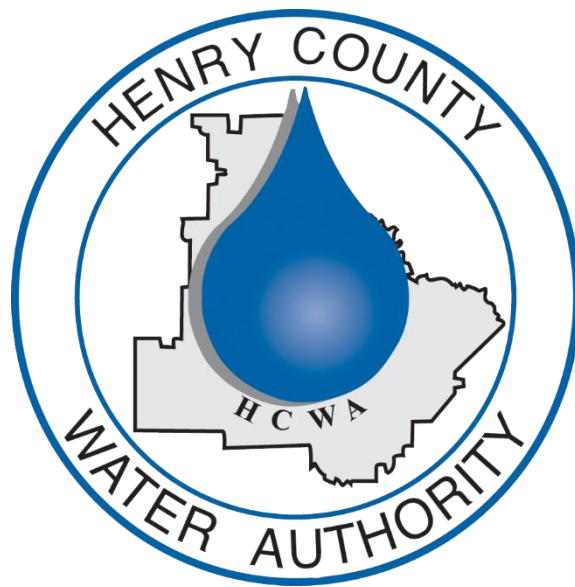


STANDARDS AND SPECIFICATIONS



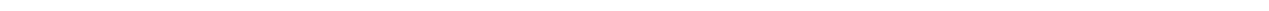
HENRY COUNTY WATER AUTHORITY

1695 Highway 20 West, McDonough GA 30253

Revised December 2023

Reviewed and Approved:

Henry County Water Authority Standards and Specifications



Henry County Water Authority Standards and Specifications

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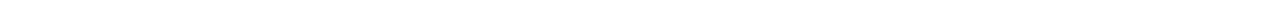
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Henry County Water Authority Standards and Specifications



Henry County Water Authority Standards and Specifications

DIVISION 1 – POLICIES AND PROCEDURES

Henry County Water Authority Standards and Specifications

Henry County Water Authority Standards and Specifications

SECTION 1.1 - GENERAL PROVISIONS

1.1.1 Authority and Title

These Standards and Specifications are adopted by the Henry County Water Authority under the authority of the Constitution of the State of Georgia. These regulations shall be known as “Henry County Water Authority Standards and Specifications,” and may be referred to generally as “Standards and Specifications.”

1.1.2 Purpose and Intent

The purpose of this document is to set forth the policies, procedures, design requirements, material requirements, and construction requirements of the Henry County Water Authority for the design, installation, and construction of water distribution and sanitary sewerage systems, as well as the improvements allowed within the protected water supply watersheds. It is intended that these Standards and Specifications will provide guidance for the design of water distribution and sanitary sewerage systems and will protect and promote the health, safety, and welfare of the general public as it relates to water supply protection, water distribution, and sanitary sewerage systems.

1.1.3 Variance

Any variance from these Standards and Specifications must be approved in writing by the Henry County Water Authority.

1.1.4 Amendments and Revisions

The Henry County Water Authority shall amend and/or revise these “Standards and Specifications” whenever it is determined to be necessary in order to improve the performance and integrity of the water distribution and sanitary sewerage systems.

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SECTION 1.2 - DEFINITIONS

1.2.1 Definitions

The listed words or acronyms shall mean the following:

ACI: American Concrete Institute

ANSI: American National Standards Institute

ASTM: American Society for Testing and Materials

AWWA: American Water Works Association

Contractor: Any individual, firm, or corporation with whom a contract is made by the developer or the HCWA for the purpose of constructing the water distribution and/or sanitary sewerage systems described herein.

Developer: Any individual, firm, or corporation who contracts with a contractor to construct a water distribution and/or sanitary sewerage system.

Developer's Engineer: The engineer who is hired by the Developer and is in responsible charge of the water distribution and/or sanitary sewerage system design. Developer's engineer must be licensed by the Georgia State Board of Registration for Professional Engineers and Land Surveyors.

DIP: Ductile Iron Pipe

DIPRA: Ductile Iron Pipe Research Association

Domestic Wastewater: Wastewater from sanitary fixtures such as toilets and urinals.

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Food Service Facility: Any facility which cuts, cooks, bakes, prepares, or serves food, or which disposes of food related wastes.

