



STANDARDS FOR WATER & WASTEWATER SYSTEM DESIGN AND CONSTRUCTION

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BGWSC Planning & Construction Division
1703 Gloucester Street
Brunswick, Georgia 31520



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1.1. SCOPE

The purpose of the Brunswick Glynn Joint Water & Sewer Commission (JWSC) Standards for Water and Sewer Design and Construction (Standards), as well as all companion Specifications documents, is to define the minimum requirements for the design and construction of public and private potable water and sanitary wastewater collection system infrastructure within Glynn County. The following sources form the basis for which the design and construction of all new connections, upgrades and extensions to the JWSC public system shall be made, and are incorporated by reference (latest revisions as appropriate) to include but not be limited to:

- GA EPD Minimum Standards for Public Water Systems
- GA EPD Guidelines For Sewage Collection Systems
- GA EPD Planning For Domestic Wastewater Systems
- Recommended Standards for Wastewater Facilities (“Ten States Standards”)
- City of Brunswick Water & Sewer Ordinances
- Glynn County Water & Sewer Ordinances
- Glynn County Subdivision Regulations
- JWSC Development Procedures
- JWSC Record Drawing Standards
- Considerations and preferences as seen fit by the JWSC Board of Commissioners

These Standards are also based upon research and recommendations by industry organizations including but not limited to the National Fire Protection Association (NFPA), American Water Works Association (AWWA), American Society of Testing and Materials International (ASTM) and the American Society of Civil Engineers (ASCE). Some JWSC Capital Improvement Projects (CIPs) and system rehabilitation projects may be designed and constructed in-house or by outside Engineers and Utility Contractors under contract to the JWSC. Such projects shall also conform to the requirements of these Design and Construction Standards and Specifications.



1.2. DEFINITIONS

- **Applicant:** The person or legal entity that proposes to construct water and/or wastewater improvements to connect to or be served by the JWSC. The JWSC holds the applicant as the responsible party for all concerns in the review and construction process.
- **Brunswick-Glynn Joint Water and Sewer Commission (JWSC):** A political subdivision of the State of Georgia and a public corporation created by an act of the General Assembly (Ga. L. 2006, p. 3661) acting by and through a Board of Commissioners. The mission of the JWSC is to safeguard the public health and safety by providing sufficient drinking water and environmentally responsible wastewater treatment in a financially sound manner while meeting or exceeding all regulatory requirements and supporting planned growth in the community.
- **City of Brunswick (City):** A municipal corporation, created and existing under the laws of the State of Georgia, acting by and through its Mayor and Commissioners.
- **Developer/Owner:** Any person or legal entity undertaking development.
- **Engineer:** Licensed Professional Engineer, registered in the State of Georgia.
- **Engineer of Record:** The licensed Professional Engineer who designs a proposed plan and certifies/seals the design as compliant with the Standards.
- **Environmental Protection Division (EPD):** The Environmental Protection Division, Department of Natural Resources, State of Georgia.
- **Glynn County Board of Commissioners (County):** A political subdivision of the State of Georgia, acting by and through a Board of Commissioners.
- **Infiltration/Inflow (I&I):** Groundwater or surface water which leaks or otherwise enters into sanitary sewers through defective pipes, joints, manholes, yard drains, down spouts, sump pumps, or by other means or openings.
- **Planning and Construction Division (P&C):** The division within the JWSC responsible for assisting in the planning, design, construction and acceptance of developer installed water and sewer utility systems as public or private infrastructure.
- **Plumber:** Plumber licensed in the State of Georgia.
- **Red-Lined Construction Plans (RLCP):** JWSC stamped plans onto which the contractor has noted all deviations from the original approval. RLCPs submittal is required to initiate the JWSC final inspection, testing and punchlist process.
- **Rate Resolution (RR):** Schedule of rates for water and sewer service and fees as approved by the JWSC Board of Commissioners on an annual basis.
- **Residential Equivalent Unit (REU):** That portion of a user's facility that has an impact on the water and/or wastewater systems equivalent to a single-family unit.
- **Satellite System:** A private and independently owned water and/or wastewater system, including infrastructure, appurtenances, structures, lift stations, and devices, which connect to the Utility's public water and/or wastewater systems.
- **System:** The public water and wastewater system, as well as any private systems served by or connected to it.
- **Specials:** Miscellaneous fittings other than tees, crosses, elbows, and reducers.
- **Surveyor:** Licensed Professional Surveyor, registered in the State of Georgia.



- **Utility:** The combined or unified water and wastewater systems of the City and County and any additions and extensions, owned and operated by the JWSC.
- **Utility Contractor:** Licensed Utility Contractor, registered in the State of Georgia.
- **Virgin:** Made of original raw materials; not recycled.

1.3. ABBREVIATIONS

AADF	Annual Average Daily Flow (Water Demand)
AASHTO	American Association of State Highway and Transportation Officials
ADWF	Daily Average Dry Weather Flow (Wastewater Demand)
ANSI	American National Standards Institute
API	American Petroleum Institute
ASCE	American Society of Civil Engineers
ASSE	American Society of Safety Engineers
ASTM	American Society of Testing and Materials, International
AWG	American Wire Gauge
AWWA	American Water Works Association
DIP	Ductile Iron Pipe
DNR	Georgia Department of Natural Resources (GA DNR)
EPA	U. S. Environmental Protection Agency (U.S. EPA)
EPD	Georgia Environmental Protection Division of GA DNR
FPS	Feet per second
FPVC	Fusible Polyvinyl Chloride
GDOT	Georgia Department of Transportation
GPD	Gallons per Day
GPM	Gallons per Minute
HDPE	High Density Polyethylene
IAPMO	International Association of Plumbing and Mechanical Officials
JWSC	Joint Water & Sewer Commission
MDF	Maximum Daily Flow (Water Demand)
MGD	Million Gallons per Day
MIG	Metal Inert Gas
NEMA	National Equipment Manufacturing Association
NFPA	National Fire Protection Association
NPT	National Pipe Thread
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Administration
PE	Polyethylene
PF	Peak Flow (Wastewater Demand)
PHF	Peak Hourly Flow (Water Demand)
PLC	Programmable Logic Controller
PVC	Polyvinyl Chloride
REU	Residential Equivalent Unit
RMS	Root Mean Square
RPZ	Reduced pressure zone



RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
VFD	Variable Frequency Drive
WPCF	Water Pollution Control Federation

1.4. DEVELOPMENT PROCESS

Water and wastewater system improvements associated with private development projects within Glynn County are typically reviewed as part of the Glynn County or City of Brunswick permit review process, as appropriate. The JWSC may allow developments incorporating only water and/or wastewater improvements to be submitted directly to the JWSC for review and approval. All governing Glynn County and/or City of Brunswick permitting requirements shall still apply. All water and wastewater systems, whether public or private, shall be designed and constructed in accordance with these Standards. All infrastructure beyond the point of public/private demarcation shall be designed and constructed in accordance with any relevant and governing State, local or industry standards for construction. A detailed description of the JWSC review process is provided in the separate document, JWSC Water and Wastewater Systems Development Procedures. These Standards also reference other applicable governing JWSC documents such as the most current JWSC Water and Wastewater Rates and Charges (Rate Resolution) and the JWSC Master Plan Update.

1.4.1. Preliminary Information Requests

Upon request, the JWSC Planning and Construction Division will respond to questions regarding the availability of water and sewer service at a particular location. Requests are submitted using the JWSC Preliminary Information Form document and include detailed information as to the size and location of the parcel to be served. Such information includes but is not limited to:

- Street address
- Parcel ID number
- Owner’s name
- Existing land use
- Proposed land use
- Calculated water and sewer needs

Existing utility location information provided by the Planning & Construction Division is based on the best available data from JWSC files such as GIS maps, record drawings, etc. No warranty is made by the JWSC, expressed or implied, as to the completeness or accuracy of such information. It is the responsibility of the applicant to ensure accuracy of any information provided by the JWSC as it relates to their design proposal. This includes field verification, which may require permitted excavation and measurement by the applicant.

Use of this information for planning and design purposes without proper field verification is at the user’s own risk.



For new and existing developments requesting water and sewer service, the JWSC reserves the right to specify the point of service, the size and type of service, and the general layout of the overall system consistent with the JWSC Standards and Specifications. The JWSC may also specify design features to ensure compatibility and conformance with existing and planned/future improvements of the JWSC system.

1.4.2. Plan Review Phase

1.4.2.1. Plan Submittal Requirements

All plans submitted to the JWSC for approval shall be designed to meet the minimum requirements of the Standards. Any deviation from the Standards will only be allowed through specific written approval by the JWSC for each instance. The JWSC plan review is performed to gain confidence and a general belief that the proposed plan meets minimum JWSC Standards. JWSC review and approval in no way provides for quality assurance of the plan, nor confirms that it meets the minimum requirements of the Standards. The JWSC assumes no responsibility for any design presented by an applicant and in no way guarantees functionality or appropriateness. It is the responsibility of the Engineer to ensure that all Standards requirements are met in the proposed plan, even if the JWSC review does not specifically comment on or question a deficiency.

A construction plan shall not span multiple property parcels. Common developments may be comprised of separate and independent construction phases, capable of standalone testing, operation and service. Phases must be clearly delineated, presented in the planned order of completion and designed to minimize service interruptions.

After review and approval of the conceptual drawings in accordance with the JWSC Development Procedures, detailed construction plans shall be prepared and formatted to 24"x36" sheets, signed and sealed by a licensed Professional Engineer registered in the State of Georgia, and submitted to Glynn County Community Development, the City of Brunswick or the JWSC as appropriate. The plan submittal shall meet all requirements of the governing permit authority, as well as include the following at a minimum:

1. An overall water and sewer master plan with proposed phases clearly marked.
2. A north arrow and graphic scale on all plan sheets (max plan scale: 1" = 50').
3. Vicinity map.
4. Lot numbers and street names.
5. Permanent or temporary benchmark.
6. Horizontal control benchmarks - Horizontal datum to be based on the Georgia State Plan, East Zone, and NAD83 with sub-meter accuracy.
7. Vertical control benchmarks - Vertical datum to be based on NAVD88.
8. Owner/Developer contact information including name, address, phone and e-mail address.



9. Engineer's contact information including name, address, phone and e-mail address.
10. Clearly designate ultimate planned ownership of the proposed system as "Private" or "JWSC".
11. Clearly designate planned public/private right-of-ways and any easements.
12. Plan sheets for proposed water and sewer facilities drawn at a maximum scale of 1"=50'. At JWSC discretion, certain projects may be drawn using up to 1"=100' scale provided the information is legible.
13. All facilities clearly shown and labeled including pipes, valves, fire hydrants, water services, sewer services, pumping stations and manholes and include (but not limited to) size, station numbers, material of construction, slopes, appurtenances, etc.
14. All existing and proposed property lines and easements for water and sewer clearly marked with size and location.
15. Any proposed parcel or property dedications labeled.
16. Plan and profile sheets for proposed water mains, gravity sewers and force mains drawn at a maximum scale of 1"=50' horizontal and 1"=5' vertical.
17. Plan and profile sheets shall include station numbers, pipe size, length, materials, slopes, manhole top and invert elevations.
18. Profile sheets shall show all planned utility conflicts, minimum depths of cover for planned and existing utilities, both existing and final proposed surface grades, storm drain crossings, water main crossings and other utility crossings as appropriate.
19. Proposed profiles shall provide graphical confirmation that all utility improvements meet Standards for depth of cover and separation from other utilities.
20. Force main elevations every 100 l.f. and at all grade changes.
21. Roadway cross sections with proposed utility locations depicted.
22. Construction details in accordance with Joint Water and Sewer Commission Standard Details.
23. Utility Notes:
 - **All water and sewer construction shall conform to the requirements of the Design and Construction Standards and Specifications of the Joint Water & Sewer Commission. In the event of a discrepancy between the construction plans and the Standards and specifications, the Standards and specifications shall take precedence unless the deviation has been specifically approved in writing by the JWSC.**
 - **The minimum horizontal and vertical separation between water lines, sewer lines and storm drains shall conform to the latest Georgia EPD requirements.**
 - **All planned mains and services outside of roadways or other compacted final grades shall have a minimum final cover depth of 36". Those within compacted final grades shall be installed with a final cover depth of 48" (ASTM D2321).**
 - **A minimum distance of 20' or two times the depth of the main, whichever is greater, shall be maintained from all buildings,**



foundations and the top of bank of all ponds. Any deviation from this requirement must be approved in writing by the JWSC.

- **Pressure and leakage testing shall be performed in accordance with the Design and Construction Standards and Specifications of the JWSC.**
- **Disinfection of water mains shall be performed in accordance with the Design and Construction Standards and Specifications of the JWSC. Note that tablet method for disinfection is not allowed.**
- **At least 72 hours prior to commencement of the work, the contractor shall notify the Utilities Protection Center (UPC) at 1-800-282-7411 (GA811) to request underground utility locate service.**

1.4.2.2. Non-Compliance

In the event a construction plan submittal is deemed "Non-Compliant" after JWSC review, the plans shall be revised and resubmitted until the plans are deemed "Compliant". The plans shall have revision dates listed in the revision block on all affected sheets and all revisions clearly marked (clouded) to highlight the changes.

1.4.2.3. EPD Review

All projects that expand the existing water distribution or wastewater collection system, or increase capacity to provide for greater service ability and new customers qualify for EPD review (State of Georgia Rules and Regulations, Chapter 391-3-6). The JWSC may choose to exercise delegated review authority, as allowed by GA EPD.

Once the JWSC has approved the construction plans, the Applicant is responsible for compiling an EPD packet that includes plans, applications, and other supporting documents. The EPD packet is to be submitted to JWSC as the local public water/wastewater service provider who must endorse the EPD application for general acceptance in meeting minimum design Standards.

1.4.2.4. Final Plan Approval and Pre-Construction

Once the plans have received final JWSC/EPD approval, the applicant will coordinate with the JWSC for a water and wastewater pre-construction meeting. Glynn County or the City of Brunswick may require a separate precon meeting, or have other requirements before construction may begin. The JWSC precon may be scheduled when the following conditions are met:

- All JWSC fees are paid.
- Utility construction is expected to happen no less than 2 weeks but no more than 4 weeks from coordinating the meeting.
- Both General Contractor and Utility Contractor have been selected and contact information provided to JWSC.
- A minimum of 3 sets of approved plans, signed sealed and submitted on 24" x 36" sheets, delivered to JWSC to be stamped FOR FIELD USE.



Depending on the scope of the project, JWSC may coordinate a pre-construction meeting at the JWSC office or on-site. In either case the Owner/developer, General Contractor and Utility Contractor are required to attend.

Before the meeting adjourns "FOR FIELD USE" stamped plans will be distributed to the JWSC Inspector, applicant, General Contractor, and Utility Contractor. JWSC will keep an electronic (PDF) master copy with the project file. It is the responsibility of the owner/developer to ensure one (1) set of approved plans shall be always kept at the jobsite. The contractor will maintain a detailed depiction of all construction that differs from the approved plans. These mark ups will be reflected on the Red-Lined Construction Plans provided to the JWSC to initiate the final inspection.

JWSC and EPD plan approval shall be valid for a period of one year. If construction has not commenced within one year, a re-submittal to comply with current standards is required.

1.4.2.5. Plan Changes

Any changes to the project which are made after final plan approval that materially affect the system design, shall require a revised plan submission for review and approval. Minor alignment adjustments and similar changes which do not materially affect the approved design, may be simply reflected on the Red Lined Construction Drawings, at the direction of the JWSC. Any changes constructed without prior written approval are at the risk of the applicant and will be required to be corrected. All deviations and final constructed conditions are to be documented and certified by the Engineer of Record and shown on the Record Drawings.

1.4.2.6. Permitting

Depending on the project, these agencies may require permits:

- *City / Glynn County Right of Way (R/W) Permit:* All work on a City of Brunswick or Glynn County Right-of-Way requires a permit. The Contractor is solely responsible for obtaining such permits and paying all required fees prior to commencement of the work.
- *GDOT Utility Encroachment Permit:* As the GDOT requires the utility owner to be the applicant, the JWSC will obtain utility encroachment permits for water and sewer utility construction on a Georgia Department of Transportation (GDOT) Right-of-Way. Certain information is required from the applicant before such applications are filed. The applicant will be given a copy of the GDOT permit. The contractor shall perform all work within the GDOT right-of way in accordance with all applicable requirements of the permitting agency. JWSC will hold the applicant requesting the improvements responsible for all activities, including traffic control and safety. The JWSC may require the applicant to execute a hold harmless agreement, obtain insurance/name the JWSC as insured, and provide a bonded guarantee to include warranty provisions.



- *Railroad Crossing Permits:* All utility construction on a CSX, Norfolk Southern and Colonel’s Island Railroad right-of-way require a utility encroachment permit from the appropriate agency if their respective form of ownership (easement, fee simple etc.) gives them the right to require same. Unless otherwise noted, the applicant shall obtain the utility encroachment permit from the appropriate agency and pay all required fees. The contractor shall perform all work within the railroad right-of way in accordance with all applicable requirements of the permitting agency.
- Planned encroachments of other types of easements will require appropriate documentation from the holder of the easement prior to any work within that area; i.e. power/natural gas transmission, private landowner, etc.
- *NPDES Permit:* Unless otherwise noted, the applicant shall prepare and file the Notice of Intent for Coverage under the applicable NPDES General Permit to Discharge Storm Water Associated with Construction Activity and pay all required fees. The applicant shall be responsible for implementation of the Erosion, Sedimentation and Pollution Control Plan, including rainfall monitoring, inspections, and all other requirements of the permit.
- Land Disturbing Activity Permit (LDA): If required and unless otherwise noted, the applicant or their Designee shall obtain the Land Disturbing Activity Permit through Glynn County Community Development and pay all required fees. The applicant shall be responsible for implementing all requirements of said permit.

1.4.3. Construction Phase

1.4.3.1. Protection of Existing Utilities

The protection of existing utilities shall be the sole responsibility of the contractor. Information provided by the JWSC regarding existing utilities plans may not be complete or accurate as to horizontal or vertical location, size and material. The existence of buried or overhead utilities not shown shall not relieve the contractor of the responsibility under this requirement. The applicant shall excavate and visually verify the existence, size and location of all existing utilities. **At least 72 hours prior to commencement of the work, the contractor shall notify the Utilities Protection Center (UPC) at 1-800-282-7411 (GA811) to request an underground utility locate service.** The applicant shall indemnify and hold harmless the JWSC, their officers, agents and employees from any claims or actions for damage to any existing utility or any liability which may arise there from. All construction on public water and wastewater assets, greater than five (5) feet in depth or otherwise qualifying as defined by the Georgia Secretary of State, shall only be installed by a Licensed Utility Contractor, registered in the State of Georgia.

1.4.3.2. Reference Points and Layout

The applicant shall be responsible for all construction lay-out and staking including setting of grades, lines and levels; and the location of existing and proposed



easements and/or rights-of-way. All construction lay-out and staking shall be confirmed for accuracy by the applicant's surveyor prior to construction.

1.4.3.3. Final Inspection

The Planning and Construction Division Inspection staff will assist the contractor in the identification of items of non-compliance with current standards. However, the burden of proof of compliance remains with the applicant.

The applicant shall maintain a red-lined set of construction drawings throughout construction of the project and until draft Record Drawings are created. The contractor will provide the red-lined plans to the JWSC as a requirement to initiate the Final Inspection process. The applicant shall utilize the services of a Licensed Professional Surveyor, registered in the State of Georgia, to capture appropriate as-constructed horizontal and vertical (elevation) measurements throughout construction for the creation of accurate red-lined plans and subsequent Record Drawings. The applicant shall be responsible to ensure the surveyor measures all features (i.e. service laterals, conflicts, etc.) prior to being buried. Any features not measured during construction shall be exposed and measured to ensure accuracy of the subsequent Record Drawings at no expense to the JWSC.

When milestone testing of the water and sewer infrastructure has been completed satisfactorily, the JWSC Inspector shall request the utility contractor to provide three copies of the red-lined construction plans to initiate the final inspection process.

Upon receipt of the Red Lined Construction Plans, the JWSC Inspection staff will begin the final inspection process as outlined in the JWSC Development Procedures. During the final inspection a list of defects and/or drawing errors and omissions that require correction and re-verification will be developed by the JWSC Inspector.

What follows is a list of key items included in, but not limited to, the final inspection:

Water Distribution Systems: Verification of the location, size and materials construction for all pipes, valves, hydrants, services, meters, boxes, tracing wire and other appurtenances.

Wastewater Collection and Transmission Systems: Verification of the location, size and materials construction for all gravity sewer pipes, manholes, service laterals, cleanouts, boxes, air-release valves, tracing wire and other appurtenances. Where necessary, pipe slopes must be verified to ensure adequate scouring velocity in the mains. The applicant may be required to confirm proper pipe installation through the use of ovality mandrels or other equipment as requested by the JWSC.

Adequate clearance must be maintained between all water/sewer lines and structures to allow future operation, maintenance, and repairs to be conducted without endangering the structural integrity of any existing dwelling or structure.



Prior to JWSC testing, the construction must be orderly, accessible and cleaned as directed in the JWSC Development Procedures. Any components which are found to be defective or not in compliance with current standards and specifications must be relocated, repaired and/or replaced all at the expense of the existing utility owner.

1.4.3.4. Surface Restoration

All disturbed areas shall be re-vegetated immediately after construction in a manner consistent with the latest version of the *Manual for Erosion and Sediment Control in Georgia*. All erosion and sediment controls shall be installed prior to or concurrent with the start of construction. Any reference points, right-of-way monuments, property corners, benchmarks or other monuments disturbed during construction shall be restored by a Licensed Professional Surveyor, registered in the State of Georgia, with all associated costs borne by the applicant. Likewise, all landscaping, street signs, mailboxes, traffic signs and other street appurtenances disturbed by construction operations shall be restored by the applicant to their original condition.

