A2L-MN4
BRACKET → GE PART # RBSU2H6PP
POLE → GE PART # ASHTS202T-5.3-11PP

SODIUM VAPOR SECURITY LIGHT ON 20' BREAK DOWN POLE

NOTE: BREAK DOWN POLE TO BE LOCATED INSIDE FENCE

GWINNETT COUNTY DEPARTMENT OF WATER RESOURCES

JOB TITLE: PUMP STATION STANDARD DRAWING
SHEET TITLE: YARD LIGHT

DRN. BY:
CKD BY:
APPD. BY:
DATE: 04-05-07

DETAIL NO. PS-4
FILE NO:
SCALE: N.T.S.
MONOLITHIC POUR OF SLAB & CURB

Curb & Gutter 8" x 30" x 14"

Gutter Slope to be continued across driveway

Plan

Original curb and gutter to be removed. Asphalt to be patched as required.

Curb & Gutter

Slope: 1" per foot

Slope Range: 1/2" to 1" per foot to right-of-way

Top of 6" Curb

Max. slope 2 1/2" per ft.

Max. slope 1 1/2" per ft.

6" or 8" thick 3,000 PSI concrete

6" Graded Aggregate Base

#4 6 x 6 wire required on industrial drives. No wire required if 8" thick

R/W

As directed by property owner

Section A-A
MINIMUM CONTAMINENT PROTECTION

NEW CONSTRUCTION and RETROFIT INSTALLATIONS

SERVICE METER SIZES: thru 1-inch (Residential Only)

DUAL CHECK (Duc) BACKFLOW PREVENTER (BFP)

SPECIFICATIONS: The CUSTOMER/owner shall provide a Dual Check (Duc) Backflow Preventer (BFP) in a size to match the required service meter. The Duc for a 3/4-inch meter shall have a minimum capacity of 25 gpm and it shall be bronze-bodied and include a female swivel union with (NHF) meter thread that attaches directly to the outlet side of the meter, and a female union adaptor 3/4 of 1 inch on the discharge side with the union nut drilled to accept a tamper proof locking wire. The device shall be embossed, or have a brass identification tag attached to the valve body by corrosion resistant mechanical fasteners, to display the following:

1. Name or manufacture or trademark.
2. Type, size and model number of the device.
3. Maximum rated working pressure and temperature.
4. Direction of flow through the device.
5. Date of manufacture or serial number.

The DuC–BFP shall have tested by a nationally recognized laboratory in accordance with ASSE Standard 1024, and bear the ASSE seal.

INSTALLATION INSTRUCTIONS: The DuC–DFP shall not be buried in earth but may be installed below ground as in the Water System’s meter box attached to the meter outlet or in an adjacent similar enclosure. A positive shut off valve shall be near both the inlet and outlet sides. When the device is attached directly to the meter, the Water System’s curb stop (valve) may be used for the inlet side valve. (See below.)

TYPICAL METER BOX INSTALLATION

NOTE: ASSEMBLY MUST BE CENTERED IN METER BOX

GWINNETT COUNTY DEPARTMENT OF WATER RESOURCES

JOB TITLE
PUMP STATION STANDARD DRAWING

SHEET TITLE
TYPICAL METER BOX INSTALLATION

DRN. BY:

REV. NO. BY

DATE

CKD BY:

APPD. BY:

DATE: 04–05–07

DETAIL NO. PS–9

FILE NO:

SCALE: N.T.S.
"A" - TO BE SIZED PER ARV MANUFACTURERS SPECIFICATIONS.
"B" - TO BE SIZED PER ARV MANUFACTURERS SPECIFICATIONS.

NOTE:

1) PIPE SHOULD BE BURIED TO A DEPTH THAT WILL ACCOMMODATE THE MINIMUM REQUIREMENTS OF THIS STANDARD AND THOSE OF THE SPECIFIED ARV.

2) A LENGTH OF ANGLE IRON SHALL BE FASTENED TO BOTH SIDES OF THE MANHOLE USING SIDE BEAM BRACKETS. THE VALVE STEM SHALL BE BRACED AGAINST THE ANGLE IRON USING A U-BOLT.
1. THIS IS A GENERAL SCHEMATIC LAYOUT. LOCATIONS MAY VARY ACCORDING TO EQUIPMENT SIZE AND SITE REQUIREMENTS.

2. COMPACTION CERTIFICATION LETTER REQUIRED AS STATED IN THE GCDWR DESIGN MANUAL.

3. FLOOR OF CHECK VALVE VAULT TO BE SLOPED TO DRAIN.

4. SLAB AND FENCE DIMENSIONS SHALL BE INCREASED WHEN NECESSARY TO FIT SPECIFIED EQUIPMENT.

5. SEE DETAIL PS-21 FOR GROUND GRID DETAILS AND DETAIL PS-22 FOR GENERATOR BERM AND DRAIN DETAILS.

6. SEE DETAIL PS-5 FOR FENCE & GATE DETAILS.

7. SEE DETAILS PS-23 AND PS-24 FOR TYPICAL SLAB DETAILS AND CONCRETE NOTES.

8. LOCATION OF SERVICE POLE TO BE COORDINATED WITH THE POWER COMPANY AND GCDWR.

GWINNETT COUNTY DEPARTMENT OF WATER RESOURCES

JOC TITLE: PUMP STATION STANDARD DRAWING

SHEET TITLE: SUBMERSIBLE PUMP STATION SITE LAYOUT

DRN. BY: CKD BY: APPOD. BY: DATE: 11 July 08

DETAIL NO. PS-12 FILE NO.: SCALE: N.T.S.
1. This is a general schematic layout. Locations may vary according to equipment size and site requirements.
2. Compaction certification letter required as stated in the GCDWR design manual.
3. Floor of check valve vault to be sloped to drain.
4. Slab and fence dimensions shall be increased when necessary to fit specified equipment. Final slab and fence footprints shall be square.
5. See detail PS-21 for ground grid details and detail PS-22 for generator berm and drain details.
7. See details PS-23 and PS-24 for typical slab details and concrete notes.
8. Location of service pole to be coordinated with the power company and GCDWR.

GWINNETT COUNTY DEPARTMENT OF WATER RESOURCES

JOB TITLE: PUMP STATION
STANDARD DRAWING: LARGE SUBMERSIBLE PUMP STATION SITE LAYOUT

DETAIL NO. PS-12A
FILE NO.: SCALE: N.T.S.
NOTES

1. Rigid conduits shall be stubbed into wall of wetwell 18" min. below ground level to provide access to cables and control wiring to control panel.

2. The hole in the wetwell wall for the conduit stubs shall be sized and bored for the conduit to fit. The hole shall be grouted.

3. When conduit stub is 12" or over in length, the stub shall be supported by hangers.

4. The stubs inside the wetwell shall not protrude or interfere with the clearance of the access hatch's opening; nor hinder the removal of the pumps.