Flow Sensor: An inline device installed at or near the supply point of the landscape irrigation system that produces a repeatable signal proportional to flow rate.

GIS: Geographic Information System

GPD: Gallons per day

GPM: Gallons per minute

Grease: A material composed primarily of fats, oil, and grease from animal or vegetable sources. The terms fats, oil, and grease shall be deemed as Grease by definition. Grease may also include petroleum based products.

HCWA: Henry County Water Authority

HCWA Engineer: The Henry County Water Authority's engineer or authorized representative.

Landscape Irrigation System: An assembly of component parts that is permanently installed for the controlled distribution of water to irrigate landscapes.

Large Landscapes: All landscapes other than those in the yards of one and two-family dwellings.

MGD: Million Gallons per Day

Master Shut-Off Valve – An automatic valve installed at the irrigation supply point which controls water flow into the landscape irrigation system. When this valve is closed, water will not be supplied to the landscape irrigation system.

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PCF: Pounds per cubic foot

PSI: Pounds per square inch

PVC: Polyvinyl chloride

Rain Sensor Shut-Off Valve – An electric device that detects and measures rainfall amounts and overrides the cycle of a landscape irrigation system so as to turn off such system when a pre-determined amount of rain has fallen.

Sanitary Sewer Lateral: A pipe that extends from a sanitary sewer main to the public street right-of-way or easement for the purpose of providing sewer service to a parcel.

Sanitary Sewer Main: A gravity sewer line which has one or more sanitary sewer laterals connected to it.

Sanitary Sewerage Systems: A network of pipes, pumps, and force mains for the collection and conveyance of wastewater, or sewage, from a community.

Service Line: the pipe from the public water main to the primary service of a customer

Sewage: refuse liquids or waste matter usually carried off by sewers.

Sewerage: the removal and disposal of sewage and surface water by sewers.

Sewers: an artificial usually subterranean conduit to carry off sewage.

SCADA: Supervisory Control and Data Acquisition System

Water Distribution System: A network of pipes, valves, and fittings that convey potable water from a water treatment plant to the customers.

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Water Main: An underground pipe greater than 6 inches that is designed to deliver water to multiple customer's service lines.

WaterSense Controller – Weather-based irrigation controllers, labeled under the U.S. Environmental Protection Agency's WaterSense Program, which includes stand-alone controllers, add-on devices, and plug-in devices that use current weather data as a basis for scheduling irrigation.

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SECTION 1.3 - PRE-DEVELOPMENT REQUIREMENTS

1.3.1 Water/Sewer Availability Letter

The Authority provides water and sewer services where capacity is available on a first-come, first-served basis. Each customer, developer, and property owner must also comply with the rules, regulations, and ordinances of the Authority.

Prior to preparing and submitting construction plans for a water distribution and/or sanitary sewerage system, the Developer/Owner shall notify the HCWA of the proposed development. If property is being rezoned, the Developer/Owner shall apply for and obtain a Water/Sewer Availability Letter. A proposed development on rezoned property that would cause the existing water distribution and/or sanitary sewerage system to exceed HCWA or Georgia EPD limits, or would adversely affect the system, will not be connected to the HCWA system.

The HCWA charges an application fee for the preparation of a Water/Sewer Availability Letter. The current fee can be obtained by visiting the Development page on the HCWA web site at www.hcwa.com. A deposit and additional costs may be required for proposed larger developments, industrial projects, or unusual cases that require a feasibility/basin study. Payment of the fee(s) is due at the time of the submittal of the application for a Water/Sewer Availability Letter. This fee is non-refundable even if it is determined that water and/or sewer service is not available.

Information that shall be submitted to the HCWA when applying for a Water/Sewer Availability Letter includes the following:

- A. Application for Water/Sewer Availability Letter that is signed and notarized.
- B. A Letter of Intent that clearly states the proposed use of the development and the estimated time period for construction.
- C. A Preliminary Site Plan that clearly presents the following minimum information.
 1. Location of proposed development (identify all adjacent roads that will be used to access proposed development).