1.4.4. Record Drawing Phase

The submittal of accurate Record Drawings to the JWSC is required upon the completion of water and sewer infrastructure improvements intended for either public dedication or private ownership and maintenance. Once defects have been corrected, errors and omissions on the Red Line Construction Drawings revised and verified by the JWSC Inspector at the conclusion of the Final Inspection phase, the JWSC will review the final Red-Lined Construction Plans. Once approved, the applicant will then provide these to their Surveyor for the creation and submittal of draft Record Drawings. Once the draft Record Drawings are approved, final Record Drawings are submitted with applicable signatures and certifications. The Final Record Drawings will be endorsed by the JWSC operational superintendents and Inspector by statements on the record drawing to that effect.

To ensure the accuracy of the Record Drawings, the applicant shall utilize the services of a Licensed Professional Surveyor, registered in the State of Georgia, to capture appropriate as-constructed measurements throughout construction and subsequent Record Drawings creation. Additional information on the Record Drawing requirements may be found in the JWSC Water and Wastewater Systems Development Procedures.

1.4.5. Closing Phase

All JWSC closing phase requirements must be met prior to connection of the new infrastructure to the public system. If the infrastructure is to remain privately owned and maintained, the final requirement is submittal of the Record Drawings. If the infrastructure is intended to be dedicated for public ownership and maintenance, appropriate dedication/easement/warranty documentation must be submitted by the applicant along with the signed Final Record Drawings. To convey ownership the applicant/owner of the private infrastructure shall submit to the JWSC appropriate documentation to convey:

Water/Wastewater Systems Dedication Application



The JWSC will only consider the acceptance of privately owned water and/or wastewater systems for dedication as public infrastructure if construction is shown by the applicant to have been in accordance with the JWSC Standards and has met all other JWSC dedication requirements. For existing privately owned systems, the JWSC Board of Commissioners, at its discretion, may evaluate acceptance of the system provided that the following criteria are met:

- The infrastructure is located within public rights-of-way or has unencumbered access via dedicated water and sewer easements meeting JWSC Standard requirements.
- Acceptance of the privately owned system must be consistent with the JWSC service delivery strategy, such that ownership of the system is necessary to extend water and sewer services to other potential customers.
- JWSC’s system reliability or capacity will be improved or increased as a result of the dedication; and/or,
- Dedication of the system is warranted to eliminate or prevent potential environmental damage.

In order to be considered for acceptance the applicant must show the system meets current JWSC design and construction standards, is functioning properly, does not present a financial or environmental liability to the JWSC and provides accurate Record Drawing documentation of all components of the system. The system must be cleaned and allowed to be inspected by the JWSC. Any deficiencies found will be noted as a punch list for the applicant to correct before further consideration. All costs incurred with dedication including repairs and documentation are the responsibility of the applicant. The burden of proof for compliance remains with the private utility owner.

Water/Sewer Utility Easement Deed

All infrastructure intended for public ownership shall be constructed within public right-of way with priority placed on future access for maintenance. Infrastructure shall only be located within roadways or other paved surfaces when no other option is available. When location within public right-of-ways is not feasible a specific, deeded and recordable easement shall be provided to the point of public-to-private transition. Blanket type easements shall only be allowed when specific deeded easements are not practical. A Water/Sewer Utility Easement Deed shall include as Exhibits: 1) a survey in recordable form signed and sealed by a Registered Professional Surveyor, licensed in the State of Georgia, that includes metes and bounds; 2) a legal description of the property; and appropriate graphical plat exhibit. The Easement Deed and attachments must be approved by JWSC Legal Counsel.

Satellite System Agreement

A Satellite System is defined as a private and independently owned and maintained water and/or wastewater collection system, including infrastructure, appurtenances, structures, pumpstations and devices which connect to the Utility’s public water and/or wastewater collection systems. In accordance with Glynn County Ordinance 2-16-15 the owner of an existing or proposed Satellite System who currently, or in



the future, will receive potable water from the Utility and/or discharges wastewater into the Utility's system, will enter into an agreement with the Utility. The agreement will define all areas of responsibility, standards of operation and maintenance, authority for inspections, remedies for non-compliant issues, and clears up all rights of easement regarding service lines that cross adjacent properties. The owner will be expected to maintain and operate the Satellite System in a manner that prevents discharge of abnormal wastewater, storm water, excessive groundwater infiltration, and more. In all cases the owner of the Satellite System commits to preventing all negative impacts to the public system. The Satellite System Agreement will clearly delineate the point of connection to the public system and where private ownership begins. Any shared use of infrastructure between property owners as well as legal agreement in ownership and maintenance responsibilities will be clearly defined. All Satellite System Agreements shall be legally binding and fully transferred with changes in property ownership.

JWSC Board of Commissioners Acceptance

Once required Closing documents are received and verified by the JWSC and JWSC Legal, the items are placed on the next regular agenda of the JWSC Board of Commissioners for adoption. The JWSC will record adopted Easements with the appropriate jurisdiction and maintain copies of fully executed documents for adopted infrastructure and easements.

1.5. Revisions and Updates

1.5.1. Standards

Revisions and updates to the Standards will be through Staff recommendation to the JWSC BOC for approval as required.

1.5.2. Details

Revisions and clarifications to the JWSC Details will be through Executive Director approval as required.

1.5.3. Acceptable Products and Manufacturers

Revisions and clarifications to the JWSC Acceptable Products and Manufacturers will be through Executive Director approval as required.

1.5.4. Specifications

Revisions and clarifications to the JWSC Acceptable Products and Manufacturers will be through Executive Director approval as required.

1.6. End of Section



SECTION 2 Water Distribution

- 2.1. General**
- 2.2. Engineering Reports**
- 2.3. Hydraulic Analysis**
- 2.4. Design Flows**
- 2.5. Sizing of Water Mains**
- 2.6. Installation of Water Mains and Appurtenances**
- 2.7. Miscellaneous Items**
- 2.8. End of Section**

2.1. General

This section provides the minimum guidelines for the design and construction of water transmission and distribution systems. All new connections, upgrades and extensions to the JWSC water distribution system are to be evaluated for intended use, as well as impacts to the existing public system.

At the request of the applicant and per the fee schedule listed in the Rate Resolution, the JWSC will provide information on the existing public system for specific locations through hydrant flow testing and 24-hour pressure data logging reports. Any additional information necessary, including field measurements through JWSC authorized access, shall be the responsibility of the applicant.

All access, modification, or operation of the existing public system shall only be via written JWSC permission and coordination with the appropriate JWSC operational Division. All tapping of the existing potable JWSC system shall only be performed by JWSC Water Distribution Division personnel.

2.2. Engineering Reports

An Engineering Report (Utility Report) prepared by the Engineer of Record shall be submitted to the JWSC prior to the preparation of the final construction plans and include:

2.2.1. A summary of the basis of design to include:

- 2.2.1.1. General description of the service area:**
 - General location of new pipe, replacement, or rehabilitation.
 - Lengths.
 - Sizes.
 - Hazen-Williams coefficient ($c= 120$).
 - Key appurtenances (meters, valves, hydrants, back-flow devices).

2.2.2. Design Flow Calculations:

- 2.2.2.1. Type of uses(s).**
- 2.2.2.2. Flow contribution per use:**



- ADF
- PDF
- PHF

2.2.2.3. Fire flow demand shall be based on the project demands.

2.2.3. Existing System pressure at point (s) of connection as determined by data recorder:

- High static pressure, minimum 24-hour basis.
- Low static pressure, minimum 24-hour basis.

2.2.4. Hydraulic analysis for the following scenarios:

2.2.4.1. Supply Pressure at high static value:

- Flow at AADF.
- Flow at MDF.
- Flow at PHF.
- Flow at lowest pressure node in project.
- 20 psi residual at any point in system (Fire Flow).

2.2.4.2. Supply Pressure at low static value:

- Flow at AADF
- Flow at MDF
- Flow at PHF
- Flow at lowest pressure node in project system with 20 PSI residual at any point in system (Fire Flow)

2.2.4.3. Supply pressure at annual peak hourly low static value

- Flow at AADF
- Flow at MDF
- Flow at PHF
- Flow at lowest pressure node in project system with 20 PSI residual at any point in the system (Fire Flow)

2.2.4.4. Water Quality and Age

- Using ADF demands show maximum calculated water age within proposed distribution system.
- Water age shall not be greater than 48 hours at any point in the proposed system for any phase of total project buildout.

2.2.4.5. Fire supply or Booster Pumps

- Pumps that receive water from the public distribution system and boost downstream pressures above normal JWSC operational levels in any scenario shall be shown to have no adverse effect to the public system. Adverse effects may include but are not limited to low



residual pressures, surging, water hammer and excessive flow velocities.

- Under no circumstances may a connected demand create residual pressures in the public system below 20 psi.
- The JWSC may require applicants to isolate boosted systems with pressure control valves or other approved appurtenances in addition to normal backflow prevention devices.
- Before approval the booster system shall be tested at maximum demand by the applicant and witnessed by JWSC staff to demonstrate the lack of adverse effects.

2.2.5. Design shall consider operational concerns with regard to:

- Looping with adjacent developments as most reasonably feasible, with provision given to future extension/connection through dedicated easements and/or public right-of-way connection to adjacent properties.
- Providing for sufficient source connections to minimize service outages within the planned system.
- Where construction phases end, provide for end of line valves to facilitate future main extension without service interruptions for customers.

2.2.6. Detailed plan shall be prepared meeting the requirements of these Design Standards (found in Section 1, General Information) and shall include:

- Water pipe lengths, type material, and sizes,
- Valve locations, type, size
- Service lines lengths, type material, and sizes
- Point of tie-in and type (wet tap, cut-in)
- Erosion and sedimentation control as required by appropriate governing authority, city, county, state (DNR/GDOT).
- Any other information pertinent to the project
- Profile.

2.2.7. The Engineering Report and plan submittals shall be accompanied by the JWSC preliminary information form a letter of transmittal identifying:

- The name of project
- Owner/Developer name, and
- Owner/Developer's address.
- Engineer's name
- Engineer's contact information, include address, telephone number and email address.
- Seal and signature of the design engineer



2.2.8. With the exception of exploratory investigations, no water or sewer construction shall be initiated without prior approval from JWSC.

2.2.9. The JWSC may consider and allow deviations from these Standards only where adequate documentation is provided to prove the need for such deviation. Deviations, if allowed, will only be granted in writing.

2.3. Hydraulic Analysis

Provide hydraulic analysis of the proposed water distribution improvements that includes the size of all water lines, valves, feeder mains, service lines, blow-off valves, booster pump stations, point of tie-in, and any other information pertinent to the project. The applicant shall provide scaled, schematic drawings labeled with appropriate nodes annotated with residual pressures, flows, demands, velocities, water age, etc. When the hydraulic analysis is conducted through modeling software (i.e. WaterCAD, etc.) the applicant shall provide an electronic file of the model for review, in a format determined by the JWSC. Scenarios required for demonstration are:

- static with average daily flow
- peak hourly flow
- fire flow conditions
- maximum water age with average daily flow

2.4. Design Flows

Each water system component shall be designed to meet certain flow requirements to ensure that water will be available in adequate quantities to meet demand characteristics throughout the system. The various flow requirements are described below.

2.4.1. The average daily demand expresses the average amount of water used in a system during an average day. One Residential Equivalent Unit (REU) is the equivalent demand that can be expected for one residential connection. The AADF shall be 300 gallons per day per REU. In as much as the AADF will often be exceeded, it is generally not appropriate to use AADF for design purposes.

2.4.2. The following table provides a guide for estimating the average daily demand for various types of establishments, in gallons per day per unit. Acceptable flow rates for design calculations may also be found in the JWSC Water and Wastewater Rates and Charges. The unit for the table below is persons per day, unless otherwise indicated:

Table 1: Annual Average Daily Demand Flow Values



Type of Establishment Average Daily Use	(Gallons per day) 1
Airport (per passenger)	3-5
Assembly Halls (per seat)	2
Camps - Children, overnight, central facilities	40-50
Construction	50
Migrant Labor	35-50
Day type, no meals served	15
Churches (per member)	1
Cottages, season occupancy	50
Clubs - Residential	100
Non residential	25
Factories, sanitary uses, per shift	15-35
Food Service – Restaurants	7-10
With bars	9-12
Fast Food	2
Highway Rest Areas	5
Hotels (2 persons per room)	60
Institutions – Hospitals (per bed)	250-400
-Nursing Homes (per bed)	150-200
-Others	75-125
Office Buildings	15-30
Laundries, self service (per customer)	50
Motels (per bed)	60
Parks – Day use (with flush toilets)	5
-Mobile Homes (per unit)	200
-Travel Trailers (per unit)	90-100
-Picnic Areas (with flush toilets)	5-10
Residential Communities	100
-Single Family Dwelling (per person)	400
-Single Family Dwelling (per house maximum)	120
-Multi-Family (per bedroom)	120
-Rooming house/tourist home (per bedroom)	
Resort Motels and Hotels	75-100
Retail Stores (per toilet room)	400
Schools – Day, no showers or cafeteria	15
-Day, with cafeteria	20
-Day, with showers and cafeteria	25
-Residential Types	75-100
Shopping centers, per sq. ft. sales area	0.16



Swimming Pools and Beaches	10
Theaters – Drive-in (per car)	3-5
-Others (per seat)	3

¹ The unit is per person unless otherwise stated.

The values in Table 1 Annual Average Daily Demand Flow Values are for normal water requirements and do not include special needs or unusual conditions. Additional allowances should be made for firefighting, lawn watering, swimming pool, industrial or commercial process water and other special uses. (Georgia Environmental Protection Division, Drinking Water Program, 2000)

2.4.3. Maximum Daily Flow (MDF):

2.4.3.1. The maximum daily flow (demand) expresses the maximum amount of water used in a system in one day during peak demand. Normally expressed in gallons per day, the MDF is normally used in the design of water production and storage facilities. For water systems located in the City District, North Mainland District and South Mainland District of Glynn County, the estimated MDF shall be calculated as 1.54 times the AADF.

2.4.3.2. For water systems located on St. Simons Island the MDF shall be calculated as 1.40 times the AADF.

2.4.4. Peak Hourly Flow (PHF):

2.4.4.1. The peak hourly flow expresses the maximum amount of water used in any hour during a day. Normally expressed in gallons per minute, PHF is used, in conjunction with fire flow requirements, in the design of water distribution systems.

2.4.4.2. For water systems located in the City District, North Mainland District and South Mainland District of Glynn County, the estimated PHF shall be calculated as 2.2 times the AADF.

2.4.4.3. For water systems located in on St. Simons Island, the estimated PHF shall be calculated as 2.0 times the AADF.

2.4.5. Fire Flow Requirements:

2.4.5.1 The actual planned fire demand (minimum of 500 gallons per minute) with a minimum residual pressure of 20 PSI for 2 hours at the most distant fire hydrant during maximum daily demand shall be required.

2.5. Sizing of Water Mains

2.5.1. Fire Service/Hydrant Mains:

The minimum size for water line extensions with fire service or hydrant connections shall be approved by the JWSC. The applicant may provide design calculations for consideration of water main



sizing. In all cases, sizing shall be in accordance with Glynn County/City of Brunswick Code of Ordinances and Subdivision Regulations.

2.5.2. Major Transmission Mains:

Major Transmission mains or extensions to such mains throughout the system shall be in accordance with JWSC Water and Sewer Master Plan, latest revision, where applicable. Contact the JWSC for additional information and guidance regarding this requirement.

2.5.3. Distribution Mains:

2.5.3.1. The minimum water main size in residential subdivisions to which fire hydrants are connected shall be 8-inches in diameter. Any deviations for which the applicant provides design calculations for may be reviewed for consideration at JWSC discretion.

2.5.3.2. Developments shall be designed to create a looped system with a minimum of two connections to a distribution main external to the project wherever possible in accordance with GA EPD requirements. In cases where two feeds are not practical, the size of the single main extension serving the development or looped grid must show as appropriate through the hydraulic analysis.

2.5.3.3. All design and construction of water systems shall place emphasis on minimizing residence time/water age and provision of operational controls to minimize service interruptions as future maintenance is required. Provisions to loop water systems shall be made where feasible or as directed by the JWSC. Dead end water systems shall only be allowed in cases where there is no ability for future growth or expansion to adjacent properties.

2.5.3.4. Distribution lines smaller than 8-inches in diameter may be considered on a case-by-case basis. A water line smaller than 8-inches diameter is not considered a "water main" and is identified as a "water line".

2.5.3.5. The minimum size water line shall be two (2) inches in nominal diameter. However, the size of water mains shall be justified by hydraulic analysis. Two-inch water lines may be considered for water lines not more than 1,000 feet in length, short cul-de-sacs and permanent dead-ends where future growth or extension is not feasible.

2.5.3.6. Generally, not more than 20, or the equivalent of 20, services (domestic and irrigation) shall be connected to a 2-inch diameter water line, unless the line is looped or otherwise supplied from two connections with mains of adequate capacities. The hydraulic analysis shall show suitability of the water line.

2.5.3.7. A looped 2-inch line shall serve no more than 40, or the equivalent water demand of 40 services (domestic and irrigation).



- 2.5.3.8.** A 2-inch diameter line shall not exceed 1,000 feet in length from the point of connection to the supply main.
- 2.5.3.9.** Any water supply line less than 2-inch diameter shall not exceed 100 feet in length.
- 2.5.3.10.** The system must be designed to maintain a minimum pressure of 20 psi at each service connection under all conditions of flow (peak flow + fire flow). The normal working pressure in the distribution system should match the public system (50-60 psi), or the static pressure at the point of connection to the public system and in no case less than 35 psi.

2.5.4. Velocities in Water Mains:
The hydraulic analysis must demonstrate that expected velocities in new distribution mains do not exceed 6 feet per second (fps) at the peak hourly flow (PHF) + fire flow.

2.5.5. Pressures in Water Mains:

- 2.5.5.1.** The system must be designed to maintain a minimum pressure of 20 psi at each service connection under all conditions of flow (peak flow + fire flow). The normal working pressure in the distribution system should be approximately 60 psi, or the static pressure at the point of connection to the public system, and in no case less than 35 psi.
- 2.5.5.2.** The normal working pressure in the distribution system should match the public system (50-60 psi), or the static pressure at the point of connection to the public system and in no case less than 35 psi.
- 2.5.5.3.** Wide variations in pressure above the minimum requirement of 20 psi may be inherent in the design of a distribution system but pressures no greater than 100 psi should be delivered to the customer (unless higher pressures are requested.)
- 2.5.5.4.** In the event of excessive pressures, pressure reducing valves may be incorporated in the vicinity of each customer's source line, or by designing the distribution system to limit the maximum pressure.

2.5.6. Hazen-Williams Roughness Coefficients:

- 2.5.6.1.** This formula includes a roughness coefficient C, which accounts for pipeline hydraulic friction characteristics. The roughness coefficient varies with pipe material, size, and age.
- 2.5.6.2.** The hydraulic analysis shall use roughness coefficients (C-factors) in the Hazen-Williams formula in accordance with the following:

Table 1- Hazen Williams Roughness Coefficients

Pipe	C-
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	factor
Ductile iron pipe, cement lined (sixteen (16) inches in diameter and above)	100
Ductile iron pipe, cement lined (Less than sixteen (16) inches in diameter)	110
PVC pipe (All sizes)	120
HDPE pipe (All sizes)	130

2.6. Installation of Water Mains and Appurtenances

2.6.1. Potable Water Pipe:

Pipe for potable water lines shall be ductile iron pipe (DIP), polyvinyl chloride (PVC), polyethylene tubing (PE), cross linked polyethylene tubing, type a (PEXa) or high-density polyethylene (HDPE). Pipe sizes and applications shall conform to the following:

Table 2– Pipe size and Application Table

PIPE	PIPE SIZE	APPLICATION
Ductile Iron	4" diameter and larger	Water Mains Above Ground* Below Ground
PVC DR 14 PVC DR 18 PVC DR 25	4" diameter and larger	Water Mains Below Ground
HDPE (IPS) DR11	2" diameter and larger	Water Mains Below Ground
HDPE (CTS) DR11	1" diameter	Water Services
HDPE DR11 (IPS)	2" diameter and larger	Water Mains Water Services Below Ground
Steel PVC	4" diameter and larger	Casings Only

*Flanged joints for above ground applications only.

2.6.2. Separation Requirements:

2.6.2.1. Water lines shall not be laid closer than 10-feet horizontally from a sanitary sewer main or septic tank line. Exceptions require the approval of the JWSC Planning and Construction Division.

2.6.2.2. Sanitary sewer lines shall pass beneath water lines with the top of the sewer being at least 18-inches below the bottom of the water line, where sewer lines cross water lines.

2.6.2.3. No joints in the water line shall be located closer than a 10-foot horizontal distance from a wastewater or storm line. The installed pipe segment shall be centered at the point of



crossing.

2.6.3. Non-Standard Fittings:

2.6.3.1. Any non-standard fitting shall only be allowed through specific written approval of the JWSC. Such fittings shall meet the requirements of the JWSC Construction Specifications and shall have the same diameter and thickness as standard fittings. Laying lengths and types of ends shall be determined by the particular application and the piping to which they connect.

2.6.4. Restrained Joints:

The use of concrete thrust blocks as a method of joint restraint shall be limited to situations such as ties to, or work associated with existing systems where exposing several joints of pipe is not feasible due to existing ground conditions. In such cases other restraining devices may be required at the direction of the JWSC. Concrete thrust blocks may be used in combination with tie rods in accordance with the JWSC standard construction details.