5. The cables shall have a strain release clamp mounted to the conduit stub by a bushing or shall be fixed to the wetwell structure with hangers.

6. If float switches are to be used, they shall be installed the same way as the pump cables are installed.

7. Locate hinges on access hatch so that the hatch door swings towards the control panel when lifted.
THE FOLLOWING CALCULATIONS ARE BASED ON THE WETWELL CONFIGURATION SHOWN TO THE RIGHT. (SEE DETAILS PS-14 AND PS-19 FOR DESCRIPTIONS OF THE PARAMETERS INDICATED.)

ASSUMPTIONS
1. FRICTION BETWEEN THE SOIL AND WALLS IS IGNORED.
2. STRUCTURE WEIGHT IS BASED ON THE WEIGHT OF THE WETWELL RISER AND BASE SECTIONS AND PUMP BASE FILL ONLY. WEIGHT OF PUMPS, PIPING, TOP, ETC. ARE IGNORED.
3. MATERIAL SPECIFIC WEIGTHS:
   - WATER = 62.4 PCF
   - CONCRETE = 150 PCF
   - SOIL = 100 PCF

STRUCTURE

VOLUME OF RISER SECTIONS: \( V_r = (\text{AREA OF OUTSIDE WALL} - \text{AREA OF INSIDE WALL}) \times \text{HEIGHT OF RISERS} \)

\[
= (\frac{\pi}{4}) \times (M + 2 \times \frac{0}{12})^2 - M^2 \times (A - K) \\
= (3.14/4) \times [(8 + 2 \times 10/12)^2 - 8^2] \times (922.68 - 896.68) = 601.0 \text{ CF}
\]

VOLUME OF BASE SECTION: \( V_b = \text{AREA OF BASE} \times \text{BASE THICKNESS} \)

\[
= (\frac{\pi}{4}) \times (M + 2 \times (12 + 0)/12)^2 \times L/12 \\
= (3.14/4) \times [8 + 2 \times (12 + 10)/12]^2 \times 12/12 = 106.8 \text{ CF}
\]

VOLUME OF FILL: \( V_f = \text{AREA OF INSIDE DIAM.} \times \text{FILL DEPTH} \)

\[
= (\frac{\pi}{4}) \times M^2 \times (J - K) \\
= (3.14/4) \times 8^2 \times (897.68 - 896.68) = 50.2 \text{ CF}
\]

WEIGHT OF CONCRETE: \( W_c = (V_c + V_r + V_f) \times \gamma_c = (601.0 + 106.8 + 50.2) \times 150 = 113,700 \text{ LBS} \)

SOIL

VOLUME OF SOIL OVER BASE: \( V_s = (\text{AREA OF BASE} - \text{AREA OF OUTSIDE WALL}) \times \text{HEIGHT OF RISERS} \)

\[
= (\frac{\pi}{4}) \times [(M + 2 \times (12 + 0)/12)^2 - (M + 2 \times 0/12)^2] \times (A - K) \\
= (3.14/4) \times [(8 + 2 \times 10/12)^2 - (8 + 2 \times 0/12)^2] \times (922.68 - 896.68) \\
= 870.8 \text{ CF}
\]

WEIGHT OF SOIL OVER BASE: \( W_s = V_s \times \gamma_s = 870.8 \times 100 = 87,080 \text{ LBS} \)

WATER

VOLUME OF WATER DISPLACED: \( V_w = \text{AREA OF OUTSIDE WALL} \times \text{HEIGHT OF RISERS} + \text{VOLUME OF BASE} \)

\[
= (\frac{\pi}{4}) \times (M + 2 \times 0/12)^2 \times (A - K) + V_b \\
= (3.14/4) \times (8 + 2 \times 10/12)^2 \times (922.68 - 896.68) + 106.8 = 2,014.0 \text{ CF}
\]

WEIGHT OF WATER DISPLACED: \( W_w = V_w \times \gamma_w = 2,014.0 \times 62.4 = 125,674 \text{ LBS} \)

FLOATATION CHECK

FACTOR OF SAFETY: \( F_s = \text{TOTAL WEIGHT OF STRUCTURE AND SOIL} / \text{WEIGHT OF WATER DISPLACED} \)

\[
= \frac{(W_c + W_s)}{W_w} \\
= \frac{(113,700 + 87,080)}{125,674} = 1.60 \\
\]

\( F_s > 1.5 \rightarrow \) WETWELL WILL NOT FLOAT

GWINNETT COUNTY DEPARTMENT OF WATER RESOURCES

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<th>SHEET TITLE</th>
<th>DRN. BY</th>
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1. This is a general schematic layout. Locations may vary according to equipment size and site requirements.
2. Compaction certification letter required as stated in the GCDWR design manual.
3. Slab and fence dimensions shall be increased when necessary to fit specified equipment. Final slab and fence footprints shall be square.
4. See detail PS-21 for ground grid details and detail PS-22 for generator berm and drain details.
5. See detail PS-5 for fence & gate details.
7. All enclosures must be NEMA 4x.
8. Location of service pole to be coordinated with the power company and GCDWR.

GWINNETT COUNTY DEPARTMENT OF WATER RESOURCES

JOB TITLE: PUMP STATION
STANDARD DRAWING: WETWELL MOUNTED PUMP STATION SITE LAYOUT

DETAIL NO. PS-17
FILE NO.
SCALE: N.T.S.
NOTES

1. METER AND C.T. CABINET SHALL BE PLACED ON UTILITY POLE OUTSIDE OF FENCE.
2. DISCONNECT SWITCH IS REQUIRED. IT MUST BE LOCKABLE IN BOTH OFF AND ON POSITIONS.
3. ALL PANEL SUPPORTS FOR CONTROL PANEL MUST BE PAINTED ARCHITECTURAL BROWN.
4. ALL THREE CONDUITS SHALL TURN UP TO AN LB THAT ENTERS THE STATION.
3/4"Ø x 10' COPPERWELD GROUND ROD (TYP. FOR 4)

#2 BARE STRANDED COPPER CONDUCTOR (TYP.)

GROUND TO FENCE SEE DETAIL PS-5

GROUND CONDUCTOR IN 3/4" CONDUIT SIZE PER N.E.C.

GENERATOR

CADWELD ALL CONNECTIONS (TYP.)

TO MAIN CIRCUIT BREAKER ENCLOSURE

EDGE OF PAD 1" MIN. (TYP.)