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2. Overall size of proposed development.
 - a) Land Lot(s) and District(s) that the proposed development is located in.
 - b) Current and proposed zoning classification.
 - c) Proposed lot layout (identify total number of proposed lots).
 - d) Topography
 - e) Show existing water and sanitary sewer line sizes and locations. If an extension of the water distribution and/or sanitary sewerage system is required, a preliminary route of the proposed extension shall be provided. Preliminary profiles of a proposed sanitary sewer extension may be required.
 - f) Preliminary Site Plan shall be dated and the date shall correspond with the submittal to the County or respective City.
 - g) A statement of whether or not the property is located within a protected watershed district.
 - h) If the property is located within a protected watershed, include proposed minimum lot sizes, estimate of impervious surface area, required stream buffers, and statement of whether or not the property is within the Water Quality Critical area.
- D. If the proposed development meets the following:
 1. It is not going to be connected to a sanitary sewer system.
 2. It is located within a protected watershed district.
 3. The proposed minimum lot size is less than the requirements set forth in the Watershed Protection Ordinance.Then a letter from the Environmental Health Department is required indicating that septic systems will be adequate for the proposed lots and house/building sizes.
- E. Any additional information that the HCWA Engineer deems is necessary in order to determine water and/or sewer availability.

Water/Sewer Availability Letters are provided for informational purposes only and will not act to reserve water capacity to the property or the applicant, and will not create any liability to the Authority. The information contained within the letter will remain in effect for a period of 365 days from the letter's date unless subsequently notified in writing by the Authority. The

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information provided will be based upon the proposed zoning of the property. Any deviation in zoning that would increase density or usage above that evaluated by the Authority will automatically void the information provided and will require a re-evaluation by HCWA.

The Authority will reaffirm the availability of water and sewer services to the property at the time that the development plans are submitted. If there are any additional requirements, or if water and sewer capacity are not available, the applicant will be notified in writing.

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SECTION 1.4 - PLAN REVIEW AND APPROVAL PROCESS

1.4.1 Overview

HCWA reviews and approves plans and specifications for the design and construction of water distribution and/or sanitary sewerage system portions of a development project, as well as any proposed development planned within the protected water supply watersheds. The Developer/Owner is responsible for obtaining all other required approvals and permits from other agencies prior to beginning construction. Plan approval by the HCWA Engineer does not relieve the Developer/Owner of his responsibility for strict compliance with the standards and specifications herein, and any applicable laws and regulations. The Authority, in its sole discretion, may require the plans to include details of any and all elements of the design not covered by these specifications. A Professional Engineer registered in the State of Georgia shall certify all such details.

1.4.2 Plan Preparation

All water distribution and sanitary sewerage system designs and plans shall conform to these standards and specifications. In addition, all development plans proposed within the protected water supply watersheds shall comply with the rules and regulations of the Authority's Watershed Protection Ordinance.

- A. Protected Watersheds - HCWA reviews watershed protection measures for the following protected watersheds:
 1. Towaliga River
 2. Indian Creek
 3. Long Branch Creek
 4. Tussahaw Creek
 5. Shoal Creek
- B. General Watershed Delineation Maps can be obtained from HCWA Engineering.
- C. Applicant must meet all requirements described by the HCWA Watershed Protection Rules, Regulations and Ordinances (current edition).
- D. A hydrology report shall accompany all new plan submittals for projects located in a protected watershed.

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1.4.3 Licensed Professionals

All water distribution and sanitary sewerage system design and plan preparation shall be performed by a professional engineer who is knowledgeable in the design of water distribution and sanitary sewage systems, and who is licensed by the Georgia State Board of Registration for Professional Engineers and Land Surveyors. Likewise, all structural, electrical, geotechnical, etc. design and plan preparation shall be performed by a professional engineer who is knowledgeable in the particular discipline, and who is licensed by the Georgia State Board of Registration for Professional Engineers and Land Surveyors.