2.6.5. Water Valves and Appurtenances:

Extension stems on buried valves will be allowed only by written approval of the JWSC. Extension stems shall be designed to securely fasten to the square operating nut of the valve.

2.6.6. Isolation Valves:

- 2.6.6.1.** For pipelines 12-inches diameter and smaller use resilient type gate valves. For pipelines larger than 12-inch diameter either gate valves or butterfly valves may be used. For pipelines 16-inches and larger, valves are to be provided with bypass valves for equalizing pressure on each side of the mainline valve.
- 2.6.6.2.** Install valves at all branch connections off the mainline pipeline. For a "Tee" intersection, provide 3 valves. For a "Cross" intersection, provide 4 valves.
- 2.6.6.3.** Valves shall be installed as near as possible to tee and cross fittings.
- 2.6.6.4.** Install a gate valve next to the tee on all fire hydrant leads
- 2.6.6.5.** Valves 16 inch and larger must be installed in a vault in a horizontal position. The design of these vaults and valves will require valve restraints in the closed position.
- 2.6.6.6.** Square nut actuated valves are not required to be installed in a vault.
- 2.6.6.7.** Maximum distance between valves installed on main lines shall not exceed distances shown in Table 3 Valve Spacing.

Table 3- Valve Spacing



Spacing of Valves	Diameter Valves Maximum Spacing of Valves
4-inch to 6-inch	1,500 feet
8-inch to 12-inch (Multi-Family Residential Use)	1,000 feet
8-inch to 12-inch (Single Family Residential Use)	1,000 feet
8-inch to 12-inch (Commercial Areas)	1,000 feet
8-inch to 12-inch (Industrial Areas)	1,000 feet
14-inch on 16-inch pipeline	1,200 feet
20-inch	2,500 feet
24-inch to 48-inch	2,500 feet
larger than 48-inch	as directed by JWSC

2.6.7. Valves for Looped Water Distribution Systems:

For water mains that are looped between streets, provide valves at both ends before entering and leaving each street onto private property. In addition, at a minimum, provide a valve at the midpoint in a looped system.

2.6.8. Valves for Future Extensions:

2.6.8.1. Valves shall be provided at the end of mains where future extension is feasible.

2.6.8.2. A flush valve and riser shall be required at the end of mains intended for future extension, or that do not have hydrants suitable for flushing.

2.6.9. Fire Hydrants:

2.6.9.1. Locate Fire Hydrants at each high point and low point of the pipeline in profile, whenever possible.

2.6.9.2. No bends, offsets, etc., shall be located between the fire hydrant tee and the fire hydrant elbow. If bends are required submit to JWSC for approval.

2.6.9.3. In the vertical plane, the fire hydrant lead must be installed level.

2.6.9.4. Do not design blocking for fire hydrant tees. Restrain all pipe between the tee and the fire hydrant,

2.6.9.5. When PVC is used for the mainline piping, connect the tracer wire to the fire hydrant base elbow and extend to be accessible above ground. Attach wire to safety chain.

2.6.9.6. All fire hydrants shall have a minimum cover of 36-inches over the branch supply line and shall be restrained as shown on the



JWSC Standard Details.

- 2.6.9.7.** No fire hydrant shall be installed within 10 feet of any planned or existing driveway unless approved by the JWSC.
- 2.6.9.8.** The maximum spacing for fire hydrants shall be 500 feet unobstructed and at all dead ends, unless directed otherwise by the JWSC and/or Glynn County or City of Brunswick Fire Chief.

2.7. Miscellaneous Items

2.7.1. Tracer Wire and Detection Tape:

Locate tracer wiring and pipe detection tape on all non-metallic water mains in accordance with the JWSC Standard Details.

2.7.2. Cased Piping:

- 2.7.2.1.** For casing materials and sizes, see detail JWSC 2-10.
- 2.7.2.2.** All carrier pipes located within steel casings shall be installed utilizing casing spacers in accordance with the JWSC Standard Details.
- 2.7.2.3.** Casing spacers shall be installed 1-foot on either side of each carrier pipe joint and at no more than 10-foot intervals along the pipe.
- 2.7.2.4.** A casing spacer shall also be installed within two feet of the ends of the casing pipe.
- 2.7.2.5.** Exposed ditch crossings shall be cased and supported at either bank slope with engineered concrete piles. In all cases one continuous length of casing shall be used. Spans of waterways greater than intermittent streams shall be designed by a structural Engineer.

2.7.3. Pipe Alignment:

- 2.7.3.1.** Pipe alignment and gradient shall be straight or shall follow true curves as near as practicable. Curvature in pipelines, where required, shall be well within (no more than 80% of) the manufacturer's allowable joint deflection or laying radius for the pipe supplied. Otherwise, fittings shall be required.
- 2.7.3.2.** Pipe alignment of new water mains in residential subdivisions shall generally be located 5 feet behind the curb where curb and gutter is used.
- 2.7.3.3.** Where roadside ditches are used in lieu of curb and gutter, the water mains should be placed at the edge of the road shoulder no closer than 4 feet from the edge of pavement.
- 2.7.3.4.** The placement of water lines, valves and hydrants within the ditch shall require the approval of the JWSC.
- 2.7.3.5.** When the pipeline alignment is located outside the road right of way, minimize disruption to environmental features and where possible avoid wetland areas, trees, and other sensitive areas. A 20 foot wide water easement with the water main/water line located at the center of the easement shall be provided.



2.7.3.6. Locate the alignment so that it follows the property lines as much as possible.

2.7.4. Pipe Cover:

2.7.4.1. Pipe shall be laid with a minimum cover of 42-inches in paved areas and 36-inches in unpaved areas with an allowable maximum of 60-inches. Cover in all areas shall be measured from crown of pipe to final project finished grade. Reductions in pipe cover requirements require the prior approval of the JWSC. Cover requirements are shown on the JWSC Standard Details.

2.7.4.2. Greater depths are permissible when required to clear obstructions, conflicts, etc. The contractor shall contact the JWSC in advance for instructions as to the modifications necessary. A detail for utility conflicts is shown on the JWSC Standard Details.

2.7.4.3. When the 36" of cover cannot be feasibly achieved, upon review and approval by the JWSC, casing may be allowed. The absolute minimum depth of cover shall be 18" and the installation is limited to a maximum segment of 20 l.f.

2.7.5. Separation Requirements:

2.7.5.1. (HORIZONTAL) Water lines shall be laid at least ten (10) feet horizontally from any existing or proposed sanitary sewer, storm sewer, septic tank, sub-soil treatment system or sewer manhole. The distance shall be measured edge-to-edge.

2.7.5.2. (CROSSINGS) Storm sewers or sanitary sewers shall be laid to provide a minimum vertical separation of at least 18 inches between the bottom of the water main and the top of the sewer. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible.

2.7.5.3. All exceptions to spacing requirements must have the written approval of the JWSC Planning and Construction Division.

2.7.6. Thrust Restraints:

2.7.6.1. All non-flanged fittings and valves shall be restrained. This shall be accomplished using mechanical restraints at fittings and mechanical restraint along adjacent joints of pipe in accordance with the JWSC Standard Details.

2.7.6.2. The use of concrete thrust blocks as a method of joint restraint shall be limited to situations such as point repair where exposing several joints of pipe is not feasible due to existing ground conditions. In such cases other restraining devices may be required at the direction of the JWSC.

2.7.6.3. Concrete thrust blocks may be used in combination with tie rods in accordance with the JWSC standard construction details. Where used concrete shall be 2,500 PSI minimum.

2.7.6.4. All joints within steel casing pipe shall be restrained with



mechanical restraining devices. Harness restraints on PVC (caps) pipe installed within casings may require larger casing pipes.

2.7.7. Dead Ends:

- 2.7.7.1.** Dead ends shall be minimized by making appropriate tie-ins whenever practical.
- 2.7.7.2.** Where dead-end mains occur, they shall be provided with a fire hydrant, when fire flows are available, or with an acceptable flushing hydrant or blow-off for flushing purposes. The blow-off shall be at least 2 inches in diameter but must be appropriately sized to provide flushing velocities of 2.5 feet per second or greater in the water main being flushed.
- 2.7.7.3.** No flushing device shall be directly connected to any sewer nor be subjected to flooding or plugging.
- 2.7.7.4.** Design shall be submitted to not require service outages for future extensions/connections.

2.7.8. System Connections:

- 2.7.8.1.** Unless otherwise approved, all connections and ties to the existing public water system shall be performed by the JWSC upon payment of applicable fees.
- 2.7.8.2.** Wet Tap of the main for connecting is preferred and a shutdown of water mains for connection purposes should be avoided if possible. All wet taps shall be performed by JWSC.

2.7.9. Tapping Valves and Sleeves:

- 2.7.9.1.** Stainless steel tapping assemblies (All components shall be stainless steel) shall be used for live tap applications or when directed by the JWSC.
- 2.7.9.2.** No taps shall be made within 5 pipe diameters or 5-feet (whichever is smaller) of a joint.
- 2.7.9.3.** The contractor/developer shall coordinate the tap with the JWSC and pay all applicable fees.
- 2.7.9.4.** The contractor/developer shall furnish and install the required tapping saddle and tapping valve and pressure test in accordance with JWSC Standards, after which JWSC personnel will make the actual tap to the main. A typical water main connection is shown on the JWSC Standard Details.

2.7.10. Planned Service Interruptions/Shutdown:

If shutdowns are required, a planning/coordination meeting with the JWSC is required. Indicate the distance from all existing adjacent valves. Provide the associated valve numbers. The applicant is responsible for all community notifications, permits costs and accommodations to support a service outage.



2.7.11. Line Stop:

- 2.7.11.1.** Line stops provide a way to insert a temporary plug into an existing water pipeline through a tapping tee, stopping the flow of water to facilitate repairs, maintenance, or connections.
- 2.7.11.2.** When shutdowns are determined to be impossible, line stops can be designed to temporarily shut down the existing water pipeline.
- 2.7.11.3.** Special thrust restraint will be required to restrain the line stop.
- 2.7.11.4.** If designer and JWSC determines that the design requires the installation of line stop, submit to JWSC for approval.

2.7.12. Water Service Connections (5/8-inch, 5/8x3/4-inch, 3/4-inch, 1-inch Meters):

- 2.7.12.1.** All water service connections to mains within new developments shall include service tap, corporation stop, service tubing, and curb stop.
- 2.7.12.2.** Water meters and meter boxes will be installed by the JWSC at the time of meter installation when proper request is made by the applicant.
- 2.7.12.3.** Water service connections to existing mains shall only be made by the JWSC upon payment of all operational, impact and account setup fees.
- 2.7.12.4.** No service taps shall be made within 5 pipe diameters or 5-feet (whichever is smaller) of a pipe joint.
- 2.7.12.5.** Typical residential water service details for single, double, or multiple service lines are shown on the JWSC Standard Details.

2.7.13. Water Service Connections (1-1/2-inch and larger meters):

- 2.7.13.1.** Water service connections to existing mains shall be made by the JWSC. The contractor/developer shall coordinate the tap with the JWSC and pay all applicable fees.
- 2.7.13.2.** No service taps shall be knowingly made within 5 pipe diameters or 5-feet (whichever is smaller) of a pipe joint.
- 2.7.13.3.** Water meters and meter boxes will be obtained from and installed by JWSC.
- 2.7.13.4.** Unless otherwise approved, meters shall be installed in vaults below ground as per JWSC detail.
- 2.7.13.5.** Above ground installations may be approved on a case-by-case basis.
- 2.7.13.6.** Meters 3-inches and larger shall be installed with a bypass line around the meter setting.
- 2.7.13.7.** Typical large meter installation details are shown on the JWSC Standard Details.

2.7.14. Backflow Prevention Devices:

- 2.7.14.1.** Backflow preventers installed in accordance with the latest requirements of JWSC backflow program, are required when



the design has a direct connection between the JWSC water system (potable) and other water systems or equipment containing water or unknown substances, including but not limited to the following:

- Fire sprinkler service connection
- Fire hydrant meter
- Irrigation system
- Commercial and industrial connections
- Any customer side system with pressure greater than the JWSC system.

2.7.14.2. There shall be no physical connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water and other contaminating materials may be discharged or drawn into the system.

2.7.14.3. Backflow prevention devices shall be installed in accordance with applicable JWSC Standard Details.

2.7.14.4. Backflow prevention devices are required to be tested annually at the expense of the applicant. If water cannot be shut down for testing and/or repair a parallel backflow prevention device shall be installed.

2.7.15. Double Check Valve:

Double check valve assemblies shall be used in low to medium (non-health) hazard locations such as restaurants, lawn sprinkler systems, swimming pools, fire sprinkler systems, etc.

2.7.16. Reduced Pressure Zone (RPZ) Backflow Preventer Assembly:

A reduced pressure zone (RPZ) backflow preventer assembly shall be used for high (health) hazard locations such as hospitals, medical clinics, car wash facilities, wastewater treatment plants, pumping stations, etc. Fire suppression systems utilizing reclaimed water or other chemicals and additives are also considered high hazard locations. Any private system that boosts pressure on the customer side shall be isolated from the public system via physical air gap or RPZ.

2.7.17. Water Main and Appurtenances Abandonment:

2.7.17.1. All abandonments shall be performed by JWSC or with JWSC supervision in cooperation with the utility contractor.

2.7.17.2. If the abandoned material is to be removed, it is the responsibility of the utility contractor.

2.8. End of Section





SECTION 3 Wastewater Collection- Gravity Sewers

- 3.1. General**
- 3.2. Design Flows**
- 3.3. Sizing of Gravity Sewer Mains**
- 3.4. Gravity Sewer Pipe Slope Requirements**
- 3.5. Pipe Materials**
- 3.6. Pipe Depth**
- 3.7. Gravity Sewer Location and Alignment**
- 3.8. Easements**
- 3.9. Sewer Services**
- 3.10. Gravity Sewer Manhole Design**
- 3.11. Gravity Sewer Construction Inspection & Testing**
- 3.12. End of Section**

3.1. General

This section provides the minimum guidelines for the design and construction of wastewater collection gravity sewer systems. In all cases as practical and available, public wastewater collection systems shall be designed and constructed as open channel gravity flow. All new connections, upgrades and extensions to the JWSC gravity collection system are to be evaluated for intended use, as well as impacts to the existing public system. At the request of the applicant, the JWSC will provide information on the existing public system for specific locations through a search of database records and GIS mapping. The applicant will be required to gather any additional information necessary, including field measurements through JWSC authorized access.

3.2. Design Flows

- 3.2.1.** An Engineering Report (Utility Report) prepared by the Engineer of Record shall be submitted to the JWSC prior to the preparation of the final construction plans and include the various flow requirements described below:
- 3.2.2.** Average Daily Flow (ADF):
 - 3.2.2.1.** Average Daily Flow (ADF) shall be 300 gallons per day per Residential Equivalent Unit (REU) or 115 gallons per day per capita. This may be adjusted as determined by the JWSC.
 - 3.2.2.2.** The basis for one (REU) shall be a single-family unit occupied by an average of 2.6 persons. Where sewer service beyond the basis of the established REU is required, Sewage Flows adapted from the Georgia Environmental Division Large Community Design Guidance Document, Pages 8 & 9, Appendix A shall be used.
 - 3.2.2.3.** Where historical data is available from flow monitoring or other physical measurements approved by the JWSC for existing systems, ADWF may be considered to be calculated as averaged from seven (7) days within the monitoring



period of flow with no rainfall event greater than .5 (5/10ths) inches of rain in any of the sever 24-hour periods being averaged.

3.2.3. Peak Hourly Flow (PHF):

Wastewater collection system design shall be based on the Average Daily Flow (ADF) to be conveyed with adjustment to allow for the maximum diurnal peak hourly flow (PHF) that is expected to occur. A peaking factor shall be calculated based on population of the subject basin and a ratio of peak hourly flow to design average flow (Fair-Geyer calculation), where:

Q peak hourly= Maximum Rate of Wastewater Flow (PHF)
Q average daily= Design Average Daily Wastewater Flow (ADF)
P= Population in Thousands
PF= Peaking Factor

$$PF = Q_{\text{peak hourly}} / Q_{\text{average daily}} = \frac{18 + \sqrt{P}}{4 + \sqrt{P}}$$

3.3. Sizing of Gravity Sewer Mains

3.3.1. Major Outfalls:

The size of major outfall sewers or extensions to such mains, throughout the system shall be in accordance with JWSC Water and Sewer Master Plan, latest revision. Contact the Planning and Construction Division for additional information and guidance with regard to this requirement.

3.3.2. Collector Sewers:

No sewer main receiving raw wastewater shall be less than 8 inches in diameter unless approved by JWSC.

3.3.3. Exceptions:

3.3.3.1. Six-inch diameter pipe may be used as laterals where there are relatively low flows, a small number of people to be served, future extensions are not anticipated, and the sewer is capable of handling the design flows. The justification for using the six-inch pipe shall be provided by the applicant and must be approved by the JWSC.

3.3.3.2. Four-inch diameter pipe may be used for sewers receiving treated Or partially treated wastewater and is capable of handling the design flows. The justification for using the four-inch pipe shall be provided by the consultant and must be approved by the JWSC.

3.3.4. Flow Requirement:

All gravity sewer mains shall be designed to convey:

- The Design Peak Flow should produce a velocity of not less than 2.50 Feet per Second (FPS).
- The ADF at a flow depth not greater than 25% of the pipe inside diameter.



3.3.5. Combined Sewers:

Combined sewers (wastewater flows combined with storm or groundwater flows) are not permitted. Rainwater from roofs, swimming pools, unsheltered wash basins, trash receptacles, materials staging areas, vehicle washing operations, inflow from streets and other areas, and groundwater from foundation drains and other sources must be excluded from the sanitary collection system.

3.4. Gravity Sewer Pipe Slope Requirements

3.4.1. General:

3.4.1.1. The major items for consideration in the regulation of gravity sewer pipe slopes are carrying capacity at peak flow and self-cleansing velocity. The inability to convey peak flow results in system surcharging and potential sanitary sewer overflows. The lack in the development of self-cleansing velocity, at least during the flows diurnal peak, results in solids deposition, system odors, and the eventual reduction in pipe capacity leading to blockages and overflows.

3.4.1.2. An additional consideration in the JWSC jurisdictional area, and numerous other coastal areas, is wastewater piping system detention time. Lengthy wastewater detention or travel time through gravity piping systems encourages the development of corrosive and odorous gases that damage piping infrastructure, cause odor complaints and increase the cost of system operation by requiring the addition of chemicals to inhibit or mitigate the effects of aging wastewater. Therefore, design of gravity sewer systems in this standard shall stress the development of self-cleansing velocities as the most practical and effective method of minimizing wastewater detention times in sewer mains.

3.4.1.3. It is desired to maintain minimum slopes, as recommended by the Ten States Standards in concert with the minimum pipe diameters and minimum flow depths suggested in these guidelines.

3.4.1.4. In an effort to address these aforementioned issues, the JWSC will consider pipe slopes less than those given in Table 2 Minimum Slope for Gravity Sewer based on good hydraulic engineering practice using "projected" pipe flow rates based on REU's and peaking factors as defined by appropriate engineering literature, organizational experience, policy and regulatory guidelines. Further explanation of requirements to obtain approval for such a change is given in section 3.4.2 Gravity Sewer Main Grades.

3.4.2. Minimum Pipe Slope:



3.4.2.1. All sewers shall be so designed and constructed to give mean velocities, when flowing full, of not less than 2.05 feet per second, based on Manning's formula using an "n" value of 0.013:

Manning's Equation (Gravity)

$$V = 1.486/n \times RH^{2/3} \times S^{1/2}$$

Where:

V = velocity in feet/second

n = coefficient of roughness (Manning), n = 0.013

S = slope of energy grade line, ft/ft

RH = hydraulic radius, ft = cross-sectional area of flow (ft²)

Wetted perimeter

Based on an "n" value of 0.013, the minimum slopes which should be provided are presented in Table 2 Minimum Slope for Gravity Sewer, however, slopes greater than these are desirable.

Table 2- Minimum Slope for Gravity Sewer

<u>Nominal Sewer Size</u>	<u>Minimum Slope in Feet Per 100 Feet</u>
4 inch	1.05
6 inch	0.60
8 inch	0.40
10 inch	0.28
12 inch	0.22
15 inch	0.15
18 inch	0.12
21 inch	0.10
24 inch	0.08
27 inch	0.067
30 inch	0.058
33 inch	0.052
36 inch	0.046
39 inch	0.041
42 inch	0.037



3.4.3. The pipe diameter and slope shall be selected to obtain the greatest practical velocities so as to minimize solids settling problems. Flatter slopes with oversize sewers to increase service reach shall not be used unless justified and approved by the JWSC on a case by case basis.

3.4.4. Depending on the type of pipe, other practical "n" values may be permitted by JWSC if deemed justifiable based on research or field data presented. Reduced slopes will be permissible if:

- Obtain velocity of 2.5 FPS at PHF.
- Such decreased slopes will only be considered where the depth of flow will be not less than 0.25 of the diameter at ADF.
- Minimum Manning "n" – values used for design are:
 - Plastic Pipe Manning "n" = 0.010 (For clean pipe with little deposits/debris)
 - Metal Pipe Manning "n" = 0.013 (For clean pipe with little deposits/ debris)

3.4.5. Whenever such decreased slopes are selected, the design engineer must furnish with his report his computations of the depths of flow and velocities in such pipes at minimum, average, and peak hourly flow rates based on the Manning Equation and using the Fair-Geyer (10 State Standard).