GROUND GRID 24" BELOW GRADE

NOTE: SEE DETAILS PS-12 AND PS-17 FOR PUMP STATION LAYOUT.
NOTES
1. SEE DETAILS PS-12 AND PS-17 FOR PUMP STATION LAYOUT.
2. BERM MUST BE DESIGNED TO CONTAIN 110% OF FUEL TANK VOLUME (DIESEL ONLY).
3. GAS LINE LOCATION TO BE COORDINATED WITH GEORGIA NATURAL GAS FOR SPECIFIC LOCATION.
4. NO MORE THAN 4' OF GAS LINE SHALL BE EXPOSED ABOVE CONCRETE SLAB.
5. ALL GAS PIPING TO BE IN ACCORDANCE WITH GENERATOR MANUFACTURER RECOMMENDATIONS AND INSTALLED PER INTERNATIONAL FUEL GAS CODE, LATEST EDITION.
1. **Typical Slab Detail**
   - N.T.S.

2. **Generator Footing**
   - N.T.S.

3. **Slab at Entrance Gate**
   - N.T.S.

**Access Road**
- See details P-6 and P-7

**Square Edge Slab Penetration (e.g., Valve Vault)**
- 2 - #3 x 24" @ Center

**Plan—Square Edge Penetration at Slab (Typ)**
- N.T.S.

**Note:** See detail PS-24 for concrete notes.

---

**Gwinnett County Department of Water Resources**

**Job Title:** Pump Station Standard Drawing

**Sheet Title:** Concrete Slab Details

**Drawn By:**

**Checked By:**

**Approved By:**

**Date:** 04-05-07

**Detail No.: PS-23**

**File No.:**

**Scale:** N.T.S.
1. A CERTIFIED LETTER OF COMPACTION FROM A LICENSED GEOTECHNICAL ENGINEER MUST BE COMPLETED PRIOR TO PLACEMENT OF CONCRETE.

2. CONCRETE MIX SHALL BE IN ACCORDANCE WITH ASTM C94 AND POSSESS THE FOLLOWING CHARACTERISTICS:
   (a) COMPRESSIVE STRENGTH OF AT LEAST 3,000 PSI AT 28 DAYS.
   (b) MINIMUM AGGREGATE SIZE OF 1-INCH.
   (c) AIR CONTENT OF 4 1/2% ± 1 1/2%.
   (d) WATER–CEMENT RATIO SHALL NOT BE GREATER THAN 0.44.
   (e) SLUMP SHALL BE 4” ± 1”.
   (f) UNIT WEIGHT SHALL NOT BE LESS THAN 145 LB/C.F.
   (g) ACCELERATING ADMIXTURES IN COLD WEATHER OR RETARDING ADMIXTURES IN HOT WEATHER SHALL ONLY BE USED WHEN APPROVED IN WRITING BY GCDWR.

3. CONCRETE PLACEMENT SHALL BE IN ACCORDANCE WITH ACI 301 AND ACI 304R. CONCRETE TEMPERATURE AT TIME OF PLACEMENT SHALL BE A MINIMUM OF 55°F AND A MAXIMUM OF 90°F.

4. COLD WEATHER: CONCRETE SHALL BE PLACED IN ACCORDANCE WITH ACI 306R.

5. HOT WEATHER: NO CONCRETE SHALL BE PLACED WHEN AMBIENT AIR TEMPERATURE IS GREATER THAN 85°F. CONCRETE SHALL BE PLACED IN ACCORDANCE WITH ACI 305R.

6. CURING OF CONCRETE SHALL BE IN ACCORDANCE WITH ACI 308 AND ACI 318.

7. DEFECTIVE OR IMPROPERLY PLACED CONCRETE SHALL BE REPAIRED OR REPLACED AT CONTRACTOR’S/DEVELOPER’S EXPENSE.
1. RODS TO BE MINIMUM YIELD STRENGTH OF 50,000 PSI.
2. RODS MUST HAVE A MINIMUM 6" OF THREAD ON EACH END.
3. ALL STEEL MUST BE CLEANED AND COATED WITH ROYSTON ROSKOTE, KOPPERS SUPER SERVICE BLACK OR APPROVED EQUAL.
4. ALL NUTS USED ON TIE RODS MUST HAVE A WASHER.
N.T.S.

* NOTE: ALSO REQUIRED BETWEEN EMERGENCY STORAGE TANK TO EMERGENCY STORAGE TANKS OR EMERGENCY STORAGE TANK AND SYSTEM MANHOLES
NOTE: ALL JOINTS SHALL BE FLANGED

"A" - TO BE SIZED PER ARV MANUFACTURER'S SPECIFICATIONS.
"B" - TO BE SIZED PER ARV MANUFACTURER'S SPECIFICATIONS.

NOTE: PIPE SHOULD BE BURIED TO A DEPTH THAT WILL ACCOMMODATE THE MINIMUM REQUIREMENTS OF THIS STANDARD AND THOSE OF THE SPECIFIED ARV.
Dependant on equipment size and space requirements, locate the required pump control equipment in this area or expand the panel to a 72" wide, double door panel configuration and include the items in the adjacent panel section.

A. Starters
B. MAS Units
C. Overload Protection
D. Main Breaker
E. Soft Starter
F. Pump CTs
G. Surge Protection
H. 120V Control Power Transformer

**Notes:**
- **RTU NO. XXXX**
- **SIDE VIEW**
- **BACKPLANE LAYOUT**
- **INNER DOOR LAYOUT**
- **PANEL FRONT LAYOUT**

**Components:**
- **Fllygt MAS Unit**
- **Fllygt MAS Out**
- **Heater**
- **Power**
- **Relays**
- **Starters**
- **Fuses**
- **Terminal Strips**
- **24VDC PS**
- **UPs (500W)**

**Additional Details:**
- **Inner Door Layout**
- **Side View**
- **Building Block**
- **HMI**
- **Critical Failure**
- **PWR ON**
- **WELDED STEEL PLATE**
- **SAFETY BARRIER**
- **MOUNTED BETWEEN DOORS**
- **ALLOW MINIMUM 3" CLEARANCE FROM BACK SUBPANELS FOR WIRING BETWEEN SECTIONS**

**Also:**
- **DOCUMENT HOLDER (INSIDE FRONT DOOR)**
- **(2) HALF HEIGHT SUBPANELS 6'-0"**
- **3'-0"**
- **1'-6"**

---

**GWINNETT COUNTY DEPARTMENT OF WATER RESOURCES**

**Job Title:** PUMP STATION STANDARD DRAWING

**Sheet Title:** RTU PANEL LAYOUT TYPE 1

**Drn. By:**

**Rev. No. By:**

**Appd. By:**

**Date:** 09-18-07

**Detail No.:** PS-29a

**File No.:**

**Scale:** N.T.S.
Dependent on equipment size and space requirements, locate the required pump control equipment in this area or expand the panel to a 72" wide, double door panel configuration and include the items in the adjacent panel section.