1.4.4 Reference Documents and Standards

The design of all water distribution and sanitary sewerage systems shall conform to the Henry County Water Authority Standards and Specifications, as well as the following standards:

- A. American Concrete Institute (ACI) Standards, latest editions
- B. American National Standards Institute (ANSI) Standards, latest editions
- C. American Society for Testing and Materials (ASTM) Standards, latest editions
- D. American Water Works Association (AWWA) Standards, latest editions
- E. Georgia Department of Transportation (GDOT) Standard Specifications, latest editions
- F. Minimum Standards for Public Water Systems, latest edition, Georgia Environmental Protection Division
- G. Recommended Standards for Water Works, latest edition, Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers
- H. Recommended Standards for Wastewater Facilities, latest edition, Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers
- I. Utility Accommodation Policy and Standards, latest edition, Georgia Department of Transportation

When standards conflict with one another, the HCWA Engineer shall determine the applicable standard.

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1.4.5 CAD Standards

HCWA requires that Record Drawings be submitted prior to final acceptance of the water distribution system and/or sanitary sewerage system. The Record Drawings are required to be prepared in accordance with the HCWA “Digital As-Built CAD Standards;” therefore, it is recommended that the design drawings be prepared using these CAD standards also. The “Design As-Built CAD Standards” can be obtained by visiting the Development page on the HCWA web site at www.hcwa.com.

1.4.6 Plan Requirements

Engineering plans shall be prepared and submitted in a digital format on a minimum size of 24 inch x 36 inch. All drawing sheets shall be sealed, signed and dated by a design professional licensed by the Georgia State Board of Registration for Professional Engineers and Land Surveyors. Sealing of documents shall be in accordance with the current Rules and Regulations of the State of Georgia, Chapter 180-12: Sealing of Documents. Engineering plans shall contain the following drawings and information as applicable:

A. Cover Sheet

1. Show project name
2. Show location map with street names, north arrow, and scale (minimum scale shall be 1 inch = 2000 feet).
3. Show Developer/Owner’s name, address, email address, and telephone number
4. Show Engineer’s name, address, email address, and telephone number
5. Show name, email address, and telephone number of a 24-hour contact person
6. State land lot number(s) and district number(s) of proposed development location

B. Overall Site Plan Sheet(s)

1. Show north arrow and scale (minimum scale shall be 1 inch = 500 feet)
2. Show property lines with bearings and distances
3. Show land lot lines and district lines
4. Show any jurisdictional (city or county) boundary lines
5. Show names of adjacent property owners
6. Show all existing and proposed structures, roads, etc.
7. Show all roads adjacent to and within proposed development

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8. Show all streams, lakes, and wetland areas
9. Show all State waters located within 200 feet of the project site
10. Show all undisturbed buffers
11. Show a minimum of two (2) benchmarks referenced to HCWA GIS for horizontal and vertical control
12. Coordinate system shall be per Section 1.4.7 herein (Survey Datum)
13. State the total acreage of the development
14. State the total disturbed acreage
15. State the acreage of contributing drainage basins to the proposed development
16. State the total number of lots or units in the proposed development

C. Grading Plan Sheet(s)

1. Show north arrow and scale (minimum scale shall be 1 inch = 50 feet)
2. Show existing topography (in gray scale) and proposed topography with contour intervals in accordance with the following

Ground Slope	Contour Interval
Flat (0% to 2%)	0.5 foot or 1 foot
Rolling (2% to 8%)	1 foot or 2 foot
Steep (greater than 8%)	2 foot, 5 foot, or 10 foot

3. Show existing and proposed spot elevations as required
4. Show clearing limits

D. Water Distribution System Plan Sheet(s)

1. Show north arrow and scale (minimum scale shall be 1 inch = 50 feet). If Minimum scale does not capture entire water system layout, create a separate plan sheet to illustrate an overall utility layout for water system proposed (minimum scale 1 inch = 500 feet)
2. Show proposed water line location with staking information (include water line size and material)
3. Show grading plan in gray scale
4. Show all existing utilities (in gray scale) and proposed utilities