3.4.6. Where adherence to the minimum 8- inch pipe diameter (even with reduced "n"-values) will not develop self-cleansing velocities, if approved as an exception by JWSC, 6- inch diameter pipe may be used. A 6- inch diameter pipe exception shall only apply:

3.4.6.1. For limited reaches of gravity sewer where self-cleansing velocities cannot be developed in 8-inch pipes.

3.4.6.2. Such gravity sewer is strategically located such that system expansion from those lines is highly improbable.

3.4.7. Alternatives to the 6-inch exception include "low" flow pressurized systems (high head, low flow grinder pumps), step systems, or on-site treatment systems, only if State Department of Public Health and JWSC approved.

3.4.8. Maximum Pipe Slope:

The maximum slope for all pipe diameters shall be such that the velocity in the pipes does not exceed 5 fps at 94% of the pipe inside diameter when calculated using Manning's Equation and projected Peak Hourly Flow. Sewers supporting a flow velocity of greater than or equal to 15 feet per



second, or having a slope greater than or equal to 20% must incorporate concrete anchor per *EPD Guidelines for Sewage Collection Systems*, latest edition.

3.4.9. Gravity Sewer Pipe Design:

The contractor shall furnish gravity sewer piping systems in accordance with the JWSC Construction Specifications. The type, class, grade, and alignment of sewer pipe may be changed only at manholes, aerial crossings, conflicts, or crossings.

3.5. Pipe Materials

3.5.1. Underground:

Pipe to be installed underground using open-cut methods shall be poly-vinyl chloride (PVC) or high density polyethylene (HDPE).

3.5.2. All above grade sewer line installations will be PVC or HDPE pipe installed within a Ductile Iron Pipe casing. Two casing spacers per pipe joint shall be installed on the PVC pipe within the DIP casing, for restrained joint bell and spigot. For fused PVC/HDPE spacers may be omitted with casing one nominal size larger than the carrier pipe.

3.5.3. Ductile iron pipe is only permitted as casings for gravity sewer use where the mains or laterals are above ground as in ditch crossings

3.5.4. Pipe to be installed underground using open-cut methods shall be PVC push-on joint type as described in the JWSC construction specifications. Pipe installed above ground shall be PVC/HDPE inside ductile iron pipe or Steel casing as described in the JWSC construction specifications.

3.5.5. Pipe bursting or horizontal boring construction shall be high density polyethylene (HDPE) or Fusible PVC of a suitable ASTM Standard, classification and pressure rating as described in the "depth of cut" shall be defined as the vertical distance from pipe invert to finish grade. JWSC construction Specifications.

3.5.6. Storm Drain Crossings:

Where a gravity sewer main crosses under a storm drain and the invert of the storm drain is less than 3 feet above the crown of the sewer main, PVC/HDPE pipe shall be installed within a steel casing pipe per paragraph 1.5 B.

3.5.7. Stream/Ditch Crossings with less than 36" of cover:

3.5.7.1. Sewers should cross the stream as nearly perpendicular as possible with no change in grade.

3.5.7.2. Sewer crossing shall be encased in steel or ductile iron pipe and anchored to piers with footings with stainless hardware so no changes in alignment or grade will occur. Carrier pipe shall be PVC or HDPE fused pipe.

3.6. Pipe Depth

3.6.1. Minimum:

Gravity sewer mains shall be installed with a minimum bury depth of 36-inches, as measured from plan finished grade to pipe crown.



Gravity sewer shown by design engineers to not be able to be constructed to this minimum bury depth, but no less than 12", shall be PVC C900. Any pipes with less than 12" of depth shall be treated as above ground/cased.

3.6.2. Maximum:

3.6.2.1. Gravity sewer mains with service laterals shall not be constructed at any depth greater than 12 feet as measured from finished grade to pipe crown.

3.6.2.2. Gravity sewer mains without service laterals shall not be constructed at any depth greater than 20-feet as measured from the finished grade to pipe invert. Where such deep lines must be constructed, a gravity sewer high-line with services connecting directly into the deep manholes will be required. Such "high-lines" must be off-set at least 10-foot laterally from the deep line.

3.6.3. Exceptions:

Major sanitary sewer transmission mains 18-inch diameter and greater may be exempt from depth restrictions upon approval by the JWSC.

3.7. Gravity Sewer Location and Alignment

3.7.1. Gravity Sewers shall be constructed outside Roadways.

3.7.1.1. Align gravity sewers outside public R/W's centered in a dedicated sewer easement meeting criteria set forth below and exclusively dedicated to the JWSC. Combination drainage and sanitary sewer easements will be considered on a case-by-case basis. Sewers shall not be installed within the 25-foot buffer of State waters or within 100 feet of designated trout streams. Only crossings may be approved on a case-by-case basis.

3.7.1.2. No sewers, services, or any other utilities may be constructed on, or serve structures constructed or proposed to be constructed, on solid waste landfills.

3.7.1.3. Stream crossings and aerial crossings must be constructed in accordance with *EPD Guidelines for Sewage Collection Systems*, latest edition.

3.7.1.4. Straight alignment shall be confirmed through the use of laser, lamping or CCTV systems between manholes and show at least 90% of the full pipe circle visible when looking from manhole to manhole.

3.7.2. Gravity Sewers shown by the applicant that cannot be designed outside of Roadways and Public Rights-of-Way:

3.7.2.1. Priority is given to align gravity sewers within one lane and outside of vehicle wheel paths.

3.7.2.2. Sewer Mains & Manholes > 10 ft from R/W line, install at center of travel lane.

3.7.2.3. Manholes > 4 ft from curb & gutter.

3.7.2.4. Manholes may not be constructed to lie within ditch lines.



3.7.2.5. 40' R/W – Access Easements, install at roadway centerline.

3.7.3. Separation from other Utilities (except Water Mains):

3.7.3.1. A horizontal distance of 6-feet minimum shall be maintained from all drainage structures, telephone duct banks, electrical transformers, signal relays, power poles and other structures in the right-of-way as well as any other parallel underground utilities.

3.7.3.2. Gravity sewer mains crossing other underground utilities, (with the exception of water mains), shall have a minimum vertical separation of 6-inches. All distances shall be measured from the outside edge of the pipes. Exceptions must be approved by JWSC.

3.7.3.3. Gravity sewer mains located adjacent to storm water retention, ponds, lakes and water courses shall be designed with sufficient easement and spacing to allow excavation with 3 to 1 side slopes from top of bank to the pipe's depth of bury. The JWSC reserves the right to require casing pipe in such situations where adequate spacing cannot be demonstrated.

3.7.4. Separation from Water Mains:

3.7.4.1. Sanitary sewers shall be laid at least 10-feet horizontally from an existing or proposed water main.

3.7.4.2. Sanitary sewers shall be laid below and at least 18-inches vertically from an existing or proposed water main.

3.7.4.3. No water pipes shall pass through or come in contact with any part of a sewer manhole.

3.7.5. Encasements and Casing:

3.7.5.1. Casing pipe shall be ductile iron pipe or corrosion resistant/coated steel or Fusible PVC or HDPE casing and tested for leakage.

3.7.5.2. Casing pipe shall be electronically (GPS) marked using an approved method to allow the positive identification of casing end points.

3.7.5.3. Gravity sewer located in easements that cross wetlands shall be considered sub-aqueous and encased.

3.7.5.4. Gravity sewer that crosses under streams or within 3 vertical feet of the bottom of canals, ponds, lakes or ditches that may be considered Waters of the United States or otherwise environmentally sensitive due to local recreational use, shall be considered sub-aqueous and Encased.

3.7.5.5. Casing ends at perpendicular stream crossings shall extend a minimum of 25 feet beyond stream banks and be electronically (GPS) marked using an approved method and signed to show the casing end points. Such crossings shall be limited in length as much as possible and no reach of gravity sewer across such water body shall exceed 400 linear feet between manholes

3.7.5.6. Those runs located across wetlands, which include manholes, shall be accessible to maintenance vehicles with Access Roads.



3.7.5.7. Gravity sewer crossing public rights-of-way on State, County and City Primary Roads or railroads shall be encased in corrosion resistant coated steel or Fusible PVC casing (if allowed by the Railroad or Department of Transportation Authority)

3.7.5.8. Casing ends shall extend a minimum of 10-feet beyond the furthest edge of pavement, curb and gutter, storm drain systems or sidewalks.

3.7.6. Aerial Crossings:

3.7.6.1. Gravity sewer crossing streams, ditches and canals where sub-aqueous crossings are not practical by system design due to grade considerations may be aerial crossings.

3.7.6.2. Aerial pipe shall be cased and supported by concrete piers set a minimum of 10 feet beyond the existing stream banks with bases set a minimum of 2 feet below the existing stream bottom.

3.7.6.3. Where the crossing width dictates that more than one joint of carrier pipe be used, the pipe shall be restrained joint bell & spigot or fused (PVC or HDPE). In all cases the carrier pipe shall be supported by casing spacers to maintain grade and alignment.

3.7.6.4. Precast concrete pipe piers shall have saddle type top sections and anchored stainless steel pipe straps. (See JWSC Standard Detail)

3.7.6.5. Attachments to bridges and other stream crossing structures shall be engineered by a structural Engineer.

3.7.7. Increasing Size:

When a smaller sewer joins a larger one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. Smaller pipes shall match the crown of larger downstream pipes when enlargement of pipelines occur. An approximate method for securing these results is to place the 0.8 depth of flow point of both sewers at the same elevation. Generally, sewers shall not decrease in size in the downstream direction.

3.7.8. Allowances for Future Expansion:

3.7.8.1. Gravity sewer main stub-outs shall be provided to all undeveloped property and/or future phases of the project in accordance with the sewer master plan for the collection system service area.

3.7.8.2. Where gravity stub-outs are required, they shall be extended to within 4-feet of the property line, plat line or phase line and shall extend a minimum of ten (10) feet past the edge of pavement or a distance of 1.5 times the sewer depth whichever is greater.

3.7.8.3. The stub-out shall be terminated with a "no-invert" manhole with the effluent line plugged by a mechanical plumber's plug. (See JWSC Standard Detail)

3.7.8.4. Where gravity sewer extensions are made where there is no reasonable possibility of un-developed or un-subdivided property to



be served with a stub-out, as specified above, the end of line manhole shall be set so as not to accept any wastewater contribution from the installed system and be constructed without an invert or any influent line wall core or hole.

3.7.9. Gravity Sewer Alignment:

3.7.9.1. Install mains straight between Manholes without curves.

3.7.9.2. Provide uniform Slopes between Manholes.

3.7.9.3. Manhole structures will be installed at all changes in pipe material type, changes in alignment and elevation drops.

3.8. Easements

3.8.1. Easement Widths:

3.8.1.1. Sewer Depth Less Than or Equal to 12 ft: 20 ft minimum, symmetrical about the centerline of the pipe (10ft each side)

3.8.1.2. Sewer Depth Greater Than 12 ft: 30 ft minimum, symmetrical about the centerline of the pipe (15ft each side)

3.8.1.3. Lateral Ingress/Egress Access Road Easements: 20 ft minimum

3.8.2. Easement Access:

3.8.2.1. Provide a 12ft minimum wide access road with improved surface suitable for maintenance vehicle travel.

3.8.2.2. Where an easement is not accessible from a public road, provide a 12-foot wide access road from a public road to the easement.

3.8.2.3. A minimum Load Bearing Ratio (LBR) of 30.

3.8.2.4. Access Roads interrupted by wetlands, streams or ditches that prevent the travel of maintenance equipment from easement end to end must be provided with auxiliary lateral ingress/egress Access Roads to permit access to the sewer line so that each line segment and manhole is accessible to maintenance service vehicles.

3.8.2.5. Provide adequate drainage and incorporate features to prevent erosion from storm runoff.

3.8.2.6. A truck turnaround area suitable for designated JWSC maintenance vehicles should be provided at the intersection of all ingress/egress and sanitary sewer line easements.

3.8.3. Construction Easements:

Temporary construction easements of sufficient dimensions to allow safe installation of infrastructure shall be provided as deemed necessary.

3.9. Sewer Services

3.9.1. General

3.9.1.1. Single gravity services shall be provided to each lot or parcel provided that adequate and accessible utility corridors are also provided for maintenance.

3.9.1.2. Each residential lot shall have only one connection point to the public sanitary sewer system main.



- 3.9.1.3.** Where commercial developments require multiple connection points to a sanitary sewer main, an internal privately owned piping system shall be installed that will drain to the public main at only one connection point.
- 3.9.1.4.** Where services must be constructed through private property to access the public sanitary sewer system, it is the property owner's responsibility to secure a private sewer utility easement with the owner of the property through which the line will be constructed and provide documentation of such filed easement with the JWSC.
- 3.9.1.5.** Installation of sewer cleanout within one foot of the property line and within R/W to separate public responsibility from private. Upon approved installation of the lower clean-out, JWSC assumes ownership.
- 3.9.1.6.** Service laterals shall be terminated with a glued cap 3' below finished grade at the right of way/property line.

3.9.2. Service Marking:

- 3.9.2.1.** Gravity sewer service stub-outs shall be marked with a 24-inch x 24-inch diameter square pressure treated pine post with a 4' long #4 rebar driven flush with finished grade. The bottom of the post shall be set 2 to 3 inches above the top and directly over the end of the stub-out and protrude approximately 4-feet above finished grade. The post shall be painted green.
- 3.9.2.2.** Services shall be marked with an "S" uniformly stamped into the concrete curb face before curing, directly over the service line, and painted green. The "S" stamp of 2 inch2-inch x 2-inch dimension shall be stamped into wet concrete at the curb face.
- 3.9.2.3.** Saw-cutting/scribing of the service mark is not allowed.

3.9.3. Service Sizing:

- 3.9.3.1.** Gravity sewer services shall be at least one nominal diameter less than the size of the gravity main to which it is connected. Where the size of the service must be the same size of the main a sanitary sewer manhole shall be installed.
- 3.9.3.2.** No sanitary sewer service that is larger than the diameter of the serving sewer main shall be permitted unless JWSC has a master plan that specifies an upgrade to the sewer lines and specific plans have been implemented by the JWSC to upgrade the sewer main within one year, which will allow a temporary connection to be approved.
- 3.9.3.3.** Gravity sewer services shall be a minimum of 4 inches in diameter where serving a single unit, or 6 inches in diameter when serving two or more lots with a common connection to the main or where the service line serves multiple units such as duplex or multiple unit building, triplex, quad-plex, etc.
- 3.9.3.4.** All commercial connections shall be minimum of 6".

3.9.4. Service Design:



- 3.9.4.1.** All service laterals shall be constructed from the main to the lot to be served at a 1/8-inch per foot slope (1%).
 - 3.9.4.2.** A service shall be designed to connect to the gravity main with an inline wye fitting rotated 45 degrees up. The invert elevation of the service at the wye connection shall be at or above the crown of the mainline pipe.
 - 3.9.4.3.** The sewer flow shall enter the main through the wye positioned at 10 o'clock or 2 o'clock on the main. No service connections made at the 12 o'clock position on a main will be acceptable (See JWSC Standard Details).
 - 3.9.4.4.** All sewer services/laterals shall be constructed to JWSC minimum and maximum depths (3'-5') as per JWSC detail. Depth of bury shall be based upon existing ground surface at the time of approval, not a future planned finished grade. The applicant is responsible for measuring all constructed elevations, and ensuring documentation on the Record Drawings as applicable. The EOR shall ensure the collection system design considers all JWSC depth requirements.
- 3.9.5. Single Service Family Residential Gravity Sewer Services:**
- 3.9.5.1.** Where a service is to serve a single lot or a lot on which an indivisible duplex, triplex or quadra-plex unit is being constructed, the service shall be installed at the center of the lot and front the property being served.
 - 3.9.5.2.** Such services shall be perpendicular to the main.
 - 3.9.5.3.** All service stub-outs shall be properly marked as noted in this Section.
 - 3.9.5.4.** All service stub-outs shall have a clean-out installed within one foot of the property or easement line and within private property, to separate private from public responsibility upon connection. The developer shall be responsible for installing the clean-out.
 - 3.9.5.5.** The responsibility for the clean-out shall be the owners (See JWSC Standard Details). It is the responsibility of the Utility contractor to install a 6-inch cleanout at the right of way or sewer easement line.
- 3.9.6. Multiple Family Residential Gravity Sewer Services**
- 3.9.6.1.** Where adjacent residential properties can share a common service line the service wye that splits the discharge between the users must be constructed completely within the public rights-of-way corridor or easement using a six by four (6X4) inch double-wye fitting with the four (4) inch branch service lines from the wye ending at a point at the property line that will not conflict with other utility components such as transformers, phone pedestals, water meters, light poles, etc.
 - 3.9.6.2.** Each four (4) inch branch stub-out shall be properly marked as noted in this Section



3.9.6.3. Each four (4) inch branch stub-out shall have a clean-out installed within one foot of the property or easement line and within private property, to separate private from public responsibility upon connection.

3.9.6.4. The applicant shall be responsible for the installation of all services laterals and clean-outs.

3.9.7. Commercial Gravity Sewer Services

3.9.7.1. Double services, as described above may be applicable for certain commercial properties upon approval by the JWSC (See JWSC Standard Details).

3.9.7.2. Services shall be limited to 60' maximum length from either the sewer main or the manhole to the property line.

3.9.7.3. All commercial services shall be 6".

3.9.8. Service Alignment:

All services shall run perpendicular to the gravity sewer main line; no services shall be constructed parallel to the rights-of-way or easement line or run diagonally across rights-of-ways or easements with the exception of cul-de-sacs or where sharp curves in roadways or easements occur. Except header type collector services when allowed by the JWSC.

3.9.9. Service Depth:

Unless otherwise approved by JWSC, services shall terminate no less than thirty (30)36- inch deep and no greater than sixty (60)60- inch deep at the property line and where not expected to conflict with other crossing underground utilities.

3.9.10. Service Storm Drain Crossing:

For services that cross under storm drain structures or ditches, and do not have a minimum of 18" vertical clearance between the invert of the storm drain pipe or the ditch bottom, they shall be constructed using PVC pipe installed within a steel/ductile iron pipe casing with casing spacers per paragraph 1.5 B and with one joint of sewer safe D.I.P. centered under the storm pipe or ditch.

3.9.11. Service Cleanouts

3.9.11.1. Private clean-outs shall not be installed in the rights-of-way or easements.

3.9.11.2. The applicant shall have responsibility for the protection and repair of lower cleanouts at the right of way or easement lines for the duration of the 24-month warranty.

3.9.11.3. The cleanout shall be constructed using a 45 degree45-degree wye directed downstream on vertical riser pipe to the surface.

3.9.11.4. Size of the cleanout shall be the same as the pipe size.

3.9.12. Service Connections to Sewer:



3.9.12.1. Service connections are not permitted on trunk sewers larger than 18" in diameter.

3.9.12.2. Service Connections to manholes are allowed as follows:

3.9.12.2.1. Inline manhole connections are limited to 2 services, one from each side of the rights-of-way or easement and installed perpendicular to the Rights-of-Way or easement. Services installed into manholes will require prior approval by JWSC.

3.9.12.2.2. Terminal manholes located in residential cul-de-sacs are allowed 3 service connections. The invert of each service connection shall be a minimum of five (5) 5-inches above the invert of the manholes effluent (outgoing) main line.

3.9.12.2.3. Services shall not be connected to main line stub-out, or the terminal end of a sewer main without a manhole.

3.10. Gravity Sewer Manhole Design

3.10.1. The minimum manhole inside diameters for gravity sewer lines for various pipe sizes are given in Table 1 - Minimum Manhole Diameter as follows:

Table 4- Minimum Manhole Diameter

Pipe Size	Minimum Manhole Inside Diameter
Depth of MH (finish grade to invert) < 15 feet	
6" through 12"	4 ft
15" through 30"	5 ft base diameter (Riser above base may be 4 ft dia.)
33" through 42"	6 ft base diameter (Riser above base may be 5 ft dia.)
Greater than 42"	8 ft base diameter (Riser above base may be 5 ft dia.)
Depth of MH (finish grade to invert) > 15 feet	
6" and Greater	5ft (minimum diameter for riser, and for all other pipe sizes, base diameters shall match diameters above)

3.10.2. Manhole Configuration and Access:

3.10.2.1. Manholes shall be constructed as follows:

3.10.2.1.1. Top section shaped as an eccentric cone, or for manhole depths five (5) feet or less be a concentric cone. The clear opening for the manhole frame & cover shall not be less than that shown in Table 5 Minimum Frame & Cover Clear Opening:

Table 5- Minimum Frame & Cover Clear Opening

Main Pipe Size	Minimum Clear Opening for Frame & Cover
6" through 18"	24"



Greater Than 18"	30"
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- 3.10.2.2.** Riser sections having a minimum lay length of 16-inches.
 - 3.10.2.3.** Base section having a minimum lay length of 16-inches.
 - 3.10.2.4.** Where depth permits, use an eccentric transition section to reduce base section diameters of 6-foot or greater, to five (5) 5-foot diameter at finish grade.
 - 3.10.2.5.** Such transitions shall not be made less than 64-vertical feet above the invert bench.
 - 3.10.2.6.** Where manhole depth will not permit a diameter transition section, install a precast flat slab top section with centered 3236-inch diameter hole for the manhole frame & cover opening.
 - 3.10.2.7.** Provide a minimum elevation across manhole inverts of 0.10ft from the pipe outlet to the inlets, minimum concrete thickness from the bottom of the lowest invert to the bottom of the base not less than 8-inches.;
 - 3.10.2.8.** Manholes located within easements and outside of roadways shall have the ring and cover set 6-inches to 8-inches above or flush with final grade. Manhole locations outside of roadways and adjacent right-of-ways and are to be marked with a metal sign post and sign (per JWSC specifications) indicating JWSC ownership and contact information at the discretion of the JWSC.
- 3.10.3. Location:**
- 3.10.3.1.** Manholes shall be installed at the end of each main and at all changes in grade, pipe size, pipe material, or alignment and at all pipe intersections. The only recognized exception shall be where pipe material changes are allowed on a particular reach of main by this standard (i.e., PVC/HDPE pipe installed within a casing with casing spacers per paragraph 1.5 B).
 - 3.10.3.2.** Manholes located within roadways shall be on the centerline of roadways or center of travel lane and a minimum of four (4) feet from the edge of the manhole to the curb and gutter.
 - 3.10.3.3.** Manholes shall not be installed in the flow line of inverted crown roads or within the design high water limits of gutters, swales, ditches, or retention/detention areas.
 - 3.10.3.4.** Manholes where pipe diameter changes occur shall establish invert elevations by matching pipe crowns.
 - 3.10.3.5.** Where the vertical difference in pipe inverts, caused by matching crowns, are less than 1.5 feet in 4-foot diameter manholes and 2 feet in 5-foot or larger manholes between influent and effluent lines, transitional flow slides may be used so long as they do not interfere with the smooth flow through the primary manhole trough or other influent line flows. In all other cases, drop manholes shall be used.
- 3.10.4. Spacing:**



3.10.4.1. The maximum spacing of manholes shall meet requirements shown in Table 6 - Maximum Manhole Spacing:

Table 6- Maximum Manhole Spacing

Main Pipe size	Maximum Manhole Spacing
15" and less	400 ft
Greater than 15"	500 ft

3.10.4.2. A gravity main exceeding the maximum length may be allowed where a practical and sufficient reason can be demonstrated; however, such additional length shall not exceed the allowed maximum distance by more than 50-feet.