1. Starters
2. MAS Units
3. Overload Protection
4. Main Breaker
5. Soft Starter
6. Pump CTs
7. Surge Protection
8. 120V Power Transformer

PUMP NO. 1
- RUN
- FAIL
- STOP
- RESET

PUMP NO. 2
- RUN
- FAIL
- STOP
- RESET
### TABLE A.1 - FRICTION LOSS CHART

#### Engineering Data

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**Friction losses are loss of head per 100-foot pipe.**

**Bold values are design minimums.**

**Calculations are based on nominal pipe diameters.**

#### "C" VALUE MULTIPLIER

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#### EQUIVALENT STRAIGHT PIPE FITTINGS LOSS

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<th>PIPE SIZE</th>
<th>90-DEG. BEND 11-Feet</th>
<th>45-DEG. BEND 5-Feet</th>
<th>CHECK VALVR 27-Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-Inch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-Inch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-Inch</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Effective Date: 11/30/07
<table>
<thead>
<tr>
<th>Unit Wastewater Contributions from Proposed Land Use (Any major deviations from the following guidelines should be so noted and substantiated by the Engineer in the project report. For pump stations see reference #3.)</th>
<th>Average Annual Residential &amp; Commercial Flow Amount in Gallons per day (GPD) (See note #4)</th>
<th>Per Unit</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airport</td>
<td>25</td>
<td>Employee</td>
<td>#1</td>
</tr>
<tr>
<td>Airport - food service not included</td>
<td>25</td>
<td>Employee</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Airport - food service not included</td>
<td>5</td>
<td>Passenger</td>
<td>#2</td>
</tr>
<tr>
<td>Apartment - one bedrooms</td>
<td>175</td>
<td>Unit</td>
<td>#2</td>
</tr>
<tr>
<td>Apartment - two bedrooms</td>
<td>250</td>
<td>Unit</td>
<td>#2</td>
</tr>
<tr>
<td>Apartment - three bedrooms</td>
<td>325</td>
<td>Unit</td>
<td>#2</td>
</tr>
<tr>
<td>Auditorium, Convention Center, Assembly Hall - food service not included</td>
<td>10</td>
<td>Person, max. cap.</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Bar, Tavern, Cocktail Lounge - food service not included</td>
<td>50</td>
<td>Seat</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Beauty/Barber Shop</td>
<td>333</td>
<td>Wet Chair</td>
<td>#1</td>
</tr>
<tr>
<td>Bowling Alley - food service not included</td>
<td>125</td>
<td>Lane</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Bowling Alley - food service not included</td>
<td>25</td>
<td>Employee</td>
<td>#2</td>
</tr>
<tr>
<td>Campground - overnight</td>
<td>175</td>
<td>Space</td>
<td>#2</td>
</tr>
<tr>
<td>Carwash - automatic</td>
<td>166</td>
<td>Bay</td>
<td>#1</td>
</tr>
<tr>
<td>Carwash - self-operating</td>
<td>100</td>
<td>Bay</td>
<td>#1</td>
</tr>
<tr>
<td>Church</td>
<td>5</td>
<td>Sanctuary Seat</td>
<td>#1</td>
</tr>
<tr>
<td>Coin Laundry</td>
<td>400</td>
<td>Machine</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Commercial Laundry</td>
<td>640</td>
<td>Machine</td>
<td>#1</td>
</tr>
<tr>
<td>Country Club</td>
<td>250</td>
<td>1,000 sq. ft.</td>
<td>#1</td>
</tr>
<tr>
<td>Country Club - food service not included</td>
<td>100</td>
<td>Resident Member</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Country Club - food service not included</td>
<td>25</td>
<td>Non-resident</td>
<td>#2</td>
</tr>
<tr>
<td>Hospital</td>
<td>200</td>
<td>Bed</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Hospital</td>
<td>25</td>
<td>Employee</td>
<td>#2</td>
</tr>
<tr>
<td>Industrial - toilet waste and showers</td>
<td>35</td>
<td>Employee</td>
<td>#2</td>
</tr>
<tr>
<td>Industrial - toilet waste only</td>
<td>25</td>
<td>Employee</td>
<td>#2</td>
</tr>
<tr>
<td>Mobile Home Park - double wide</td>
<td>400</td>
<td>Space</td>
<td>#1</td>
</tr>
<tr>
<td>Mobile Home Park - single wide</td>
<td>300</td>
<td>Space</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Motel, Hotel - food service not included</td>
<td>100</td>
<td>Unit</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Category</td>
<td>Load</td>
<td>Use</td>
<td>Notes</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>------</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td>Nursing Home</td>
<td>125</td>
<td>Bed</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Nursing Home</td>
<td>25</td>
<td>Employee</td>
<td>#2</td>
</tr>
<tr>
<td>Office Medical</td>
<td>500</td>
<td>1,000 sq. ft.</td>
<td>#1</td>
</tr>
<tr>
<td>Office - food service not included</td>
<td>175</td>
<td>1,000 sq. ft.</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Office - food service not included</td>
<td>25</td>
<td>Employee</td>
<td>#2</td>
</tr>
<tr>
<td>Picnic Area, Park</td>
<td>10</td>
<td>Visitor</td>
<td>#2</td>
</tr>
<tr>
<td>Picnic Area, Park - with showers</td>
<td>25</td>
<td>Visitor</td>
<td>#2</td>
</tr>
<tr>
<td>Police, Fire Station - food service not included</td>
<td>75</td>
<td>Resident Employee</td>
<td>#2</td>
</tr>
<tr>
<td>Police, Fire Station - no food service</td>
<td>25</td>
<td>Day Employee</td>
<td>#2</td>
</tr>
<tr>
<td>Residence Single Family, Condo, Townhome</td>
<td>400</td>
<td>Unit</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Rest Stop, Comfort Station</td>
<td>25</td>
<td>Employee</td>
<td>#2</td>
</tr>
<tr>
<td>Rest Stop, Comfort Station</td>
<td>6</td>
<td>Visitor</td>
<td>#2</td>
</tr>
<tr>
<td>Restaurant</td>
<td>55</td>
<td>Seat</td>
<td>#2</td>
</tr>
<tr>
<td>School</td>
<td>17</td>
<td>Student</td>
<td>#1</td>
</tr>
<tr>
<td>School - with gym</td>
<td>21</td>
<td>Student</td>
<td>#1</td>
</tr>
<tr>
<td>School - based on average daily attendance (ADA); add 10% for visitors</td>
<td>25</td>
<td>Teacher, Employee</td>
<td>#2</td>
</tr>
<tr>
<td>School, Cafeteria with garbage grinder - based on average daily attendance (ADA); add 10% for visitors</td>
<td>5</td>
<td>Student</td>
<td>#2</td>
</tr>
<tr>
<td>School, Cafeteria - based on average daily attendance (ADA); add 10% for visitors</td>
<td>4</td>
<td>Student</td>
<td>#2</td>
</tr>
<tr>
<td>Service Station</td>
<td>25</td>
<td>Employee</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Store, Shopping Center, Retail Only - food service not included</td>
<td>100</td>
<td>1,000 sq. ft.</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Swimming Pool</td>
<td>25</td>
<td>Employee</td>
<td>#2</td>
</tr>
<tr>
<td>Swimming Pool</td>
<td>20</td>
<td>Swimmer</td>
<td>#2</td>
</tr>
<tr>
<td>Theater, Regular - employees included</td>
<td>5</td>
<td>Seat</td>
<td>#1, #2</td>
</tr>
<tr>
<td>Warehouse</td>
<td>25</td>
<td>1,000 sq. ft.</td>
<td>#1</td>
</tr>
</tbody>
</table>

References:

#1 Gwinnett County Department of Public Utilities Fee Schedule (As of September 1, 1985. Adopted by Board of Commissioners on August 20, 1985. Note that this fee schedule is not currently used.)