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5. Show all stormwater drain lines and structures in gray scale (include line size, material, and invert data)
6. Show all property lines, right-of-way lines, permanent easement lines, temporary easement lines
7. Show names of property owners and/or Parcel ID numbers.
8. Show all State water buffers, wetland areas, and 100-year flood plain elevation
9. Show the following standard construction notes:
 - a) Pre-construction conference is required with the Henry County Water Authority prior to water/sewer line construction
 - b) Contractor for the water/sewer line MUST have a state approved license and be on the approved list for Henry County Water Authority
 - c) A completed meter application if necessary along with any fees due to HCWA must be received prior **to pre-construction conference.**
 - d) All fire line meters shall be new and installed per HCWA standards (Refer to HCWA Standards and Specifications for approved models).
 - e) Water service shall not be activated until all lines, meters, and backflow prevention devices are pressure tested, disinfected, and certified with all public lines and meters being deeded over to HCWA. This includes both fire and domestic water service
10. All plan views must have a key map for orientation within a large development.

E. Water Distribution System Detail Sheet(s)

1. Use HCWA standard details located at www.hcwa.com under the Development tab/Standards and Specifications where applicable.

F. Sanitary Sewer System Plan Sheet(s)

1. Show north arrow and scale (minimum scale shall be 1 inch = 50 feet). If Minimum scale does not capture entire sewer system layout, create a separate plan sheet to illustrate an overall utility layout for sewer system proposed (minimum scale 1 inch = 500 feet)
2. Show proposed sewer line and manhole locations with staking information (include sewer line size and material)
3. Show grading plan in gray scale

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4. Show all existing utilities (in gray scale) and proposed utilities
5. Show all stormwater drain lines and structures in gray scale (include line size, material, and invert data)
6. Show all property lines, right-of-way lines, permanent easement lines, and temporary easement lines
7. Show names of property owners and/or Parcel ID numbers
 - a) Show the following standard construction notes:
 - 1) Pre-construction conference is required with the Henry County Water Authority prior to water/sewer line construction
 - 2) Contractor for the water/sewer line MUST have a state approved license and be on the approved list for Henry County Water Authority
 - 3) A completed meter application along with any fees due HCWA must be received prior to pre-construction conference
 - 4) All fire line meters shall be new and installed per HCWA standards. (Refer to HCWA Standards and Specifications for approved models)
 - 5) Water service shall not be activated until all lines, meters, and backflow prevention devices are pressure tested, disinfected, and certified with all public lines and meters being deeded over to HCWA. This includes both fire and domestic water service.
8. All plan views must have a key map for orientation within a large development.

G. Sanitary Sewer System Profile Sheet(s)

1. Show horizontal and vertical scale:
 - a) Horizontal scale shall be minimum of 1 inch = 50 feet
 - b) Vertical scale shall be 1 inch = 10 feet, unless otherwise approved by HCWA
2. Show proposed sanitary sewer profile with corresponding plan view above it (include sanitary sewer size and material)
3. Show slope of each section of sanitary sewer
4. Show location of existing utilities that are crossing proposed sanitary sewer
5. Show “invert in,” “invert out,” and “rim” elevations for each proposed and existing manhole in profile

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6. Show existing and proposed ground surface profile
7. Show approximate creek bottom elevation when lines are running adjacent to a creek
8. As necessary, show 5ft and 16ft cover depth offset lines (in gray scale, dashed or dot line-type) from the proposed finished grade along the sewer profile
9. All plan and profile views must have a key map for orientation within a large development.

H. Sanitary Sewer System Detail Sheet(s)

1. Use HCWA standard details where applicable

I. Sanitary Sewage Lift Station Plan Sheet(s)

1. Show north arrow and scale
2. Show Top View of lift station with appropriate dimensions
3. Show Bottom View of lift station with appropriate dimensions

J. Sanitary Sewage Lift Station Section Sheet(s)

1. Show pertinent elevation sections
2. Show pertinent dimensions
3. Show critical elevations (top of slab, bottom of wet well, etc.)
4. Show pump control points (high level alarm, pump on, pump off, low level alarm, etc.)
5. Show pump curve and system head curve
6. Show pump design point

A. Sanitary Sewer Force Main Plan Sheet(s)

1. Show north arrow and scale (minimum scale shall be 1 inch = 50 feet)
2. Show proposed sanitary sewer force main location with staking information (include force main size and material)
3. Show grading plan (in gray scale)
4. Show all existing utilities (in gray scale) and proposed utilities
5. Show all stormwater drain lines and structures in gray scale (include line size, material, and invert data)
6. Show all property lines, right-of-way lines, permanent easement lines, temporary easement lines

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7. Show names of property owners and/or Parcel ID numbers
8. Show all State water buffers, wetland areas, and 100-year flood plain elevation
9. All plan views must have a key map for orientation within a large development.