3.10.5. Clearance Requirements:

3.10.5.1. Manholes shall have 3-foot minimum clearance from outside edge to outside edge of other utility components, such as storm drains and storm drain boxes, utility poles, transformers, phone pedestals and cable systems.

3.10.6. Minimum Depth:

The design depth for all manholes is to be at no less than 36-inches from the top of the manhole to the pipe crown.

3.10.7. Drop Connections:

3.10.7.1. Outside and inside drop connections are only allowed within limited boundary subdivision developments to be dedicated as public infrastructure, where the potential for gravity system extensions from the manhole to adjacent properties is blocked or unanticipated by the sewer master plan, and the main line pipe size is 8-inches or greater.

3.10.7.2. Where outside drops are acceptable, they shall be required where the vertical difference between inverts is greater than 1 1/2-feet in 4-foot diameter manholes or two (2)2- feet in manholes greater than four (4)4- feet in diameter (See JWSC Standard Details).

3.10.7.3. Inside drops will only be approved where connections are being made to an existing system where depth restraints preclude the practical installation of an outside drop.

3.10.7.4. Outside drops, where the vertical distance of the drop is ten (10) 10-feet or less, shall be constructed of SDR-35Sch 40 PVC/SDR 26 pipe, bedded and backfilled along with the entire manhole structure to within 10-inches of the final grade with Class I material.

3.10.7.5. Where the vertical distance of the drop is greater than 10-feet, the drop shall be encased in a concrete column of a minimum



2-inches thickness around all pipe walls, and poured so as to provide a concrete base as a foundation for the drop bottom connection; the entire concrete structure shall be tied to the manhole wall with rebar studs for the full depth of the drop.

3.10.7.6. Inside drops, where approved, must:

3.10.7.6.1. Enter the manhole with a PVC tee fitting with a gasketed cap cut to 1/2 of the host pipe diameter.

3.10.7.6.2. Attached to the branch following the slope of the pipe reach being drained, the down leg placed closely against the manhole wall fastened with (316) stainless steel anchor bolts and bands on 2-foot centers,

3.10.7.6.3. An angled fitting and invert trough at the base to direct the flow smoothly into the existing flow line.

3.10.7.6.4. All gravity PVC piping and fittings shall be SDR-26 or greater in dimensional wall thickness (see JWSC Standard Details).

3.10.7.6.5. No inside drop or any other penetration shall land on the invert table. It shall enter the flow line without obstruction to mainline.

3.10.8. Flow Channel:

3.10.8.1. The flow Channel through manholes should be made to conform in shape and slope to that of the sewers.

3.10.8.2. Invert radius must match the largest pipe diameter.

3.10.9. Inverted Siphons:

3.10.9.1. Inverted siphons shall only be approved by the JWSC for special conditions. Manholes will require at least two barrels, with a minimum pipe size of eight (8) inches and shall be provided with necessary appurtenances for convenient flushing and maintenance.

3.10.9.2. Inverted siphon manholes shall have adequate clearances for rodding and be designed to provide sufficient head and pipe sizes to ensure velocities of at least 3.0 feet per second for average flows.

3.10.9.3. The inlet and outlet details shall be designed to permit the normal flow to be diverted to one barrel while the other barrel may be taken out of service for cleaning.

3.10.9.4. The joints should not exceed 45 degrees bends to easily accommodate cleaning equipment.

3.10.10. Grade Rings:

3.10.10.1. Grade rings shall be used where necessary to serve as spacers between the top cone of the manholes and the base of the manhole cover frame to bring the manhole design or finish grade. H-20 load rated composite material frames and covers and grade rings are to be installed on manholes located in paved areas.

3.10.10.2. On new construction, an adjustment using metal riser rings to extend the manhole cover frame to grade is not permitted.



3.10.10.3. No adjustment using grade rings between the top cone section and the manhole cover frame shall exceed 12-inches.

3.10.11. Corrosion Protection:

3.10.11.1. Manhole corrosion protection shall be provided for manholes in accordance with Table 7 - Manhole Corrosion Protection Schedule based on detention time of sewer flow from the uppermost region of the contributing pipe reach using an average velocity of two (2) feet/sec.

Table 7- Manhole Corrosion Protection Schedule

Detention Time	Vapor H2S	Corrosion Risk Level	Corrosion Protection
<2 Hours	0-10 PPM	No or Low Risk	None
2 - 4 Hours	11-50 PPM	Moderate Risk	100% Solids Epoxy
>4 Hours	>50 PPM	High Risk	Calcium Aluminates Coatings Approved Lining Systems
N.A.	FM Discharge Manhole	High Risk	Calcium Aluminates Coatings Approved Lining Systems

3.10.11.2. Corrosion protection for High-Risk manholes shall be:

3.10.11.2.1. Hydrogen sulfide resistant cementitious products containing calcium aluminates applied at a minimum of 1/2-1 inch to 3/4-inch in thickness, or, or

3.10.11.2.2. Epoxy coatings applied a minimum of 150200 mil thickness X2 coats onto all interior manhole surfaces including top of chimney surface below the ring and cover, excluding the trough, after proper substrate preparation, or

3.10.11.2.3. Precast manholes manufactured of calcium aluminate cement concrete, or

3.10.11.2.4. Manholes manufactured of fiberglass or HDPE. (Preferred)

3.10.11.2.5. All manholes must be structurally self-supporting with minimal H-20 loading.

3.10.11.3. Alternatives that provide equal or better protection may be approved.

3.10.11.4. Any manholes receiving the discharge from upstream pump stations shall be considered a High-Risk manhole and the 2nd and 3rd manholes downstream shall be considered Moderate Risk manholes and protected per this standard. Single grinder station connections only require the receiving manhole to be coated.



3.11. Gravity Sewer Construction Inspection & Testing

3.12. End of Section



SECTION 4 Wastewater Collection- Pump Station and Forcemain

- 4.1. GENERAL INFORMATION**
- 4.2. DESIGN FLOWS**
- 4.3. AVERAGE DAILY WEATHER FLOW (ADWF)**
- 4.4. PEAKING FACTORS/ PEAK HOURLY FLOW (PHF)**
- 4.5. WETWELL DESIGN CRITERIA**
- 4.6. WETWELL LEVEL CONTROL SETTINGS**
- 4.7. DEDICATED WASTEWATER PUMPSTATIONS**
- 4.8. PUMP STATION PUMP STATION TYPES**
- 4.9. WETWELL CONFIGURATION**
- 4.10. PRECAST CONCRETE STRUCTURES**
- 4.11. WETWELL AND DISCHARGE HEADER PIPING**
- 4.12. VALVES AND APPURTENANCES**
- 4.13. PUMPING EQUIPMENT**
- 4.14. REMOTE TERMINAL (RTU) - SYSTEM AND PANEL**
- 4.15. EMERGENCY POWER**
- 4.16. ON-SITE STANDBY GENERATORS & AUTOMATIC TRANSFER CONTROLS**
- 4.17. ENGINEER-GENERATOR CONTROLS**
- 4.18. AUTOMATIC TRANSFER CONTROLS/SWITCHES**
- 4.19. PUMP STATION TESTING**
- 4.20. PRIVATE PUMP STATIONS**
- 4.21. SINGLE FAMILY RESIDENTIAL & SINGLE LOT COMMERCIAL PUMP STATIONS**
- 4.22. MULTI-FAMILY MULTI-LOT AND/OR MULTI-USER COMMERCIAL STATIONS**
- 4.23. FORCE MAINS**
- 4.24. MATERIALS**
- 4.25. END OF SECTION**

4.1. GENERAL INFORMATION

4.1.1. This section provides the minimum guidelines for the design of wastewater pump station and their associated forcemains that are considered an integral component of the facility's collection system. The method of design and/or construction shall be according to these Design Standards, JWSC Construction Specifications, and the following:

- 4.1.1.1.** Recommended Standards for Sewage Works, (Ten State Standards), Latest Edition
- 4.1.1.2.** Georgia Environmental Protection Division State of Georgia Regulations for Water and Sewerage Works, Latest Edition
- 4.1.1.3.** Applicable Federal, State and Local Requirements

4.1.2. In the event of conflicts among the various sources cited above, the most stringent criteria shall take precedence.



4.2. DESIGN FLOWS

Each system component shall be designed to meet certain design flow requirements. All design flow requirements are at the discretion of the JWSC.

4.3. AVERAGE DAILY WEATHER FLOW (ADWF)

4.3.1. Average Daily Flow (ADF) for new construction shall be as calculated in Section 3.0 Wastewater Collection- Gravity Sewer.

4.3.2. ADF estimates for existing facilities that are scheduled for rehabilitation shall be made using data obtained from flow monitoring the existing system over a period of not less than 7 days, from which an average daily flow is to be developed. If any rainfall event measuring more than 0.5-inches of rain in any of the seven 24-hour periods occurs, the monitoring shall continue to provide at least 7-days without rainfall.

4.3.3. Flow monitored data shall be adjusted for other potential loadings as appropriate, (i.e. seasonal usages, tourist loading, etc.) as may be developed or estimated from water use records, percentage of increased occupancy or other rational methods approved by the JWSC.

4.3.4. ADF for existing facilities that may be scheduled for upgrading to accommodate additional flows from proposed developments shall be made using a combination of flow monitoring and REU calculations.

4.4. PEAKING FACTORS/ PEAK HOURLY FLOW (PHF)

4.4.1. Peak Hourly Flow (PDF) shall be the basis of design for all pumping flow rates. Determine the REU value for the facility and then calculate the PHF as specified in Section 3.0 Wastewater Collection-Gravity Sewer.

4.4.2. Sizing of Force Mains:

4.4.2.1. The discharge piping, to include valves, bends and the force main is to be considered an integral part of the pump station pumping system whether the facility is new or being upgraded to handle additional flows.

4.4.2.2. Force mains and associated discharge piping discharging to gravity sewer shall be sized for PDF (required pump rate) at a minimum velocity of 2.5 fps with one pump running and a maximum velocity of 6.0 fps with both pumps running in a triplex station.

4.4.2.3. For triplex or quadra-plex facilities velocity shall not exceed 6.0 fps with two or three pumps running respectively.

4.4.2.4. Common force mains for low pressure or STEP type systems shall be sized for the flow of the planned system based on the probability analysis of simultaneous pump operation in each



pressure zone and line segments common to pressure zones. Line velocities, based on this analysis, shall be a minimum of 2.0 fps at least once during the 24 hr diurnal cycle and no greater than that velocity necessary to discharge the highest head pump on the pressure zone at 11 gpm.

4.5. WETWELL DESIGN CRITERIA

4.5.1. Wetwell Volume:

The minimum required wet well storage volume (V_{min}) between the Start Level and Stop level (as defined below), shall be calculated as follows:

$$V_{min} = \frac{T_{min} \times Q}{4}$$

4.5.2. V_{min} = the minimum effective pump cycle volume in gallons. This is the volume between the Start and Stop levels in the station. The Stop level is normally at 6 inches above top of submersible pumps. The Start level should be somewhere below the inflow pipe to prevent possible sedimentation in the inflow piping system and minimize gas stripping.

4.5.3. T_{min} = the minimum cycle time in minutes, defined as the amount of time it takes to raise the liquid level to the Start level and then draw back down to the Stop level. This minimum cycle time is achieved when the pump capacity (Q) is two times the inflow (Q_{in}). T_{min} shall be a minimum of 10-minutes.

4.5.4. Q = pump capacity in gpm.

4.6. WETWELL LEVEL CONTROL SETTINGS

4.6.1. Design settings for level control in wet wells shall be as follows:

“Level Control Design Setting”

Control Function	Level Setting
Low Water Level (LWL) Alarm	Lesser of: <ul style="list-style-type: none">• 6 inches below Pump “Off” level• top of submersible pump
Pump “Off” Level (Pump Off)	Greater of: <ul style="list-style-type: none">• 6 inches above pump housing, preferably above pump handle.• pump manufacturers minimum water level,
Lead Pump “On” Level (Pump On)	vertical dimension from the Pump “Off” level needed to store the volume required by $V=0.25TQ$



Lag Pump "On" Level (Lag On)	+ 0.5 vertical feet (6 inches) above previous pump on level and labeled as Lag1 On, Lag2 On, Lag3 On , etc
SCADA High Water Level (SHW)	Highest Lag On level + 0.5 vertical feet (6 inches) ⁱ
Audio/Visual High Water Level (AVHW)	SHW elevation + 0.5 feet (6 inches). ⁱⁱ

- 4.6.2.** Where primary level control is provided by a Level Transducer Radar Unit, the AVHW float ball and installation shall be as specified for all such devices in this Standard
- 4.6.3.** Note: Where flow matching pumping systems are approved for use, (either by VFD or mechanical flow matching technology using pre-rotation basin technology), level control settings shall be by specific facility design and as approved by the JWSC.

4.7. DEDICATED WASTEWATER PUMP STATIONS

- 4.7.1.** Pump stations to be dedicated shall have a minimum required pumping rate of 22 gallons per minute (gpm) at peak diurnal flow and a minimum upstream contributory loading of 16,000 gallons per day (gpd).
- 4.7.2.** Pump stations not meeting this standard, shall be privately owned, operated and maintained. Such privately owned facilities and their contributing gravity systems shall be considered Satellite Systems of the JWSC requiring an agreement with the JWSC to discharge to the Public System.
- 4.7.3.** Any future consideration by the JWSC to accept Public ownership of a privately owned facility shall be precedent upon such facility's adherence to this Standard or upgrade to this Standard.

4.8. PUMP STATION TYPES (Intended for Public Ownership)

- 4.8.1. Low Flow**
Low Flow pump stations shall be defined as those facilities whose loading requires pumping capacities between less than 80 gpm. These facilities are intended to serve limited areas where the service area cannot be expanded, and wastewater service cannot be otherwise provided by on-site (septic) systems or low-pressure systems capable of discharging to Public gravity. Such facilities, where approved, shall be grinder pump duplex stations meeting all criteria of this Standard.
- 4.8.2. Standard Pump Stations**



- 4.8.2.1.** Standard Duplex pump stations shall be defined as those facilities whose loading requires pumping rates between 80 gpm and 749 gpm.
- 4.8.2.2.** Standards Triplex pump stations shall be defined as those facilities whose loading requires pumping rates between 750 gpm and 3,000 gpm. Triplex facilities shall be flow proportional and be equipped with an automatic standby power generator.
- 4.8.2.3.** Standard Quadraplex pump stations shall be defined as those facilities whose loading requires pumping rates greater than 3,000 gpm. Quadraplex facilities shall be flow proportional and be equipped with an automatic standby power generator.

4.8.3. Initial/Ultimate Pump Stations

Initial/Ultimate pump stations shall be defined as those facilities whose initial loading requirement is significantly less than the ultimate loading requirement as determined by a submitted and approved build-out plan, including future wetwell additions and property recorded on final plat.. Such facilities shall be designed to meet all criteria of this Standard.

4.8.4. Site Requirements

The property, on which the facility is constructed, is to include the influent manhole and all related pump station appurtenances.

4.8.5. Site Dimensions

- 4.8.5.1.** At minimum, parcel shall be sized and designed shown to accommodate future addition/replacement of wetwell.
- 4.8.5.2.** No site less than 30' X 30' shall be dedicated for public.
- 4.8.5.3.** Four (4) foot and five (5) foot diameter wet wells – minimum 30' x 30' (restricted to Low Flow Stations)
- 4.8.5.4.** Six (6) foot and eight (8) foot diameter wet wells – minimum 50' x 50'
- 4.8.5.5.** Ten (10) foot diameter and greater – minimum 60' x 60'
- 4.8.5.6.** Rectangular structures – minimum 60' x 60'
- 4.8.5.7.** Irregular sites and site sizes may be considered by the JWSC where atypical conditions exist.
- 4.8.5.8.** Site dimensions shall include provisions for any designed future wetwell additions or pumpstation improvements for planned future phases.

4.8.6. Fencing

- 4.8.6.1.** Fencing is required on all sites and shall be placed a minimum of 2-feet inside of all site property lines. The entrance gate shall be set back at least twenty feet from a public or private road in order to allow vehicles to pull off the road before opening the gate. Provide a 16 ft wide double leaf swing gate



with two 8 ft gate leaves or cantilever. No nose roller gates. All schedule 40 double, hot-dipped galvanized post and hardware.

4.8.6.2. All fencing fabric shall be commercial/industrial grade aluminum coated (aluminized) steel meeting ASTM A491, Tension wire shall meet ASTM A817 for metallic coated wire used in chain link fencing. Fencing is to be installed per ASTM F567. Fabric shall be black vinyl clad at the discretion of the JWSC.

4.8.6.3. Where aesthetics is a concern, the fencing fabric may be interwoven with vinyl stripping or covered with appropriate screening fabric to obscure the site from public view. Other styles of screening may be approved by the JWSC based on site, application and maintenance requirements.

4.8.7. Site Access, Ground Cover and Drainage

4.8.7.1. The entire site shall be covered with a geotextile filter fabric covered with 6-inches of compacted crusher run (GAB) stone. Stone shall be clean with no soil or foreign material present.

4.8.7.2. The graveled area shall be treated with a high quality, long lasting, EPA environmentally approved weed killer.

4.8.7.3. Site shall be serviced by a 12' wide all-weather road with top of road above the two year flood elevation.

4.8.7.4. Drainage structures and conveyances shall not be allowed, and no catch basin shall be located within the pumping station site. The entire site shall be graded such that storm water runoff sheet-flows outwards and away from structures and other appurtenances and into proper drainage channels.

4.8.7.5. No site shall be located within the backwater of any lake, pond, ditch, canal or other water body without such flood level being taken into consideration by raising the site grade, the structure openings or providing watertight structure hatches above such backwater levels. The 25-year flood elevation shall be the governing factor if backwater levels are not historically available or known.

4.8.7.6. Pump stations shall be designed and located on the site to minimize the effects resulting from odor, noise, and lighting.

4.8.7.7. Where the location of the facility would require backing onto a public road to leave the site an area along the access or at the facility gate shall be wide enough to provide a service vehicle turnaround.

4.8.7.8. Any proposed on-site landscaping or specialized ground cover being considered to improve the aesthetics of the site or block the site from view shall be approved by the JWSC. No trees will be permitted within the property boundary.

4.8.8. Site Electrical Power



- 4.8.8.1.** All power lines within the site shall be underground. No overhead power line will be allowed to cross the site.
- 4.8.8.2.** All facilities shall be served with Minimum 230v three-phase power. If three-phase power is not available, the Design Engineer shall submit a copy of written communication from the commercial power provider stating at what cost three-phase power would be available. In cases where pump station location has been optimized for both elevation and power supply and providing three-phase power costs are disproportionally high, variable frequency drives (VFD's) will be considered to operate the three phase motors. Prior written approval will be required from the JWSC to utilize single-phase power. Add-a-phase units are not allowed.
- 4.8.8.3.** A facility yard light and pole shall be provided for night operations and security purposes. The light shall be a 120V LED floodlight pointed at the control panel. The light shall be placed on a switch with a dusk to dawn switchable timer capable of illuminating the facility on a selectable periodic basis. The switch and timer shall be housed in a weather-proof enclosure on the light pole. The light pole shall extend a minimum of 12 feet from grade with the light fixture mounted within one foot of its top for maximum coverage.

4.8.9. Facility Water Supply

- 4.8.9.1.** The facility shall be provided with a 1- inch water service line for clean-up use and testing.
- 4.8.9.2.** The water service line shall be protected with the installation of a reduced pressure backflow assembly installed within the fenced enclosure. The RPZ shall be in accordance with the JWSC Standard Construction Specifications.
- 4.8.9.3.** Where requested by the JWSC, the backflow preventer piping shall be provided with a 4-20 milli-amp pressure transducer to sense area potable water pressures.
- 4.8.9.4.** The water service line shall incorporate a frost-proof yard hydrant. Yard hydrants are to be stainless steel and have locking capability.
- 4.8.9.5.** Water meter will be required for water use at pump stations.
- 4.8.9.6.** Install fiberglass insulation Hot Box.