#3 GCDPU Sanitary Sewer Pump Station Design & Construction Manual.

#4 Peak Hour Flow (PHF) is calculated using the formulas in Table 10-3 (645x13x.xls) of the Water and Wastewater Master Plan Update, Gwinnett County Department of Public Utilities, July 13, 1998, Disaggregate Factor = 1.00.
Sanitary sewer pump station submittals must include this form with ALL indicated information provided. Design formulas, design minimums and given variables are shown below or on reverse, and are to be utilized in providing the required data. In addition to the below, the designer must submit all design information from manufacturer(s) supporting the proposed pumps and electrical equipment.

Name of Project: _______________________________________________________________________

Name of Developer: _____________________________________________________________________

Name of Engineer: _____________________________________________________________________

Location: ______________________________ L.L. _____ Dist. _____

*****************************************************************************

FLOW INFORMATION

Proposed Flow
From Development: 400 GPD (single family residences) x ________ = ________
(No. of lots) (GPD)

Design Flow Average: ________ / 1440 (minutes per day) = ________
(GPD) (GPM A)

Design Flow Peak: ________ x 2.5 (peaking factor) = ________
(GPD) (GPM P)

Force Main Size: ________ inch

Design Pump Rate: ________ GPM

Actual Pump Rate: ________ GPM *

Force Main Velocity: ________ fps **

Force Main Size Total Length: ________ ft

Force Main Size Hydraulic Length: ________ ft ***

Maximum No. of Lots: ________ ****

That Can Be Served

Is depth of flow in receiving sewer greater than half of sewer diameter? ________ ***** (Attach Calculations)

* Based on duty point of manufacturer system head curve for selected pump model. This number to be used for calculating total dynamic head.

** As calculated in attached documents or per Table A.1. Note - must maintain recommended minimum 2.5 fps scour velocity.

*** For force mains where gravity flow exists in some sections prior to the end of the force main.

**** Based on rate of flow of selected pump model (i.e. - Actual Pump Rate).

***** Based on Actual Pump Rate and existing flows in calculations. Coordinate with GCDWR if depth of flow is greater than half of sewer diameter.
TOTAL DYNAMIC HEAD INFORMATION

Static Discharge Head:  
\[
\text{High-point Elev.} - \text{Centerline Pump Elev.} = \text{SDH (ft)}
\]

Static Suction Head:  
\[
\text{Centerline Pump Elev.} - \text{Pump-Off Elev.} = \text{SSH (ft)}
\]

Station Loss:  
\[
\text{SL (ft) (From Manufacturer)}
\]

Wetwell Piping Loss:

Wetwell Piping Loss includes frictional losses in all suction and discharge piping located inside the wetwell to Station 0.00 of the forcemain.

Suction Pipe Diam:  
\[
\text{inch}
\]

Suction Pipe Length:  
\[
\text{ft}
\]

Suction Pipe Fittings Equivalent Lengths:

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Eq. Length</th>
<th>Total Len.</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-Deg.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-Deg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.5-Deg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Suction Pipe Fittings Eq. Length = \[
\text{ft}
\]

\[
\text{Suction Pipe Friction Loss} = \left( \frac{\text{Pipe Length}}{\text{Fittings Eq. Length}} \right) \times \frac{\text{C-Value Mult. (From Chart)}}{\text{Eq. Length}} \times \frac{\text{Fric. Loss}}{100}
\]

\[
= \text{SPFL (ft)}
\]

Wetwell Discharge Pipe Diam:  
\[
\text{inch}
\]

Wetwell Discharge Pipe Length:  
\[
\text{ft}
\]

Wetwell Discharge Pipe Fittings Equivalent Lengths:

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Eq. Length</th>
<th>Total Len.</th>
</tr>
</thead>
<tbody>
<tr>
<td>90-Deg.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-Deg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.5-Deg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Wetwell Discharge Pipe Fittings Eq. Length = \[
\text{ft}
\]

Effective Date 11/30/07
Wetwell = \left( \frac{\text{Pipes Length}}{\text{Fittings Eq. Length}} \right) \times \frac{\text{C-Value Multi.}}{\text{Fric. Loss (From Chart)}} \times \frac{1}{100}

\text{Discharge Pipe Friction Loss} = \frac{\text{WDFL}}{\text{ft}}

\text{Total Wetwell Loss} = \frac{\text{SSH}}{\text{SPFL}} + \frac{\text{TWL}}{\text{WDFL}} = \frac{\text{ft}}{}

\text{Force Main Loss:}

\text{Force Main Fittings Equivalent Lengths:}

\begin{array}{|l|c|c|c|}
\hline
\text{Type} & \text{Number} & \text{Eq. Length} & \text{Total Len.} \\
\hline
90-Deg. & & & \\
45-Deg. & & & \\
22.5-Deg. & & & \\
Check Valve & & & \\
Gate Valve & & & \\
Plug Valve & & & \\
\hline
\end{array}

\text{Total Force Main Fittings Eq. Length} = \frac{\text{ft}}{}

\text{Force Main Design Length*} = \frac{\text{ft}}{}

* The force main design length is either the total length of the force main or the hydraulic length of the force main. The hydraulic length may apply if there is an intermediate high point in the system.

\text{Total Force Main Loss} = \left( \frac{\text{Forcemain Length}}{\text{Fittings Eq. Length}} \right) \times \frac{\text{C-Value Multi.}}{\text{Fric. Loss (From Chart)}} \times \frac{1}{100}

\text{TFML}

\text{Total Dynamic Head} = \frac{\text{SDH}}{\text{SL}} + \frac{\text{TFML}}{\text{TWL}} = \frac{\text{TDH}}{\text{ft}}
WETWELL VOLUME/SIZE INFORMATION

Wetwell Diam. = gal/v.f. =

\[
\text{Min. Wetwell Volume} = \frac{\text{TBSS}}{\text{Qp}} \times \frac{\text{Qp}}{(Qs - Qp)} \times \frac{\text{Qs}}{\text{Vp}}
\]

= gal.