B. Sanitary Sewer Force Main Profile Sheet(s)

1. Show horizontal and vertical scale:
 - a) Horizontal scale shall be a minimum of 1 inch = 50 feet
 - b) Vertical scale shall be 1 inch = 10 feet, unless otherwise approved by HCWA
2. Show proposed sanitary sewer force main profile (include force main size and material)
3. Show location of all existing utilities (in gray scale) that are crossing proposed sanitary sewer force main
4. Show existing and proposed ground surface profile
5. Show approximate creek bottom elevation when lines are running adjacent to a creek. As necessary, show 5ft and 16ft cover offset lines (in gray scale, dashed or dot line type)
6. All plan and profile views must have a key map for orientation within a large development.

1.4.7 Survey Datum

Survey data shall be geo-referenced to the State Plane Coordinate System, NAD 83, Georgia West Zone, US Survey Feet. All surveys shall contain a minimum of two reference survey markers (pins) with x, y, and z coordinates tied to the Henry County GPS monument system. A list of existing GIS survey monument locations can be obtained from the Henry County GIS Department and online at the Henry County GIS web site at www.co.henry.ga.us/GIS/.

1.4.8 Plan Submittal Process

Construction plans and specifications for water distribution and/or sanitary sewerage systems shall be submitted to the HCWA. If the property that is to be developed has been rezoned, the Developer/Owner shall have obtained a Water/Sewer Availability Letter prior to submitting construction plans and specifications for review.

The plan submittal process is as follows:

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- A. Developer's Engineer shall submit a complete set of construction plans and specifications to the HCWA for the initial review. If the project lies within any of the Authority's protected water supply watersheds, a signed and sealed hydrology study is also required.
- B. Upon receipt of the construction plans and specifications, HCWA will review the plans and specifications for technical adequacy and conformance with these Development Standards and Specifications. HCWA comments will be marked in red (Redline Comments) on the plans and/or specifications.
- C. Developer's Engineer will be notified once the initial review has been completed.
- D. Any comments shall be returned to the Developer's Engineer. After the Redline Comments have been addressed, Developer's Engineer shall resubmit the construction plans and specifications requested in the Redline Comments, along with the original Redline Comments to HCWA for subsequent review. A Comments Response Sheet is required detailing how the applicant addressed the previous Redline Comments.
- E. Upon final plan approval, Developer's Engineer shall be notified of any additional requirements for permitting (i.e. permit fees, impact fees, offsite easements, etc.).

1.4.9 Permit Fees

A. Permit Fees

HCWA charges a permit fee for the plan review and subsequent site inspection of water distribution, watershed protection, and sanitary sewerage systems. Payment of the Permit Fee is due at the time of plan re-submittal. If a re-submittal is not required, the Permit Fee shall be due prior to final approval. The current Permit Fee Schedule is located at www.hcwa.com under the Development tab.

B. Impact Fees

The Henry County Water Authority has adopted impact fees to ensure that adequate public facilities are available to serve new growth and development in Henry County and to provide that new growth and development bears a proportionate share of the cost of new public facilities needed to serve them.

1. Commercial/Industrial Developments, impact fees are due prior to final plan approval.
2. Residential Developments, impact fees are due at the time of meter purchase/sale.

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1.4.10 Expiration of Plan Approval

Plan approval is valid for twelve (12) months. Projects with approved plans that are not initiated within twelve (12) months of plan approval, or projects that are initiated and then become inactive for a twelve (12) month period, shall become invalid. If an approved plan becomes invalid, the HCWA Engineer shall determine if the plan can be revalidated, or if a new design and plan submittal is required.