4.8.10. Facility Bypass Pumping Connection

- 4.8.10.1.** A facility bypass pumping connection shall be provided in accordance with the JWSC Standard Details.
- 4.8.10.2.** The facility shall be provided with an external connection to the force main serving the station for use during emergency and maintenance situations.
- 4.8.10.3.** The bypass connection shall be sized to the diameter of the main pumps discharge line and be set downstream from the isolation valves of the main pump piping header.



- 4.8.10.4.** The bypass connection shall be provided with a plug valve, set on the underground horizontal run to the bypass connection plug valve laid on horizontal to avoid sediment in the stem, and a CAM Lock with cap set on the aboveground horizontal run to the pump connection point.
- 4.8.10.5.** The bypass connection shall be placed and oriented on the site to facilitate the setting of a bypass pump between the influent manhole and the bypass connection. Suction line in wetwell preferred.
- 4.8.10.6.** The bypass connection shall be provided with a 3'x3'x6" concrete slab base. (When not using a by-pass pump slab.)
- 4.8.10.7.** The point of attachment to the bypass connection shall be oriented horizontal and not protrude above its concrete slab more than 3 foot.
- 4.8.10.8.** The bypass connection piping and fittings shall be epoxy lined "Sewer-Safe" D.I.P. with exterior coating the same as the pump station discharge header piping. HDPE or stainless inside the wetwell.

4.8.11. Facility Elevation Benchmark

A Standard Brass Benchmark shall be set into the wet well slab top with the NAVD88 Mean Sea Level Elevation stamped on the face of the benchmark by a Georgia Registered Land Surveyor. An alternate location for the benchmark may be approved where structure configuration is non-conductive.

4.9. WETWELL CONFIGURATION

4.9.1. Size and Depth

- 4.9.1.1.** Depth, as measured from the wet well rim to the lowest point of the sump, shall be set by the gravity system.
- 4.9.1.2.** The minimum circular wetwell diameter shall be 6 feet; (surface area 28sf), for all but low flow stations for which wet well diameters of 5 feet shall be used.
- 4.9.1.3.** The minimum rectangular wetwell dimensions, where approved for special applications where wetwell depth is critical, shall be 6 feet by 6 feet or other dimension providing an equal or larger surface area; (surface area 36sf)
- 4.9.1.4.** Where the JWSC has approved a facility having an initial and an ultimate flow design, the wetwell shall be sized for the ultimate pump rate whereas the storage height (and consequent level control settings) shall be established on the initial pump rate. The level settings shall be as stipulated in Paragraph 1.2 of this Standard.

4.9.2. Piping and Equipment Layout

- 4.9.2.1.** All wetwell inverts and pump intake sumps shall be configured to provide self-cleaning characteristics. Water surface levels at low water level shall be minimized to allow



- the removal of debris before the pump loses prime during a manual maintenance pump-down by operators.
- 4.9.2.2.** The wetwell shall have only one influent line with its invert set 0.5 feet above the "Lag Pump-Off" elevation, and it shall enter the wetwell coplanar, (aligned parallel and in-line), with the pump discharge lines in accordance with the JWSC Standard Details.
- 4.9.2.3.** The wetwell inverts shall be sloped downward from the top of the submersible pump motor toward the wet well pump sump. Flat areas for pump connection discharge elbows shall be eliminated or sloped with coated grout materials as much as possible to shed debris (See the JWSC Standard Details).
- 4.9.2.4.** The wetwell pump sump geometry shall provide for the required spacing between pumps, sump walls and floor as required by the manufacturer while simultaneously minimizing the water surface area at the "lowest" water level (top of pump) to allow the vortex to engulf floating solids quickly before the pump loses prime during periodic cleaning cycles in manual operation.
- 4.9.2.5.** The wetwell shall be provided with appropriately placed adjacent sleeves, 24 inches below finished grade, for access of the power and control conduits. The sleeves shall be of proper size to accommodate all necessary power and control conduits. Minimum 2" schedule 40. Each cable gets an independent sleeve.
- 4.9.2.6.** Where the design flow of the station requires a pressure transducer for level control, an additional sleeve shall be required. It shall be placed 24 inches below finished grade and centered between the discharge legs. The sleeve shall be 2-inch diameter. (See JWSC Standard Details).
- 4.9.3. Ventilation**
- 4.9.3.1.** The ventilation for the wet well shall be designed as a passive gravity ventilation system where the air volume in the wet well is either increased or decreased as the wastewater level fluctuates due to inflow and outflow. The passive ventilation shall be sized to vent at a rate equal to the maximum pumping rate of the station, not to exceed maximum permissible design airflow through the vent pipe of 600 feet per minute (fpm). Passive "gooseneck" vents shall be turned down so that the opening faces the top slab of the wet well.
- 4.9.3.2.** The minimum allowable passive vent diameter shall be 4 inches. Stainless steel screens shall be required to prevent birds and/or insects entry into the wet well. The vent shall be placed diametrically opposite of the control panel. Vent piping shall be 304 stainless steel.
- 4.9.3.3.** Gooseneck must be sized to accommodate appropriately sized carbon canister and flange (ANSI).



4.9.4. Access Hatches

- 4.9.4.1.** Access hatches shall provide the required clear opening for pump removal and be set in the concrete top to allow the pump to be removed through the approximate center of the hatch.
- 4.9.4.2.** Pump access covers shall be suitably sized to provide adequate clearances for installation and removal of the pumping units.
- 4.9.4.3.** Hatches should be sized for the ultimate pump design. The access hatch should be designed for a minimum width of 36-inches or 6-inches beyond the manufacturer's minimum required width, whichever is greater.
- 4.9.4.4.** The minimum hatch length should be 48-inches for standard duplex stations and 96-inches for triplex stations or the sum of the pump width, centerline pump separation, plus 12-inches, whichever is greater.
- 4.9.4.5.** Low Flow Station hatches shall be sized to adequately remove the pumps and shall not be required to adhere to the minimum requirements.
- 4.9.4.6.** Fall protection shall be of aluminum grate configuration, mounted within all wet well hatch openings and operate independently of the hatch lids.

4.10. PRECAST CONCRETE STRUCTURES

4.10.1. Materials

- 4.10.1.1.** WET well and related structures may be precast concrete or fiberglass and shall meet the requirements of the JWSC Standard Construction Specifications.
- 4.10.1.2.** GDOT minimum specifications.

4.10.2. Influent Manhole and Wetwell Influent Line

All pump stations shall be equipped with only one influent line to the wetwell to serve as an approach pipe to the self-cleaning wet well pump sump, and one influent manhole to facilitate bypass pumping.

4.10.3. Influent Manhole

- 4.10.3.1.** The influent manhole shall be located within the fenced pump station enclosure area or extension thereof and placed on the same side of the wetwell as the bypass pump connection. The horizontal distance between the wet well and the influent manhole shall be the greatest possible horizontal distance within the confines of the site; however, at a minimum the horizontal distance shall be one foot of horizontal separation for every vertical foot of wet well depth to avoid taking both structures out if construction work on either is necessary in the future.



4.10.3.2. All influent manholes shall be inside drop manholes with the influent line being a minimum of two (2) vertical feet above the manhole invert to provide a nominal pumping range during bypass operations. The influent manhole shall be 5-foot in diameter minimum. Where a wetwell diameter less than the 6-foot minimum is approved, the influent manhole may be 4 foot in diameter.

4.10.3.3. The corrosion protection on the influent manhole shall be the same as that required on the wetwell at the site. The manhole frame & cover on the influent manhole shall be a JWSC Standard 32-inch composite frame & cover.

4.10.4. Wetwell – Influent Line

4.10.4.1. To reduce wetwell turbulence caused by cascading influent that results in odor/corrosion problems and air entrainment, and to provide wet well structures that are in large degree self-cleaning, and to ensure a reasonable time period of free flow through the gravity influent line & manhole to develop self-cleansing velocities, The effluent line from the influent manhole to the wet well shall meet the following conditions:

- Enter the wetwell 0.5 feet above the “Lag on elevation,
- Be at least one nominal diameter larger than the largest diameter influent line coming from the basin gravity sewer system
- Be sloped no greater than the minimum for the diameter.
- Be sloped no less than needed to provide self-cleansing velocity at the facility design pump rate.

4.11. WETWELL AND DISCHARGE HEADER PIPING

4.11.1. Interior Piping

4.11.1.1. All interior wetwell discharge piping shall be:

4.11.1.1.1. Schedule 40 Flange by Flange stainless steel (304) or,

4.11.1.1.2. IPS DR 11.0 (160 psi) Flange by Flange High Density Polyethylene (HDPE)

4.11.1.1.3. All nuts, bolts and accessories within the wet well shall be 316 Stainless Steel

4.11.1.2. Each discharge leg shall be one continuous pipe joint.

4.11.2. Exterior Piping

4.11.2.1. All pipe and fittings inside the valve pit and above ground shall be:

4.11.2.1.1. Class 53 Flange by Flange Ductile Iron Pipe (DIP), epoxy lined “Sewer-Safe”.

4.11.2.1.2. Above ground pipe, fittings and valves shall receive an exterior coating. All header discharge piping, fittings and valves shall be constructed approximately three (3) feet above grade and horizontal to the top of the wet well.



4.11.2.1.3. Support the header discharge assembly using adjustable pipe stands. The strength and number of pipe stands may vary depending on header length and weight.

4.11.2.2. Interior and exterior piping to be sized so fluid velocity does not exceed 5.0 feet/second.

4.12. VALVES AND APPURTENANCES

4.12.1. All pump station pumps shall be equipped with:

- isolation valves
- check valves
- discharge gauge fittings on all discharge headers installed by tapping saddle and 316 stainless fittings.

4.12.2. The common manifold header for the pumps shall be equipped with:

- air release valves
- plug valves to isolate the entire pumping system from the serving force main

4.12.3. Isolation (Plug) Valves

Pump Station isolation valves on submersible pump installations shall be Plug Valves mounted with the stem horizontally on the discharge header.

4.12.4. Check Valves

Pump Station check valves on submersible pump installations shall be swing check valves mounted horizontally on the discharge header. External arm W/ lever & weight.

4.12.5. Air Release Valves

Pump Station Air Release Valves on submersible pump installation discharge headers shall be single function air release type valve placed on the discharge header manifold piping upstream of the manifolds station isolation valve on the common header.

4.12.6. Discharge Gauge Fittings

4.12.6.1. Discharge Gauge fittings shall be installed on the discharge header pipe of each submersible pump.

4.12.6.2. The gauge fitting shall be installed on discharge header pipe a minimum of six (6) inches upstream from each pumps check valve.

4.12.6.3. The gauge fitting shall have an isolation ball valve and tapping saddle W/ 316ss fittings.

4.13. PUMPING EQUIPMENT

Pump station pumps shall be submersible pumps and shall meet the following requirements.

4.13.1. General Requirements:



- All pumps designed and selected shall be within +/-20% of the best efficiency point of the pump. When possible, the pump selection shall be made in the center of the family of curves.
- Where the JWSC has approved the station to be designed as an initial/ultimate facility, the pump's base elbow should be sized for the ultimate pumps. The pump manufacturer shall provide an adapter plate for the initial pumps.

4.13.2. Submersible Pumps

Submersible Pump installation shall be in accordance with the JWSC Standard Construction Specifications.

4.13.3. Grinder Pumps

Grinder Pumps shall be required for Low Flow Stations and installation shall be in accordance with the JWSC Standard Construction Specifications.

4.13.4. General

All wiring shall meet the requirements of the National Electrical Code (Latest edition). All wiring outside the control panels shall be enclosed in rigid PVC conduit sized for 40% fill unless indicated otherwise. A separate conduit shall be used for each pump power cable sized for not more than 40% fill. Each conduit shall have at minimum a cord grip for single cables and a cord grip for multi strand cables if solid sheathed cable is not supplied. The opposite side for penetration into cabinet or box will have a receiving cord grip per cable to make new penetrations. This to insure least gas leakage as possible. The cord grip only pertain to the conduits leading from the wet well only. Interconnecting conduit can be solid runs from panel to panel.

4.13.5. Electrical Service

4.13.5.1. The pumping station incoming service shall consist of type THW or XHHW multi conductor tray cable to protect more against scrapes and moisture due to the wet conditions underground in our areas of use made up of correct amp rated copper conductors in rigid PVC conduit installed a minimum of (36) inches below final grade. Overhead service within the pump station limits is not allowed. Electric service shall be sized as required by ultimate station electrical loadings but shall be minimum of 200 amp.

4.13.5.2. Electric service shall be routed within public rights-of-way, or if approved due to special considerations, within dedicated easements. Preliminary Record Drawings documentation shall include a diagram indicating actual routing from utility transformer/s to station meter and to control panel.



- 4.13.5.3.** If overhead service, an electrical pole shall be set outside of the pump station fencing then installed underground within the pump station's fenced enclosure.

4.13.6. Control Panel Connections

- 4.13.6.1.** The power line and each motor line shall enter the bottom of the motor control panel separately and each in SCH 40 PVC sized as per National Electric Code. Each line shall travel directly from motor control panel to the pump motors and contain only one pulling 90-degree elbow at the base of each panel/box. Each conduit shall have at minimum a cord grip for single cables and a cord grip for multi strand cables if solid sheathed cable is not supplied. The opposite side for penetration into cabinet or box will have a receiving cord grip per cable to make new penetrations. This is to insure minimal gas leakage. The cord grip only pertains to the conduits leading from the wet well only. Interconnecting conduit can be solid runs from panel to panel.

- 4.13.6.2.** The motor control panel and service shall be grounded per NEC Article 250 and utilize a minimum of 3 grounding electrodes at least 20 feet apart and eight (10) feet deep. The neutral conductor shall not serve as the grounding conductor to the main breaker panel. A separate conductor shall be used for this purpose. Grounding system shall be copper clad coated and buried above the vapor barrier and below the gravel to prevent a trip hazard. Each connection shall be thermally connected to each ground rod. No mechanical methods are authorized.

4.13.7. Electrical Equipment and Controls

Controls shall be compatible with pumps supplied meeting both pump manufacturer requirements and the minimum standard below. Pump supplier shall assume sole source responsibility for pumps and controls:

- 4.13.7.1.** All pumpstations shall be designed for and around 480Volt, 3-phase Wye primary voltage. Unless otherwise supporting information provided from GA Power, we will require written notice of use of any other voltages and phasing.
- 4.13.7.2.** 230/208Volt and all single-phase services will need to be submitted to JWSC along with reasonable proof and cost as to why 480Volt, 3-phase Wye service is not available. Discretion as to final is sole responsibility of JWSC.
- 4.13.7.3.** Pump Stations with 10 HP or higher will be required to use at minimum Soft Starting devices, and 20 HP or above will require VFD (Variable Frequency Drives). Sites with less than 10 HP will be submitted to JWSC for approval, along with the manufacturer specification for all HP ranges



- 4.13.7.4.** All motor and pump FLA and breaker sizes will follow guidelines for over-current protection based on NEC specification for the proposed motor at current voltage used.
- 4.13.7.5.** All service entrances shall be a minimum of 200 Amps, as in section F.1, Electrical Service.
- 4.13.7.6.** All devices for running capabilities shall be NMEA rated and sized corresponding to HP.
- 4.13.7.7.** All Services Should be at minimum of 200 Amps. As in section F. 1. Electrical Service.
- 4.13.7.8.** If the total is greater than 200 Amps, the service size shall be the same as the emergency and main breaker size.
- 4.13.7.9.** Where the JWSC has approved an initial/ultimate station, the main and emergency breakers, as well as service size shall be designed for ultimate design conditions.
- 4.13.7.10.** Starters shall be sized corresponding to the NEMA ratings.
- 4.13.7.11.** If the JWSC has approved the station to be designed as an initial/ultimate station, the starters shall be sized for the ultimate pumps with a note added to the drawings stating: "Heater coil sized to protect the initial pumps".

4.13.8. Submersible Pump Station Motor Control Center

Submersible pump station Motor Control Center (MCC) shall be constructed in accordance with UL 508A requirements for enclosed industrial control panels and shall bear the UL 508A serialized label.

4.13.9. Enclosures shall be configured with the following features:

- Minimum submersible pump station Motor Control Panel shall be forty-eight (48) inches high, thirty-six (36) inches wide and twelve (12) inches deep.
- NEMA 4X rated drives from preferred manufacturers used in conjunction with a high and low voltage, 304 stainless steel distribution panel rated for outdoor usage.
- NEMA 3R painted steel for use indoors, when installed in a room with ventilation to reduce the possibilities of gasses entering the Control Room.
- Minimum low flow submersible pump station enclosure size for Motor control Panel shall be thirty-six (36) inches high, thirty (30) inches wide and twelve (12) inches deep.
- All control components shall be housed in a NEMA 12/4x 304 stainless steel enclosures rated NEMA 12 with drip shield resulting in a NEMA 12/4 x rating. The enclosure shall have a single handle and a 3-point latch system with padlock feature (no keyed locking handles will be accepted.)
- The enclosure shall have a brushed finish and collar studs. The enclosure shall also have a 90-degree flanged lip where the outer door contacts the enclosure to make a more efficient seal.
- The enclosure shall have a hinged inner door(s) (dead front) fabricated from 0.125-inch-thick marine alloy grained aluminum.



The inner door shall have an adjustable latching mechanism to keep door firmly closed and shall be comprised of captive hardware. The inner door(s) shall have stainless steel hardware to secure the door open for service.

- The enclosure shall have a ten -gauge aluminum (mill finished), formed, removable sub panel.
- The enclosure and mounting system shall have devices to keep them open when service is being rendered. Mounting system to be as shown in the JWSC Standard Detail.
- Enclosures shall be sized to enable all breakers and controls to be located not more than six 6' 6" inches above grade or walkway. No less than 36" inches above finished surface/floor elevation.
- Construction of MCC III type panels shall have VFD manufacturer recommended cooling as part of overall panel construction. Preference to a NEMA 4X rated drive Danfoss Model with 10 Year Warranty. Mounted to Uni-Strut. Inside buildings the NEMA 4X is not required if it's a sealed building with Air Conditioning standard drives can be used but mounted on Uni-strut attached to the concrete or wall structures.

4.13.10. Panel Components:

- At a minimum, the panel shall consist of the following components:
- Motor Starter/Controller Preference on Soft Start for 5HP and up - one per pump
- Thermal Magnetic Circuit Breakers - one per pump
- Circuit breaker operators (thru inner door type) - one per pump
- Power Monitor – one (ABB True One level 4 display)
- Alarm Light 24 Volt- one
- 20A Duplex GFI Receptacle – two (one inside and one outside)
- Generator Receptacle using quick-connect twist lock one per phase and Manual Transfer - one (if not equipped with a generator set and automatic transfer switch along with Camlock quick connect. One per phase.
- Hand-Off-Automatic Selector Switch located on the RTU panel - one per pump
- Moisture Sensors can be located in remote box or inside SCADA panel- one per pump
- Thermal Sensors can be located in remote box or inside SCADA panel - one per pump
- Audible Alarm Device, 24 Volt, 90 db at 10 feet.
- Relays - six (8 pin 24volt control with matching sockets)
- Indicator Lights (LED Type) for "Run", "Seal Fail", and "Over Temperature" if required and not output to the SCADA panel - one set for each pump
- RTU Circuit Breaker
- Power Distribution Block
- Lightning Arrestor - one



- Elapsed Time Meter installed in SCADA panel- one per pump
- Thermostatically Controlled Panel Heater
- Control Transformer when 480 volt, 3-phase power is used externally mounted not internally rated at minimum of NEMA 3R.

4.13.11. Motor Starter/Controller

To extend the useful life of the pump station components including the pump and motors, one of the following 2 started/controllers is required for each pump/motor based upon the motor horsepower. A minimum 18 month warranty is required on all started/controllers (including VFD equipment). The warranty shall include materials or workmanship which does not conform to these specifications. Expectation of extended warranty offered to be purchased or extended by JWSC for up to 10 years.

- 4.13.11.1.** Type "one" (MCC I): 0-15 HP 208/230 VAC started across the line shall be protected at 300% of nameplate FLA (full load amperage), using NEMA motor starters. 10 HP and above soft start flow matching use VFD, and Preference for Soft Starts down to 5HP.
- 4.13.11.2.** Type "two" (MCC II): 26 HP and above 460/480 VAC, requires variable frequency drives with NEMA 4X rating for outdoors and Standard if in applicable indoor cooled room protected at 200 % of motor nameplate FLA.

4.13.12. Motor Starters (MCC-I Only):

Motor Starters shall be NEMA rated Magnetic Motor Starter with solid state overload relay with lifetime coil warranty. Overload relay includes phase loss and phase unbalance. Device must be manufactured to ensure full voltage is applied to coil even at 85% of nominal eliminating contact chatter and premature contact failure. When lower than acceptable voltages are applied the motor starter will not start or will break the circuit to prevent contact chatter. Starters shall be mounted twelve (12) inches (minimum) from the bottom of the cabinet.

4.13.13. Variable Frequency Drive (VFD) Controllers (MCC II Only):

The Variable Frequency Drive shall be rated for input voltage. NEMA 4X rating mounted on Unistrut. The variable frequency drive shall be microprocessor-based control for three phase induction motors. The VFD's shall be Pulse Width Modulated (PWM) design. Insulated Gate Bipolar Transistors shall be used in inverter section. Bipolar Junction Transistors, GTOs or SCRs are not acceptable. The VFD's shall have efficiency at full load speed that exceeds 97% for motors over 40HP. The VFD's shall limit harmonic distortion onto the utility system to a voltage and current level as defined by IEEE 519 for general systems applications, by using the standard 3% nominal impedance integral ac three phase line reactor. Drives meeting IEEE



519 rating with internal hardware are accepted not needing external line reactor unless requested by GA power.