Where:

\[\text{Vp} = \text{Volume of Wetwell from Pump On to Pump Off}\]

\[\text{BSS} = \text{Time Between Successive Starts (Use 10 min. minimum)}\]

\[\text{Qp} = 50\% \text{ (Worst Case) of Peak Flow (GPM Peak)}\]

\[\text{Qs} = \text{Actual Pump Rate (GPM)}\]

Using the above listed wetwell size minimums, divide \(\text{Vp}\) by gal/v.f. and round up to the larger 1-foot increment. This is the minimum distance in the wetwell between "Pump On" and "Pump Off". Use this figure in establishing wetwell depth and elevations as below.

\[
\text{Minimum Distance Between "Pump On" and "Pump Off"} = \frac{\text{Vp}}{\text{gal/v.f.}} = \text{ft (Rounded up)}
\]
PUMP STATION ELEVATION & EMERGENCY STORAGE INFORMATION

Top of Wetwell: _______ ft

Lowest Overflow Elevation: _______ ft

Inlet Pipe Invert: _______ ft (minimum of 2 feet below "Top of Wetwell" or "Lowest Overflow Elevation")

High Level Alarm: _______ ft

Lag Pump On: _______ ft ("High Level Alarm" - 1 ft min.)

Lead Pump On: _______ ft ("Lag Pump On" - 1 ft min.)

Pumps Off: _______ ft ("Lead Pump On" - Minimum Distance Between "Pump On" and "Pump Off")

Pump Suction: _______ ft ("Pumps Off" - manufacturer minimum)

Bottom of Wetwell: _______ ft ("Pump Suction" - manufacturer minimum)

Required Emergency Storage: _______ gal (minimum of 3 hours at Design Flow Average)

Calculate the volume of emergency storage available in the wetwell. This is equal to the distance between the Top of Wetwell or Lowest Overflow Elevation (whichever is less) and the High Level Alarm elevation multiplied by the gal/v.f.

\[ \text{Emergency Storage Available in Wetwell} = \left( \frac{\text{Top of Wetwell or Lowest Overflow Elevation}}{\text{High Level Alarm}} \right) \times \frac{\text{Vp}}{\text{gal/v.f.}} = \text{_______ gal} \]

Does wetwell by itself provide the minimum Required Emergency Storage?

Yes _______ No _______

If not, describe how the minimum Required Emergency Storage will be provided. Include all relevant calculations:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Effective Date 11/30/07
DEPTH OF FLOW CHECK

From Mannings Equation:

Pipe Shape: Circular
Pipe Diameter: ________ in
Pump Flowrate: ________ gpm
Minimum Slope: ________ ft/ft
Existing Flowrate: ________ gpm
Total Flowrate: ________ gpm
Manning's n: ________
Full Flow X-Sectional Area: ________ s.f.
Wetted Area: ________ s.f.
Wetted Perimeter: ________ in
Full Flow Perimeter: ________ in
Hydraulic Radius: ________ in
Percent Full: ________ %
Depth of Flow: ________ in

GENERATOR BERM HEIGHT CALCULATIONS

Generator size: ________ ft. length (GL)
________ ft. width (GW)

Fuel Tank Volume (V): ________ gal = ________ ft³

Berm Area Inside Width (BW): ________ ft.
Berm Area Inside Length (BL): ________ ft.

Fuel Area (FA) = (BW x BL) - (GW x GL) = ________ ft²

Berm Height = \[ \frac{V}{FA} \] = _____ ft.
Sanitary sewer pump station submittals must include this form with ALL indicated information provided. Design formulas, design minimums and given variables are shown below or on reverse, and are to be utilized in providing the required data. In addition to the below, the designer must submit all design information from manufacturer(s) supporting the proposed pumps and electrical equipment.

**Name of Project:** ABC Road Pump Station

**Name of Developer:** John Q. Jones and Associates

**Name of Engineer:** Acme Engineering, Inc.

**Location:** ABC Road L.L. 237 Dist. 5th

**FLOW INFORMATION**

**Proposed Flow**

From Development: 400 GPD (single family residences) \(\times\) 530 = 212,000 (GPD)

Design Flow Average: \(\frac{212,000}{1440}\) (minutes per day) = 147.2 (GPM A)

Design Flow Peak: \(\frac{147.2}{2.5}\) (peaking factor) = 368.1 (GPM P)

**Force Main Size:** 6 (nom) inch

**Design Pump Rate:** 368.1 GPM

**Actual Pump Rate:** 385.0 GPM *

**Force Main Velocity:** 4.37 fps **

**Force Main Size Total Length:** 2,589.9 ft

**Force Main Size Hydraulic Length:** N/A ft ***

**Maximum No. of Lots:** 554 ****

Is depth of flow in receiving sewer greater than half of sewer diameter? **No** **** (Attach Calculations)

* Based on duty point of manufacturer system head curve for selected pump model. This number to be used for calculating total dynamic head.

** As calculated in attached documents or per Table A.1. Note - must maintain recommended minimum 2.5 fps scour velocity.

*** For force mains where gravity flow exists in some sections prior to the end of the force main.

**** Based on rate of flow of selected pump model (i.e. - Actual Pump Rate).

***** Based on Actual Pump Rate and existing flows in calculations. Coordinate with GCDWR if depth of flow is greater than half of sewer diameter.

Effective Date 11/30/07
TOTAL DYNAMIC HEAD INFORMATION

Static Discharge Head:
\[
\frac{1089.00}{\text{High-point Elev.}} - \frac{975.50}{\text{Centerline Pump Elev.}} = 113.5 \text{ ft SDH}
\]

Static Suction Head:
\[
\frac{975.50}{\text{Centerline Pump Elev.}} - \frac{977.00}{\text{Pump-Off Elev.}} = -1.5 \text{ ft SSH}
\]

Station Loss: \[
\frac{1.1}{\text{SL}} \text{ ft (From Manufacturer)}
\]

Wetwell Piping Loss:

Wetwell Piping Loss includes frictional losses in all suction and discharge piping located inside the wetwell to Station 0.00 of the forcemain.

Suction Pipe Diam: \[\text{N/A inch}\]

Suction Pipe Length: \[0 \text{ ft}\]

Suction Pipe Fittings Equivalent Lengths:

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Eq. Length</th>
<th>Total Len.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; 90-Deg.</td>
<td>1</td>
<td>6.6</td>
<td>6.6</td>
</tr>
<tr>
<td>6&quot; 45-Deg</td>
<td>0</td>
<td>5.3</td>
<td>0.0</td>
</tr>
<tr>
<td>6&quot; 22.5-Deg</td>
<td>0</td>
<td>2.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Total Suction Pipe Fittings Eq. Length = 6.6 ft

\[
\text{Suction Pipe Friction Loss} = \left(0 + \frac{6.6}{\text{Pipe Length}}\right) \times 0.715 \times \frac{2.07}{100} \times \frac{1}{\text{Prel. Loss}}
\]

\[
= \frac{0.1}{\text{SPFL}} \text{ ft}
\]

Wetwell Discharge Pipe Diam: \[6 \text{ inch}\]

Wetwell Discharge Pipe Length: \[12 \text{ ft}\]

Wetwell Discharge Pipe Fittings Equivalent Lengths:

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Eq. Length</th>
<th>Total Len.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; 90-Deg.</td>
<td>2</td>
<td>6.6</td>
<td>13.2</td>
</tr>
<tr>
<td>6&quot; 45-Deg</td>
<td>0</td>
<td>5.3</td>
<td>0.0</td>
</tr>
<tr>
<td>6&quot; 22.5-Deg</td>
<td>0</td>
<td>2.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Total Wetwell Discharge Pipe Fittings Eq. Length = 13.2 ft

Effective Date 11/30/07
Wetwell = (12 + 13.2) x 0.715 x 2.07 / 100

Discharge Pipe Friction Loss = 0.4 ft

Total Wetwell Loss = (-1.5 + 0.1 + 0.4) = -1.0 ft

Force Main Loss:

Forcemain Fittings Equivalent Lengths:

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>Eq. Length</th>
<th>Total Len.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6&quot; 90-Deg.</td>
<td>10</td>
<td>6.6</td>
<td>66</td>
</tr>
<tr>
<td>6&quot; 45-Deg.</td>
<td>1</td>
<td>5.3</td>
<td>5.3</td>
</tr>
<tr>
<td>6&quot; 22.5-Deg.</td>
<td>1</td>
<td>2.0</td>
<td>2</td>
</tr>
<tr>
<td>6&quot; Check Valve</td>
<td>1</td>
<td>33.0</td>
<td>33</td>
</tr>
<tr>
<td>6&quot; Gate Valve</td>
<td>0</td>
<td>2.7</td>
<td>0</td>
</tr>
<tr>
<td>6&quot; Plug Valve</td>
<td>4</td>
<td>6.0</td>
<td>24</td>
</tr>
</tbody>
</table>

Total Forcemain Fittings Eq. Length = 130.3 ft

Force Main Design Length* = 2,589.9 ft

* The force main design length is either the total length of the force main or the hydraulic length of the force main. The hydraulic length may apply if there is an intermediate high point in the system.

Total Force Main Loss = (2,589.9 ft + 130.3) x 0.715 x 2.07 / 100

= 40.3 (ft)

Total Dynamic Head = 113.5 + 1.1 + 40.3 + -1.0

= 153.8

Effective Date 11/30/07
WETWELL VOLUME/SIZE INFORMATION

Wetwell Diam. = 10 ft  gal/v.f. = 587

\[
\text{Min. Wetwell Volume} = \frac{10}{\text{TBSS}} \times \frac{184.0}{\text{Qp}} \times \frac{201.0}{(\text{Qs} - \text{Qp})} / \frac{385}{\text{Qs}}
\]

\[
= \frac{960.6}{\text{Vp}} \text{ gal.}
\]

Where:
- \( V_p \) = Volume of Wetwell from Pump On to Pump Off
- \( \text{TBSS} \) = Time Between Successive Starts (Use 10 min. minimum)
- \( \text{Qp} \) = 50\% (Worst Case) of Peak Flow (GPM Peak)
- \( \text{Qs} \) = Actual Pump Rate (GPM)

Using the above listed wetwell size minimums, divide \( V_p \) by gal/v.f. and round up to the larger 1-foot increment. This is the minimum distance in the wetwell between "Pump On" and "Pump Off". Use this figure in establishing wetwell depth and elevations as below.

\[
\text{Minimum Distance Between "Pump On" and "Pump Off"} = \frac{960.6}{\text{Vp}} / \frac{587}{\text{gal/v.f.}} = \frac{2}{\text{ft}} \text{ (Rounded up)}
\]
PUMP STATION ELEVATION & EMERGENCY STORAGE INFORMATION

Top of Wetwell: 990.00 ft

Lowest Overflow Elevation: 988.34 ft

Inlet Pipe Invert: 981.26 ft (minimum of 2 feet below "Top of Wetwell" or "Lowest Overflow Elevation")

High Level Alarm: 981.00 ft

Lag Pump On: 980.00 ft ("High Level Alarm" - 1 ft min.)

Lead Pump On: 979.00 ft ("Lag Pump On" - 1 ft min.)

Pumps Off: 977.00 ft ("Lead Pump On" - Minimum Distance Between "Pump On" and "Pump Off")

Pump Suction: 975.50 ft ("Pumps Off" - manufacturer minimum)

Bottom of Wetwell: 975.00 ft ("Pump Suction" - manufacturer minimum)

Required Emergency Storage: 26,500 gal (minimum of 3 hours at Design Flow Average)

Calculate the volume of emergency storage available in the wetwell. This is equal to the distance between the Top of Wetwell or Lowest Overflow Elevation (whichever is less) and the High Level Alarm elevation multiplied by the gal/v.f.

\[
\text{Emergency Storage Available in Wetwell} = \left( \frac{988.34}{V_p} - \frac{981.00}{\text{High Level Alarm}} \right) \times \frac{587}{\text{gal/v.f.}} = 4,309 \text{ gal}
\]

Does wetwell by itself provide the minimum Required Emergency Storage?

Yes ________ No X

If not, describe how the minimum Required Emergency Storage will be provided. Include all relevant calculations:

Additional storage will be obtained from 3 10-foot diameter wetwells set above the high level alarm, so that the total volume of available emergency storage is equal to 35,000 gallons. (Additional calculations required)
DEPTH OF FLOW CHECK

From Mannings Equation:

Pipe Shape: Circular

Pipe Diameter: 8.00 in

Flowrate: 385.0 gpm

Minimum Slope: 0.0120 ft/ft

Existing Flowrate: 0 gpm

Total Flowrate: 385.0 gpm

Manning's n: 0.0100

Full Flow X-Sectional Area: 0.3491 s.f.

Wetted Area: 0.1715 s.f.

Wetted Perimeter: 12.4568 in

Full Flow Perimeter: 25.1327 in

Hydraulic Radius: 1.9824 in

Percent Full: 49.3152 %

Depth of Flow: 3.94 in

Depth of Flow 3.94 in < 4.00 in (half of sewer diameter). Therefore OK

GENERATOR BERM HEIGHT CALCULATIONS

Generator size: ______ ft. length (GL)

_______ ft. width (GW)

Fuel Tank Volume (V): _______ gal ___ = ___________ ft³

Berm Area Inside Width (BW): _______ ft.

Berm Area Inside Length (BL): _______ ft.