4.13.14. The system containing the VFD's shall comply with the 5% level of total harmonic distortion of line voltage and the line current limits as defined in IEEE 519- (latest version) If the system cannot meet the harmonic levels with the VFD provided with standard input line reactor or optional input isolation transformer, the VFD manufacturer shall supply a multiple bridge rectifier AC to DC conversion section with phase shifting transformers for all drives above 100 horse power. The multiple rectifier converters shall cause multiple pulse current waveforms that will more neatly approximate a true sine wave to reduce voltage harmonic content on utility line. Harmonic filters are not acceptable above 100HP. The device shall be capable of communicating with JWSC approved programmable logic controller with Modbus RTU or approved protocol communication link not optional. The VFD's shall be mounted a minimum of twelve (12) inch from any interferences or bottom of cabinet.

4.13.15. Thermal Magnetic Circuit Breakers

- 4.13.15.1.** Protector operators are to be quick make, quick break and trip free. The thermal and magnetic elements shall operate independently, and multiple pole breakers be designed with common trip bar breaking all poles when a fault is received on any pole.
- 4.13.15.2.** All "Normal Main" breakers shall be minimum "E" frame. "E" frame circuit breakers shall contain a self-test "Trip Selector" permitting a mechanical simulation of the over current tripping device and shall be rated a minimum of a 460 Volt @ 14 KAIC for 240 Volt systems and 600 Volt @ 18KAIC for 460/480 Volt systems. The use of Q-frame breakers is not acceptable.
- 4.13.15.3.** All "Emergency Main" breakers shall be minimum "E" frame. "E" frame circuit breakers shall contain a self-test "Trip Selector" permitting a mechanical simulation of the over current tripping device and shall be rated a minimum of 460Volt @ 14KAIC for 240 Volt systems and 600 Volt @ 18 KAIC for 460/480 Volt systems. The "Emergency Main" breaker current rating must be equal to or less than the current rating of the generator receptacle. The use of Q-frame breakers is not acceptable.
- 4.13.15.4.** All "Pump" breakers shall be minimum "E" frame. "E" frame circuit breakers shall contain a self-test "Trip Selector" permitting a mechanical simulation of the over current tripping device and shall be rated a minimum of 460 Volt @ 14 KAIC for 240 Volt systems and 600 Volt @ 18 KAIC for



460/480 Volt systems. The use of "MCP", Motor Circuit Protectors or Q-frame breakers is not acceptable.

4.13.15.5. All "Control" breakers shall be rated for 120/240 @ 20 KAIC (Q Frame).

4.13.16. Circuit Breaker

Each circuit breaker shall be mounted with breaker handles extending through the dead front panel door.

4.13.17. Audible Alarm

A horn shall be provided and shall sound upon high level at 90db at ten (10) feet rated at 24volts. A silenced push button shall be mounted on exterior right side of SCADA cabinet to energize a relay to disconnect the horn when pressed. Horn will be wired to allow remote silencing via the local RTU and radio link.

4.13.18. Alarm Light

A red alarm light shall be provided rated at 24volts and LED light source and shall be mounted remotely in approved location per job site based on ease of sight to local road.

4.13.19. Duplex GFI Receptacle

Two GFI duplex receptacles shall be provided, one to be mounted on the appropriate weatherproof enclosure and the other to be mounted on the outside bottom right hand side of the cabinet. The receptacle face shall be flush with front of Low Voltage electrical cabinet and be supported as required by NEC. The receptacles shall be rated 20 amps, 125vac.

4.13.20. Generator Receptacle

When a generator set is not installed on the site, a generator receptacle shall be installed inside of an approved panel to allow access for cam/ twist lock connectors per phase. The ability to lock panel or close lid after making connection required. Sized according to minimum rating for 200 amps.

4.13.21. Manual Transfer Switch

If Automatic Generator is not specified, a manual transfer switch shall be provided with one normal power circuit breaker and one emergency power circuit breaker interlocked mechanically to prevent both breakers from being closed at the same time. The emergency breaker will be fed from the generator receptacle. Panel manufacturer is to size breaker and receptacle per facility requirements.

4.13.22. Hand-Off-Automatic Selector Switches



A three-position selector switch shall be provided for each pump and be mounted on the inner door of SCADA panel. The switches shall be heavy duty 30mm devices.

4.13.23. Moisture Sensors

The panel shall be equipped with moisture sensing relays for each pump energizing red status indicator lights mounted on the dead front and send a signal to the PLC. Relays shall disconnect control power to the pumps and will be controlled by SCADA. Panel Indicator lights shall remain energized until manually reset. Lights are not required if using VFD and not using the cabinet design, Sensor can also be located inside the SCADA panel dependent upon JWSC preference.

4.13.24. Heat Sensors

The panel shall be equipped with heat sensing relays for each pump energizing red status indicator lights, mounted on the dead front and send a signal to the PLC. Relays shall disconnect control power to the pumps and will be controlled by SCADA. Indicator lights shall remain energized until manually reset. Lights are not required if using VFD and not using the cabinet design, Sensor can also be located inside the SCADA panel dependent upon JWSC preference.

4.13.25. Power Monitor

4.13.25.1. A power monitor relay shall be installed and connected to the control circuits. When the power to the RTU is deactivated, it shall disconnect control power from the motor starters and open the 24vdc monitor circuit to the RTU and shall have a dedicated set of contacts to provide input for the RTU. The power monitor relay shall be deactivated if any of the following two conditions occur and shall have a dedicated set of contacts to provide input to RTU.

- Phase loss (single Phasing) when one Phase line drops to 85% of nominal voltage.
- Low voltage (brown out) when all three Phases voltage drop to 85% or less of nominal voltage.

4.13.25.2. Usage of Power Quality Motor Management Relay SEL- 849 Used in place of standard phase monitor Relay. Installed as per Specs and Integrated into SCADA accordingly. For 20 HP and above or per JWSC.

4.13.26. Relays

All relays shall be large ice cube style case and be 2 poles double throw octal type relays for all 120 volt applications. Relays must be standard 8 pin octal type relays with contacts rated 10 amps @ 24VAC. Relays are to have internal LEDs and test push button as standard. Matching 8 pin sockets shall be supplied. In use of single pole double throw and in



some instances a Phoenix Contact Small Form Factor Relay is to be used. For lower amp rated applications. JWSC to specify.

4.13.27. Indicator Lights

All indicator lights shall be built into the SCADA panel.

4.13.28. RTU Circuit Breaker

RTU shall be powered through a 20 ampere circuit breaker "Q" frame.

4.13.29. Power Distribution Block

Power distribution block with touch safe cover shall be provided, sized for 600 volt, 175 amps minimum. The power distribution block shall have a flammability rating of UL 94V-0 and shall be based upon NEC. Power block shall be Bussmann 16 series.

4.13.30. Lightning Arrestor

Any Secondary arrestor must follow the manufacturer's instruction for proper installation and meet or exceed ANSI-C62.11 & NEC 285.

4.13.31. Elapsed Time Meters

Time Meters are to be installed on the dead front panel of the SCADA RTU cabinets and meet all NEC and UL, ANSI codes.

4.13.32. Level Control Systems

4.13.32.1. Pump station level control systems shall be either floats or Level Transducer in accordance with the following guidelines:

4.13.32.1.1. All Low Flow pump stations with a design pump rate between 22 gpm and 79 gpm shall be float controlled.

4.13.32.1.2. All Standard Duplex pump stations with a design pump rate between 80 gpm and 349 gpm shall be float controlled; Unless otherwise noted by JWSC staff to be used in accordance with Flow matching

4.13.32.1.3. All Standard Duplex pump stations with a design pump rate between 350 gpm and 749 gpm shall be Level Transducer controlled, with the exception of the Audio/Visual High Water Alarm system, which shall be by float; With Backup float controller backup unit installing all floats needed for design

4.13.32.1.4. All Triplex, Quadraplex and Initial/Ultimate pump stations shall be Level Transducer controlled, except for the Audio/Visual High Water Alarm system, which shall be float controlled. With Backup float controller backup unit installing all floats needed for design

4.13.32.1.5. Vega Pulse C21 Radar Unit installed from hanger into 2" conduit for radar cable, 18"X18" from exterior wet well wall, to allow for least interference. Accounting for pump location, incoming flow, and any other devices inside wetwell.



4.13.32.1.6. Radar unit to be installed with minimum depth of wet well, along with minimum measurement angle of radar.

4.13.32.1.7. Level Control: Floats, where required, shall activate when switch is horizontal and deactivate when liquid level drops below the activation elevation. The float shall have a chemical resistant polypropylene casing with a firmly bonded electrical cable protruding. One end of the cable shall be permanently connected to the switch with the entire assembly encapsulated to form a completely watertight unit. The float shall be mounted from above on a 316 Stainless Steel hanger.

4.13.33. Control Transformer

Control transformer shall be 480 Volt Primary, 120 Volt Secondary, sized as necessary to carry all connected loads. Always externally mounted to wall or uni strut with at Minimum NEMA 3R rating painted steel and never installed inside control cabinet.

4.13.34. Control Wiring Identification

4.13.34.1. All wiring shall be color coded sized as follows:

- 120 VAC (Un-switched Hot) #12 AWG Black Tin Coated
- 120 VAC (Dry Contacts) # 12 AWG Red Tin Coated
- 120 VAC (Neutral) # 12 AWG White Tin Coated
- 120 VAC (Switched Hot) # 12 AWG Red Tin Coated
- 24 VDC + # 16 AWG Blue Tin Coated
- 24VDC - # 16 AWG White W/ Blue Strip Tin Coated

4.13.34.2. Control Wiring shall be numbered or lettered at each end. Wire numbers/letters shall be Pass & Seymour "Legrand" or JWSC P&CD equal. Preference for Labels to site name unless number convention used matches As built wiring diagrams.

4.13.35. Wire Duct

All wiring shall be routed through a wiring duct system to provide protection and an organized appearance. Duct sizing schedules and mounting plans are to be approved by the JWSC.

4.13.36. Terminals

Terminals shall be provided for interface with field installed equipment. The terminal blocks shall be mounted on a 30-degree angle for ease of field connection. Unless not need for access. Phoenix Contacts terminals are only preference unless otherwise approved by JWSC.

4.13.37. Nameplates

All components shall be labeled using engraved bi-color layered plastic name plates. The nameplate shall be a laminated two-part system using black letters on a white background providing protection against fading, peeling or warping. The labeling system shall be computer



controlled to provide logos, post-script type or custom designs. The uses of laminate or plastic engraved legend plates will not be accepted.

4.13.38. Mounting Hardware

4.13.38.1. All components shall be mounted using stainless steel machine screws. All mounting holes shall be drilled and tapped. The use of self-tapping screws shall not be acceptable.

4.13.38.2. UL Labels: The entire control system shall bear a UL 508 serialized label "Enclosed Industrial Control Panel". The use of the label "Industrial Control Panel Enclosure" without the UL508 serialized label is not acceptable.

4.14. Remote Terminal (RTU) - System and Panel

4.14.11. An approved manufacturer as listed in the Approved Materials Section of this Standard shall manufacture the remote terminal unit (RTU). The panel shall be constructed in accordance with UL 508A requirements for enclosed industrial control panels. SEL 2411P hardware will be used as the main controlling PLC for pump station applications.

4.14.12. General

4.14.12.1. Accommodations have been made to spec and build out a complete RTU panel using in house personnel trained on the proper use of protocols associated with the materials used to construct a fully operational RTU with all standards of the JWSC.

4.14.12.2. The component list will list all components and warranty reasons behind that use, all components have been used prior and or tested with in the environment to accommodate and keep in mind the issues we have in the field and environment.

4.14.12.3. The base function of the RTU shall be to monitor the status of and provide control of pump station pumps, and to provide historic data of facility operations.

4.14.12.4. RTAC 3505 minimum and MMR 849 Relays will be installed in critical locations as referenced by JWSC, usually minimally installed on all sites with VFDs installed.

4.14.13. Warranty

Warranty on system function and equipment shall be the standard warranty offered by the vendor, but not less than 2 years from the date of start-up. Warranty shall include any problems (to include lightning and other surges) which prevent satisfactory operation of the system. Warranty shall include, but not be limited to parts, labor and travel expenses.

4.14.14. System Requirements



- 4.14.14.1.** RTU's shall meet or exceed the following requirements:
- 4.14.14.1.1.** Each RTU shall incorporate the power supply, logic, memory, communications interface and input/output circuitry:
- Fused, user configurable, digital input/output
 - User configurable digitally scaled analog input/output.
- 4.14.14.1.2.** Each digital input/output shall be user configurable through either the host computer or local terminal; each must use a standard input/output module. The selected modules must provide the ability to use input signals up to 140VAC and 30VDC and provide output signals to the interface with control voltages up to 280VAC/60VDC.
- 4.14.14.1.3.** RTU shall be Driver and MODBUS programmable to existing SCADA or approved equivalent
- 4.14.14.1.4.** Communication Modem:
- Modems supplied shall be Verizon SEL 3061 and have the ability to use Verizon, and the use of VPN service provided by carrier to create a private network for the government sector. APN information to be received or available from staff of the JWSC.
 - Antenna and cable shall be selected to be compatible with the transceiver and be installed to deliver clear and reliable signals by approved manufacturer. No top penetrations to any cabinets are permitted. Cabling will need to accommodate and be able to reach both penetrations. With exception of the antenna.
- 4.14.14.2.** Contact points for all SCADA systems shall at a minimum provide Input/output functionality and relays for the following settings:
- Off level
 - Low level
 - Lead level
 - Lag level(s)
 - High level
 - Power fail (phase failure)
 - Pump run status (all pumps)
 - Pump fail status (all pumps)
 - Pump enable/disable
 - Wet Well Water level
 - Potable water system pressure
 - Alarm Horn Output
 - Alarm Light Output
 - Status of HOA
 - UPS alarm/ Power Supply Fault
 - Flow
 - VFD ref
 - Local Force Main Pressure.



4.15. EMERGENCY POWER

Pump stations with a design capacity of 1,500 gpm or greater shall be provided with a permanently mounted on-site generator set and automatic transfer switch or JWSC approved by-pass pump. Sized for peak flow. Pump stations with a design capacity less than 1,500 gpm shall be equipped with a generator Cam Lock receptacle for use with a portable generator. Generator receptacles, where applicable, shall be matched to accommodate the use of JWSC portable generators. Cam lock/Twist lock with one per Phase.

4.16. ON-SITE STANDBY GENERATORS & AUTOMATIC TRANSFER CONTROLS

4.16.11. On-Site generators shall be installed in accordance with NEC Article 702, Optional Standby Systems.

4.16.12. On-Site generators shall be sized by the manufacturer based upon the pump stations running electrical load and motor-starting requirements as specified by a Georgia Licensed Engineer, taking into consideration the characteristics of the generator and engine.

4.16.13. On-Site generators shall be sized, designed and capable of operating two pumps simultaneously on duplex and triplex facilities and three pumps simultaneously on quadra-plex facilities taking into account the pump motor starting sequence delay interval. The design shall allow for a maximum 20% voltage dip at motor start of the second or third pump while the originally started pump is in full operation. Where the facility includes differing motor sizes, the largest motor shall always be started first.

4.16.14. The generator shall be equipped with field-forcing equipment to sustain the rated excitation and current up to three times the generator's rated output. Downstream and generator circuit breakers shall be coordinated so that the branch circuit breaker trips first. An under-voltage relay shall be provided to trip breakers and shut down the engine if over current at less than full voltage occurs for a predetermined length of time.

4.16.15. On-Site generators shall be powered by a diesel fueled engine capable of supplying the shaft power required by the actual/required maximum load applied to the generator. The diesel fueled generator shall be provided with a UL 142 compliant above ground fuel storage tank or integral belly tank sized to provide a minimum of 24 hours of continuous run time based on full facility power requirements and loadings.

4.17. ENGINEER-GENERATOR CONTROLS

4.17.11. General controls shall include:

- Manual start/stop



- Auto/remote start
- Emergency stop
- Fault reset
- Remote start input active
- Fuel gauge
- Exercise function
- 3-Phase voltage regulator
- Fault history
- Output circuit breaker
- Output of Modbus RTU or JWSC approved communication protocol on each unit installed at any JWSC facilities.

4.17.12. Instruments for the engine shall include:

- Oil Pressure
- Coolant temperature
- Engine speed
- Engine running hours
- Number of starts
- Battery voltage

4.17.13. Safety controls for engine shutdown shall only be manually reset and shall include:

- Low oil pressure
- High engine coolant temperature
- Failure to crank shutdown
- Over crank (failure to start)
- High/low battery voltage/weak battery
- Over-speed
- Low fuel

4.17.14. Instruments for generator shall include:

- 3-Phase L-L and L-N voltage
- Frequency
- 3 Phase current
- Kilowatt hour
- Total kilovolt-amps

4.17.15. Safety control for generator shutdown shall only be manually reset and shall include:

- Under and over voltage
- Under and over frequency
- Over current and short circuit
- Reverse power

4.17.16. Instruments and controls shall be mounted on the generator control panel.



4.17.17. Actuating the safety devices shall shut-down the generator set, indicate the cause of the shut-down by lighting the appropriate indicating light, and provide separate outputs for the remote alarm indication panel and the computer.

4.18. AUTOMATIC TRANSFER CONTROLS/SWITCHES

4.18.11. Automatic Transfer Controls/Switches shall be provided and shall conform to all of the requirements of UL 1008 and be so listed and labeled; Bypass isolation switches that allow the ATS to be removed for repairs shall be provided:

4.18.11.1. Automatic transfer switches shall be ABB True One (Control Level 4) switches having the following ratings:

- Continuous rating.
- In-rush rating
- Load interrupting
- Thermal and Magnetic

4.18.11.2. Automatic transfer switches shall include a pause-in-neutral position with an adjustable time delay that causes the motor to be disconnected from the power source during transfer and allows the motor voltage to collapse to a safe level prior to re-energization. Automatic transfer switch position indicating panel shall include:

4.18.11.3. Starting batteries for the standby generator shall be wet cell lead-acid batteries having a cranking capacity adequately sized for the specific application.

4.18.12. Generator Set Enclosure

4.18.12.1. Generator Set enclosure shall be sound attenuated weather protective enclosure with the following features:

- Stainless Steel hardware.
- Compact footprint.
- Package listed to UL 2200.
- Fuel and electrical stub-up area within enclosure perimeter.
- Two or more recessed doors per side, depending on dimensions.
- Pad-lockable doors with weather protective seals.
- Enclosed exhaust silencer.
- Rain collar and rain cap.
- Access lifting points for spreader bars or forklift.
- Window for control viewing.
- Exterior oil and coolant drains with interior valves for ease of service.
- Sound attenuated 70 dB(A) at 23 feet (non-residential).

4.19. PUMP STATION TESTING

Each pump station shall be subjected to testing in accordance with JWSC Water and Wastewater Developmental Standards and Procedures.



4.20. PRIVATE PUMP STATIONS

4.20.11. This section delineates the minimum standards for wastewater pump stations intended for private ownership, operation and maintenance that will discharge to the publicly owned and operated gravity sewer systems or force mains of the JWSC.

4.20.12. These Standards shall encompass individual residential, single property service commercial, multi-service/multi-lot facilities that fall below the threshold for public ownership, and those facilities not "intended" for dedication by a documented "Notice of Intent" from the property owner to the JWSC.

4.20.13. General Requirements:

4.20.13.1. No Publicly owned and operated sanitary sewer system or pump station shall be permitted to discharge, directly or indirectly, to a privately owned and operated pump station.

4.20.13.2. All piping systems contributing flow to a private pump station shall be privately owned and operated by the facility owner and/or allowed by a documented agreement between the owners of contributing systems and the pump station owner. Such agreements shall establish the rights and responsibilities for operation and maintenance of the pump station and of the individual piping systems between the parties. The JWSC shall be provided with a copy of such agreement(s) prior to the payment of connection fees.

4.20.13.3. With the exception of individual residential and single property commercial pump stations, private pump station and sanitary sewer system owners shall be required to enter into a Satellite System Working Agreement with the JWSC prior to payment of connection fees to discharge to the public system.

4.20.13.4. Private Pump stations of capacities suitable for dedication to the JWSC that have not been designed and constructed in accordance with the Dedicated Pump Station Standards herein stated shall not be considered for public ownership until such facility is brought to the minimum current Standards for Dedicated Pump Stations. Exempted from this policy will be pump stations designed and constructed in accordance with City of Brunswick or Glynn County Standards at the time of installation and that are functioning properly.

4.20.13.5. The served property for a low pressure connection to the public force main shall be adjacent or contiguous to the publicly owned low pressure force main; the acquisition of an easement through private property to access a low pressure system force main that is not adjacent or contiguous to the property is the responsibility of the owner.



4.20.13.6. With the exception of Single Family Residential and Single Lot Commercial pump stations serving only one (1), water account customer, all private pump stations shall display a sign in a prominent location at the facility fitted to a post or enclosing fence. The sign shall identify the facility as a wastewater pump station, identify the owner and provide an emergency contact phone number after the phrase "In Case of Emergency Call". The sign lettering shall be large enough to be easily read from fifty (50) feet away with the lettering and sign made of durable weather resistant material.

4.20.13.7. All privately owned pumpstations will require submittal of an approved Satellite Systems Agreement prior to connection to the JWSC system.

4.21. SINGLE FAMILY RESIDENTIAL & SINGLE LOT COMMERCIAL PUMP STATIONS

4.21.11. Owner Responsibilities:

4.21.11.1. The individual property owner shall be responsible for the selection, purchase and installation of the on-site wastewater collection and transmission system to the approved point of connection to the public facilities.