Fuel Area (FA) = (BW x BL) - (GW x GL) = ______ ft²

Berm Height = V/FA = _____ ft.
Application For
Approved Contractor’s List

Check Appropriate Areas
Water ______ Sewer ______
Backflow Preventer ______

Date: __________________________

1. Company Name: ________________________________________________________
   Address: __________________________________________________________________
   City: ___________________________ State: _______________ Zip: _______________
   Phone #: ______________________ Fax #: ___________________ Cell Phone #: ________

2. Company is: Sole Proprietorship: ___________ Corporation: ___________ Partnership: ___________

3. Information on Principals:
   Name: ____________________________________________________________________
   Title: ____________________________________________________________________
   __________________________________________
   __________________________________________
   __________________________________________

4. Supervisory / Foreman Information:
   Name: ____________________________________________________________________
   Title: ____________________________________________________________________
   Years w/ Company: ______________ Experience/Years Water: ________________
   Sewer: ______________________
   __________________________________________
   __________________________________________
   __________________________________________

GWINNETT COUNTY DEPARTMENT OF WATER RESOURCES USE ONLY

Approved: Pump Station Date: ______________________ Initials: ____________________

446 West Crogan Street, Suite 275 • Lawrenceville, GA 30045-2439
5. Regular / After Hours Contract Persons:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Regular Phone #</th>
<th>After Hours #</th>
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<tbody>
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6. Major Equipment available for Pump Station Construction
   (Attach computer inventory listing if available):

<table>
<thead>
<tr>
<th>Type of Equipment</th>
<th>Model</th>
<th>Number of Units</th>
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7. Bonding Capabilities: $________________________ (maximum)
   Bonding Company: __________________________________________
   Contact Person: ____________________________ Phone: ____________

8. Additional **REQUIRED INFORMATION** to be attached to completed application:

   **IMPORTANT**
   
   A. Letter of recommendation from Engineer, City or County for which three of the below listed jobs were completed.
   B. Biographical/Experience summary for each of company’s principals, supervisors, and foreman.
   C. Current “Certificate of Insurance” showing coverage limits for General Liability and Worker’s Compensation Insurance.
   D. Copy of Current Business License.
   E. Complete the following list for each sub-contractor normally used for the specialty work of blasting (furnish copy of blasting certificates) and electrical (furnish license number) – use additional pages if necessary:

<table>
<thead>
<tr>
<th>Sub-Contractor</th>
<th>Type of Work</th>
<th>Sizes</th>
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</table>
9. List four (4) pump station construction projects, including at least two (2) stations with 100 hp or larger pumps, completed by your company in the last five (5) years.

A. Project No. 1: ____________________________

   Location: ______________________________________

   Owner: _________________________________________

   Contact Person: __________________ Phone: ____________

   Pump Type: __________________

   Motor Size: __________________

   Generator Size: __________________

   Telemetry System Type: __________________

   Date Completed: ___________ Date Accepted by Owner: _____________

   Project Engineer: ____________ Phone: ______________

   Contact Person: ______________ Phone: ______________

   Contract Bid Amount: $_________________________

   Final Contract Amount: $________________________

   Contract Completion Days: _______ Actual Completion Days: ____________

   Comments: __________________________________________

   ________________________________________________________

   ________________________________________________________

   ________________________________________________________
List four (4) pump station construction projects, including at least two (2) stations with 100 hp or larger pumps, completed by your company in the last five (5) years. (Continued)

B. Project No. 2: ____________________________________________________________

Location: __________________________________________________________________

Owner: _____________________________________________________________________

Contact Person: ___________________________ Phone: __________________________

Pump Type: ____________________________

Motor Size: ____________________________

Generator Size: _________________________

Telemetry System Type: __________________________

Date Completed: ________________ Date Accepted by Owner: ________________

Project Engineer: ______________________ Phone: ______________________

Contact Person: ______________________ Phone: ______________________

Contract Bid Amount: $__________________________

Final Contract Amount: $__________________________

Contract Completion Days: _________ Actual Completion Days: ________________

Comments: __________________________________________________________________

___________________________________________________________________________

___________________________________________________________________________
List four (4) pump station construction projects, including at least two (2) stations with 100 hp or larger pumps, completed by your company in the last five (5) years. (Continued)

C. **Project No. 3:**

Location:

Owner:

Contact Person: Phone:

Pump Type:

Motor Size:

Generator Size:

Telemetry System Type:

Date Completed: Date Accepted by Owner:

Project Engineer: Phone:

Contact Person: Phone:

Contract Bid Amount: $

Final Contract Amount: $

Contract Completion Days: Actual Completion Days:

Comments:
List four (4) pump station construction projects, including at least two (2) stations with 100 hp or larger pumps, completed by your company in the last five (5) years. (Continued)

D. Project No. 4:

Location: 

Owner: 

Contact Person: Phone: 

Pump Type: 

Motor Size: 

Generator Size: 

Telemetry System Type: 

Date Completed: Date Accepted by Owner: 

Project Engineer: Phone: 

Contact Person: Phone: 

Contract Bid Amount: $ 

Final Contract Amount: $ 

Contract Completion Days: Actual Completion Days: 

Comments: 


10. List any other information which you feel is pertinent to this application but which was not requested above:


PLEASING PROVIDE NAME(S) OF PERSON(S) AUTHORIZED TO PICK UP PERMITS FOR YOUR COMPANY!!!


REMINDER: BRING CONTRACTOR STAMPED PLANS TO OBTAIN PERMITS!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
I hereby certify that the above information is true. I also hereby certify that I have purchased the latest edition of the Gwinnett County Department of Water Resources Sanitary Sewer Pump Station and Force Main Design and Construction Manual, or will purchase said Specifications prior to obtaining a construction permit for first project.

I agree to fully comply with the Gwinnett County Department of Water Resources applicable policies, regulations, and requirement together with its approved plans and current installation specifications in the construction of pump stations for all projects.

I understand and agree that failure to comply with any of the above requirements can result in suspension from the Approved Contractor's List, and/or revocation of any or all current construction permits.

Signature of Applicant

Title

Date

****All applicants, if approved, shall be on a "PROBATIONARY STATUS" until completion and approval of first project. Any failure to comply with any of the above requirements during probation will result in immediate suspension from the Approved Contractor's List.****
REQUEST FOR EXCEPTION/CHANGE
TO PUMP STATION CONSTRUCTION

Date: ____________________________

Requested By: ____________________________

Company Name: ____________________________

Contact Phone Number: ________________ Fax Number: ________________

The following exception/change is requested at ____________________________
Pump Station.

Station is: ______ New ______ Upgrade

Description:

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Purpose for change:

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Detail Attached: _____ Yes _____ No

Date of Stamped Plans: ________________ Station: ________________ Force Main: ________________
Page # ________________ Page # ________________ Page # ________________ Page # ________________

Engineer has been consulted: _____ Yes _____ No

Engineer’s name: ____________________________ Contact phone number: ____________________________
Date of consult: ____________________________

Engineer agrees to show any and all changes on as-builts.

Engineer’s Signature: ____________________________

Pump Station Trade Manager Initial to request: ____________________________

Accepted by: ____________________________ Date: ____________________________

Must be signed by the Distribution/Collection Division Director or authorized designee.