4.21.11.2. Where an existing septic system is on the property, it shall be abandoned in accordance with Environmental Health Department Standards.

4.21.11.3. All on-site pumping systems shall be installed by a Georgia Licensed Master Plumber or Utility Contractor and permitted through the appropriate local Code Enforcement Department.

4.21.11.4. The property owner shall remain responsible for the operation, maintenance, repair and replacement of all on-site systems up to the point of connection to the public system.

4.21.12. System Components

4.21.12.1. The pump station (pumping system) shall include a holding tank, anti-floatation collars, grinder pump and electrical and controls. An alarm system that provides a light and audible signal when the water in the holding tank is above the normal operating range shall be provided.

4.21.12.2. The grinder pump shall be designed to handle the required flow rate (gpm) at the estimated backflow pressure (pressure head) for the individual application being considered.

4.21.12.3. The pump line (force main) from the pump station to the R/W or easement shall be, at minimum, 2 inch diameter PVC or HDPE pressure pipe. At no time shall a force main from a private pumping system lay within a public right-of-way without obtaining a road encroachment permit from the proper authorizing authority with a copy of which submitted to the JWSC with the connection application

4.21.12.4. When discharging to a public gravity sewer system, the pump line (force main) shall discharge to a gravity sewer system



manhole if the force main is connected to a public gravity main within a road right-of-way. If connecting to a gravity main from private property or through an easement, the private force main shall be connected to a sanitary sewer service line in accordance with JWSC Standards for Gravity Sewer Service connections. Requirements for corrosion protection as specified in Section 3 for manholes do not apply for discharge rates of 22 gpm or less.

- 4.21.12.5.** When connecting to a publicly owned and operated Low Pressure Force Main, the pressure line from the pump station shall connect to the Low-Pressure System Force Main stub-out provided for the property in accordance with the JWSC Force Main Connection Standards.
- 4.21.12.6.** A force main crossing of property not owned by the owner of the pump station to reach a public sewer system connection point shall require an easement from the owner of the property being crossed. Such documentation shall be filed with the JWSC along with the connection permit application.
- 4.21.12.7.** All on-site systems shall be inspected by a JWSC inspector prior to being placed in service.

4.22. MULTI-FAMILY MULTI-LOT AND/OR MULTI-USER COMMERCIAL STATIONS

4.22.11. Owner Responsibilities:

- 4.22.11.1.** The system owner shall be responsible for the selection, purchase and installation of the on-site wastewater collection and transmission system to the approved point of connection to the public facilities.
- 4.22.11.2.** The system owner shall remain responsible for the operation, maintenance, repair and replacement of all components up to the point of connection to the public system.
- 4.22.11.3.** The system owner shall be required to enter into a Satellite System Working Agreement with the JWSC prior to payment of connection fees to discharge to the public system.

4.22.12. System Components

- 4.22.12.1.** System shall be designed by a Licensed Georgia Professional Engineer to pump the design peak hourly flow with one pump out of service.
- 4.22.12.2.** System shall be designed and constructed in accordance with all applicable regulations and guidelines of the Georgia Environmental Protection Division.
- 4.22.12.3.** System shall have a minimum of 2 pumps with each pump being of the same capacity with the rated flow of each pump being as required for the estimated daily flow in gpm + a peaking factor per JWSC Standards.
- 4.22.12.4.** The pump line (force main) from the pump station to the point of connection to the R/W be, at minimum, 2 inch



diameter PVC or HDPE pressure pipe. At no time shall a force main from a private pumping system lay within a public right-of-way. Where a public gravity sewer main or manhole or low-pressure force main is not available contiguous to the property, the owner shall acquire easements through adjoining property or properties to the point of connection approved by the JWSC.

- 4.22.12.5.** When discharging to a public gravity sewer system, the pump line force main shall connect to a gravity sewer system service line draining to a manhole or gravity main in accordance with JWSC Standards for Gravity Sewer Service connections. Requirements for corrosion protection as specified in Section 3 for manholes do not apply for discharge rates of 22 gpm or less.
- 4.22.12.6.** When connecting to a publicly owned and operated Low Pressure Force Main, the pressure line from the pump station shall connect to the Low-Pressure System Force Main stub-out provided for the property in accordance with JWSC Force Main Connection Standards.
- 4.22.12.7.** A force main crossing of property not owned by the owner of the pump station to reach a public sewer system connection point shall require an easement from the owner of the property being crossed. Such documentation shall be filled with JWSC along with the connection permit application.
- 4.22.12.8.** All on-site systems shall be inspected by a JWSC inspector prior to being placed in service.

4.23. FORCE MAINS

4.23.11. General:

- 4.23.11.1.** Force mains shall discharge to sanitary sewer gravity system manholes at the manhole invert level in such a manner as to minimize turbulence and join the normal flow of wastewater through the manhole without disrupting or impeding other flow or flows entering or passing through the manhole. Where the discharge manhole has no other flows entering it, the force main discharge shall be directed straight through the manhole, through a properly constructed invert, into the manhole effluent line.
- 4.23.11.2.** No force main, with the exception as noted in section 4.6.2.2, System Components for Single Family Residential and Single Lot Commercial pump station and stations discharging less than 22 gpm), shall connect to a sanitary sewer manhole that does not meet the requirements for corrosion protection as cited in the Section 3 of these standards for the discharge manhole and downstream manholes.
- 4.23.11.3.** No force main shall be discharged to a sanitary sewer system unless such downstream gravity system has been verified by the JWSC to have adequate capacity to accept the discharge.



4.23.11.4. Force mains shall have isolation valves installed at 2,000 foot intervals beginning at the isolation valve installed at the pump station. Pump stations with force mains less than 2,000 feet to the point of discharge do not require isolation valves beyond the pump station.

4.23.12. Force Main Manifolds:

4.23.12.1. Other than in low pressure systems, force mains from proposed public or private pump stations may not generally be manifolded with existing publicly owned force mains. Where a manifolded system is recommended for a proposed pump station by the developer's or owner's engineer for consideration by the JWSC, hydraulic modeling will be required. Such modeling shall demonstrate velocities for all interconnected pipes within standard parameters as described in Section Force Main Size [this should be linked when formatting document] to be considered.

4.23.12.2. No force main from a private pump station shall be allowed to manifold with a public force main without documented agreement shown on the approved record drawing, or by written legally binding documentation submitted to the JWSC with the connection application by the owner, accepting responsibility for any private pumping system upgrades that may become necessary if the private pump station's ability to discharge into the public force main, due to changing flow conditions in the public force main were to occur, and/or for any damage or associated liabilities that may result as a failure of such public force main to accept the discharge from the private pump station.

4.23.12.3. Force mains from single-family residential or single lot commercial users shall only connect to publicly owned Low-Pressure System force mains at service connections provided at the property line or public right-of-way in accordance with these Standards.

4.23.13. Force Main Size:

4.23.13.1. The minimum size pressure sewer service lateral for single-family residential shall be 1 ¼" onsite to 1 ¼" integrated stainless-steel curb stop & check valve assembly.

4.23.13.2. The minimum size pressure sewer service lateral for single lot commercial shall be 2" onsite to 2" integrated stainless-steel curb stop & check valve assembly.

4.23.13.3. Force mains for a single facility use pump station discharging to gravity shall be sized for peak flow (required pump rate) at a minimum velocity of 2.5 feet per second (fps) with one pump running and a maximum velocity of 5.0 fps with both pumps running in a duplex station. For triplex or quadra-plex



facilities velocities shall not exceed 5.0 fps with two or three pumps running respectively. Minimum size pipe in R/W is 2".

- 4.23.13.4.** Force mains in manifolded systems, where approved, shall be sized as demonstrated by hydraulic modeling to provide a minimum velocity of 2.5 fps with the minimum of pumps operating as needed to handle the required pump rates of all connected facilities, (i.e. one pump in each duplex facility, two pumps in each triplex facility, three pumps in each quadra-plex facility), and to provide a maximum velocity of 5.0 fps with the maximum of pumps operating in each facility, (i.e. two pumps operating in a duplex facility, three pumps operating in a triplex facility, four pumps operating in a quadra-plex facility).
- 4.23.13.5.** With the exception of single-family residential, no public force main shall be smaller than two (2) inches in diameter in the R/W, while still meeting the minimum and maximum velocities in this standard.
- 4.23.13.6.** Where the JWSC has approved an Initial/Ultimate Pump station design concept and the parameters outlined above cannot be achieved with one force main, dual interconnected parallel force mains shall be used. The interconnection of such dual force main systems shall be designed and constructed with valving to provide the use of either force main individually or together simultaneously within required velocity and flow parameters.

4.23.14. Force Main Depth:

- 4.23.14.1.** Force mains shall be designed meeting minimum cover requirements of 48 inches with a maximum of 60 inches for open cut installs. Cover shall be measured from finished grade.
- 4.23.14.2.** Force main depths shall be designed to reduce or minimize the number of high points in the pipeline by varying the depth along the route as is reasonable to maintain a consistent pipe elevation. Changes in elevation which exceed two pipe diameters will require an air release valve or other as designated by the JWSC.

4.23.15. Force Main Location:

- 4.23.15.1.** Force mains shall be designed and constructed along the shoulder or within public rights-of-way on the opposite side from water mains.
- 4.23.15.2.** Force mains shall be designed and constructed within appropriately sized easements dedicated to the JWSC. Easements provided shall be maintenance vehicle and equipment trafficable all-weather easements.
- 4.23.15.3.** A horizontal distance of 3 foot minimum shall be maintained from all force mains to drainage structures, telephone duct



banks, electrical transformers, signal relays, power poles, and other structures in the right-of-way as well as any other parallel underground utility with the exception of water mains.

- 4.23.15.4.** Where force mains cross other underground utilities, with the exception of water mains, a minimum vertical separation of 18-inch shall be maintained. All distances shall be measured from the outside edge of the pipes. The vertical separation between force mains and other crossing utilities shall be filled with a suitable pipe bedding material and compacted or filled with flowable fill to prevent settlement, contact and potential pipe to pipe abrasion caused by the vibration of flow through the force main.
- 4.23.15.5.** Force main connections to manholes shall be cored and booted connections.
- 4.23.15.6.** Force mains shall not be constructed within or below open ditch bottoms unless crossing on a perpendicular. Where crossing open ditch bottoms, the forcemain shall be a minimum of 18-inches below the bottom of the ditch and encased in concrete for the full width of the ditch as measured across the top of ditch banks or full stick of ductile iron pipe casing.
- 4.23.15.7.** Force mains shall be located outside of paved areas except at roadway crossings.
- 4.23.15.8.** Sewer force main and water main separations shall be in accordance with Georgia EPD requirements and as follows:
- At crossings, pipe joints shall be as far as possible and equidistant from the point of crossing with the water main on top. Separation shall be measured from the outside edge of the pipe to the outside edge of the pipe. A full length of pipe must be centered at the crossing.
 - Alternatively, at such crossings, the pipes shall be arranged so that all water main joints are at least 6' from all joints in the sewer force main.
- 4.23.15.9.** Sewer force mains crossing major ditches, canals, streams, creeks and rivers shall be sub-aqueous crossings installed by horizontal directional drilling or other boring/tunneling method approved by the JWSC. Such crossings shall be provided with isolation valves on both sides of the crossing. Both sides of the crossing shall be treated as high points in the force main and have air release valves installed. The placement of isolation valves and air valves shall be a minimum of 15 feet horizontally away from stream bank tops. The crossing pipe shall be perpendicular to the stream. Aerial crossings and bridge attachments shall not be permitted. No sewer force main shall be designed or constructed under ponds, lakes, retention ponds or other bodies of water other than in crossings as described above. No sewer force main



shall be designed or constructed to lay closer than 20 horizontal feet from the top of the bank of any body of water noted in this article.

4.24. MATERIALS

4.24.11. Pipe:

Force main piping shall be fused joint DR 18 HDPE with butt fused joints; or, SDR 21 Class 200 PVC with elastomeric integral bell gasketed joints Where specifically approved by the JWSC for special conditions, interior coated CL52 DIP, with elastomeric push-on joints, mechanical joints, or flange joints may be incorporated into the Work.

4.24.12. Restrained Joints/Connections:

4.24.12.1. Force mains shall have mechanically restrained joints at changes in direction.

4.24.12.2. Force mains joints shall be mechanically restrained for a minimum of 100 l.f. downstream of pumpstation valving.

4.24.13. Fittings:

4.24.13.1. Horizontal and vertical directional changes in force mains shall be accomplished with bends of 45 degrees or less and properly restrained; no short radius 90-degree bends will be permitted.

4.24.13.2. All fittings on force mains shall be inside coated "sewer safe" mechanical joint ductile iron fittings properly restrained.

4.24.14. Valves:

4.24.14.1. Force main isolation valves shall be interior coated plug valves.

4.24.14.2. Isolation valve/check valve connections by a new or replacement force main to an existing force main shall be by cutting-in a mechanical joint wye fitting to discharge in the direction of normal flow. Wet tapping with a "T" connection will be permitted. Stainless flanged tapping sleeve.

4.24.14.3. Air release valves shall be 2-inch air release valve assemblies installed within sealed manholes. Air release valves shall be provided at all force main high points. On force mains discharging to gravity systems air release valves shall be utilized. The size, depth and configuration of the sealed Air Release/Vacuum vault shall be such as to allow the entry and work of maintenance personnel (See JWSC Standards Details).

4.24.15. Force Main Casings

4.24.15.1. Force mains crossings under major roads, railroads or other major obstructions shall be installed within a casing. Steel pipe, Ductile Iron pipe, Fusible PVC, or HDPE pipe is



acceptable for casing pipe if approved by the jurisdictional authority.

- 4.24.15.2.** Casing pipe interior diameter shall, at a minimum, be twice the outside diameter of the force main being encased, when casing spacers are specified by JWSC.

4.25. END OF SECTION



SECTION 5 WASTEWATER COLLECTION- PRETREATMENT

5.1. GENERAL INFORMATION

5.2. APPLICABILITY

5.2.1. Food Service Establishments

5.2.2. Maintenance and Service Facilities

5.3. DESIGN CRITERIA

5.3.1. Location

5.3.2. Capacity

5.3.2.1. GREASE INTERCEPTORS (PRECAST CONCRETE)

5.3.2.2. GREASE INTERCEPTORS (PRE-ENGINEERED)

5.3.2.3. OIL AND SOLIDS SEPERATORS (PRE_ENGINEERED)

5.4. END OF SECTION

5.1. General Information

The Wastewater Pretreatment Compliance Coordinator within the Joint Water and Sewer Commission (JWSC) has oversight and enforcement authority over and responsible for assisting in the implementation of Article II and Article III of the Water and Sewer Ordinances of the City of Brunswick and Glynn County, Georgia which include. This section provides the minimum guidelines for:

- 5.1.1.** The design and construction of Commercial Waste Handling (fats, oils, grease) grease interceptors and separators used to minimize the discharge of pollutants associated with commercial waste discharged into the sanitary sewer system which may interfere with the normal operation of said system; and,
- 5.1.2.** Pretreatment Standards and Enforcement.
- 5.1.3.** The method of design and/or construction shall be in accordance with accepted engineering practices,
- 5.1.4.** Facilities requiring grease interceptors, oil and sand separators will require an MEP plan submitted along with all construction submittals.
- 5.1.5.** In general, no carbon steel or fiberglass tanks or interceptors will be allowed.

5.2. APPLICABILITY

Grease interceptors and separators are required in accordance with the above referenced ordinances at the following locations and at other locations deemed necessary by the Wastewater Pretreatment Compliance Coordinator

5.2.1 Food Service Establishments

Facilities likely to discharge fats, oils and grease which are newly constructed, or existing facilities which shall be expanded or renovated to include a food service facility where such facilities did not previously exist. The facility shall be required to install an approved, pretreatment



device/interceptor. Pretreatment devices/interceptors shall be installed prior to the opening or reopening of such facilities. Likewise, existing commercial facilities shall be required to install an approved, pretreatment device/interceptor when any of the following conditions exist:

- Facilities that are found to be contributing fats, oils and grease in quantities sufficient to cause line stoppages or necessitate increased maintenance on the collection system
- Remodeling of the food preparation or kitchen waste plumbing facility
- Facility change of ownership or lease holder

5.2.2 Maintenance and Service Facilities

All maintenance or service facilities shall provide approved oil and solids removal equipment or facilities sufficient to meet the effluent limits set forth in the aforementioned ordinances. This also includes the remodeling of an automotive related enterprise, commercial laundry or other users that potentially may contribute wastes with petroleum-based oils, greases or lint.

5.3 DESIGN CRITERIA

Approved types of grease interceptors include either interior or exterior sealed concrete construction or pre-engineered package systems of steel or fiberglass construction. Any unit requiring the installation of an outlet filter shall have an approved sample port installed immediately outside the unit. Sanitary wastes shall not be routed through the devices.

5.3.1 Location:

5.3.1.1 For food service establishments, the best location for grease pretreatment devices/interceptors is in an area outside and adjacent to the facility and installed in ground to finished grade of surrounding surfaces. An alternative device and location will be evaluated on an individual basis for facilities when space limitations prohibit the installation of an in-ground unit, or when special conditions exist, such as highly variable flows, high levels of grease discharge, or other unusual situations that are not adequately addressed by the design formulas below.

5.3.1.2 Each grease pretreatment device/interceptor shall be installed and connected so that it is easily accessible for inspection, cleaning, and removal of the intercepted grease at any time whether the unit is installed outside in-ground or inside the facility.

5.3.1.3 For maintenance and service facilities the unit shall be located outside of any building and accessible for proper maintenance and inspection.

5.3.1.4 For both food service establishments and maintenance and service facilities, when located in areas where additional weight loads may exist, the units shall be installed with traffic bearing



covers. A separate sampling manhole may be required at the discretion of the JWSC.

5.3.2 Capacity:

Capacity will be based on the following design criteria and must meet the required effluent quality parameters stated in Section 2-16-38 of the above referenced water and sewer ordinances with a minimum of 1000 gallons. Certain applications may require the installation of multiple units in series with outlet filters and approved sample port.

5.3.2.1 Grease Interceptors (Precast Concrete)

5.3.2.1.1 For restaurants and food service establishments, interceptor capacity shall be calculated as follows:

Capacity = (S) X (GS) X (HR/12) X (LF) where:

- (S) = Number of seats in dining area
- (GS) = Gallons of wastewater per seat (Use 25)
- (HR) = Number of hours in operation (Daily)
- (LF) = Loading Factor (See Table Below)

Location	Loading Factor (LF)
Interstate Highways	1.25
Four (4) - Lane Highways	1.00
Two (2) - Lane Highways	0.8
Other Locations	0.5

5.3.2.1.2 For hospitals, nursing homes and other commercial kitchens with varied seating capacity, interceptor capacity shall be calculated as follows:

Capacity = (M) X (GM) X (LF) where

- (M) = Number of meals per day
- (GM) = Gallons of wastewater per seat (Use 5)
- (LF) = Loading Factor (See Table Below)

Location	Loading Factor (LF)
Locations With Dishwashers	1.0
Locations Without Dishwashers	0.5



5.3.2.1.3 Specialty shops, such as take-out only, bakeries, and meat markets will be evaluated individually.

5.3.2.1.4 The Owner shall be responsible for the proper operation and maintenance of the units and the JWSC reserves the right to require additional facilities or modifications based upon operational performance.

5.3.2.2 Grease Interceptors (Pre-engineered Systems)

5.3.2.2.1 Pre-engineered grease interceptors shall remove grease and other floatable materials, solids, and other settle able materials from wastewater. The effluent from such units shall have no degreasers, surfactants or emulsifiers. The pre-engineered unit must provide adequate treatment time to limit effluent discharge levels of non-emulsified solvent extractable matter of animal or vegetable origin to a maximum of 100 parts per million (PPM) and total suspended solids (TSS) to 1,000 PPM. Submittal data for pre-engineered grease interceptors shall include the following data as a minimum:

- Maximum Gravity Flow Rate (GPM)
- Total Liquid Capacity (Gallons)
- Grease Storage capacity (Gallons)
- Solids Storage Capacity (Gallons)

5.3.2.2.2 The submittal shall also include supporting calculations to justify the design flow rate of the unit, anticipated influent and effluent wastewater characteristics and any other assumptions or criteria used in the design of the unit.

5.3.2.2.3 The Owner shall be responsible for the proper operation and maintenance of the units and the JWSC reserves the right to require additional facilities or modifications based upon operational performance.

5.3.2.3 Oil and Solids Separators (Pre-engineered)

5.3.2.3.1 Pre-engineered oil and solids separators shall remove free oil and other floatable materials from wastewater. The effluent from such units shall have no degreasers, surfactants or emulsifiers. The pre-engineered unit must provide adequate treatment time to limit effluent discharge levels of non-emulsified solvent extractable matter of mineral or synthetic origin to a maximum of ten (10) parts per million (PPM) and total suspended solids (TSS) to 1,000 PPM. Submittal data for pre-engineered oil



and solids separators shall include the following data as a minimum:

- Maximum Gravity Flow Rate (GPM)
- Total Liquid Capacity (Gallons)
- Grease Storage capacity (Gallons)
- Solids Storage Capacity (Gallons)

5.3.2.3.2 The submittal shall also include supporting calculations to justify the design flow rate of the unit, anticipated influent and effluent wastewater characteristics and any other assumptions or criteria used in the design of the unit.

5.3.2.3.3 The Owner shall be responsible for the proper operation and maintenance of the units and the JWSC reserves the right to require additional facilities or modifications based upon operational performance.

5.4 END OF SECTION