1.4.11 Plan Modifications

Approved plans shall not be modified or deviated from unless approved in writing by the HCWA Engineer.

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SECTION 1.5 - EASEMENTS AND DEEDED PROPERTY

1.5.1 General

All water distribution and/or sanitary sewerage system appurtenances that will be owned by the HCWA, and are not located in a public street right-of-way, shall be located in a permanent easement or deeded property that has been conveyed to the HCWA.

All sanitary sewage lift stations shall be located on property that is platted and deeded to the HCWA. Any roads required to access the sanitary sewage lift station from the public street right-of-way shall be included as part of the platted and deeded property or given as an access easement at the discretion of the HCWA Engineer.

HCWA will not approve any water distribution and/or sanitary sewerage system construction until all off-site easements and/or deeded property is acquired by the Developer/Owner. A design must be submitted and approved before easement acquisition can begin.

1.5.2 Permanent Easements

A permanent easement is a right granted by an underlying property owner that entitles its holder to a specific use of the property in perpetuity.

A. "On-Site" Permanent Easements

1. "On-site" permanent easements are permanent easements which fall within the boundaries of the current phase of the development and are shown on the final plat. Permanent easements are conveyed by recording the Deed of Conveyance and final plat.
2. The Developer/Owner shall grant to the HCWA, the exclusive right to construct, re-construct, operate, maintain, repair, replace, improve, alter, remove, relocate, and inspect water distribution and/or sanitary sewerage systems that are situated over, across, and under the land wherein the water distribution system and/or sanitary sewerage system lies on the Developer/Owner's property.

B. "Off-Site" Permanent Easements

1. "Off-site" permanent easements are permanent easements which fall outside the boundaries of the current phase of the development and must be provided by the

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Developer/Owner on the approved HCWA easement document for each property where an easement is required in order to install the water distribution and/or sanitary sewerage system. Plans must be submitted and approved along with an easement plat for each property where an easement is required before the Developer/Owner obtains an easement from the property owner.

2. Permanent easements through property owned by the Developer/Owner, including water and sewer lines that will be included in later phases of the same project, shall be treated as routine “off-site” permanent easements. “Off-site” permanent easements shall be negotiated and acquired by the Developer/Owner.
3. Water distribution and/or sanitary sewerage system plans shall not receive final approval until all “off-site” permanent easements required for system completion are approved and acquired.

1.5.3 Permanent Easement Requirements

A. Permanent Easements

1. Permanent easements for water distribution systems and sanitary sewage force mains shall have a minimum width of 10 feet. Permanent easements for gravity sewer systems shall have a minimum width of 20 feet.
2. The water line or sanitary sewage line shall be located in the center of the permanent easement. Permanent easements shall be accessible from the public street right-of-way.
 - a. Sanitary sewer outside of the R/W: vehicular access to an outfall line is required for HCWA operation and maintenance. As determined by the HCWA Engineer, curb cuts, concrete driveway apron, and a length of asphalt pavement (length to be determined by HCWA based on specific condition) shall be provided by the developer.
 - b. If access from a public street right-of-way is not available, permanent ingress/egress easement(s) shall be provided, as required, to provide HCWA

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access to the water and/or sewer easement. A sufficient number of permanent ingress/egress easements shall be provided so that all portions of the water and/or sewer easement is accessible by the HCWA from the public right-of-way. The HCWA Engineer will review all proposed easements and deeded property and determine the number and location, if any, of permanent ingress/egress easements required. In some cases, deeded property may be required for ingress/egress in lieu of a permanent easement. The HCWA Engineer will determine what is required.

- c. Permanent easements for water meters and appurtenances shall extend a minimum of 10 feet beyond the outside of the structure on each side.
- d. The size and/or width of permanent easements may be increased or decreased at the discretion of the HCWA Engineer.

B. Temporary Easements

A temporary easement is a right granted for a specific period of time and once it expires, the rights granted return to the property owner. Temporary easements are typically used for the stockpiling of dirt, the maneuvering of equipment, or the storage of materials. The HCWA Engineer will determine when necessary.

1.5.4 Deeded Property Requirements

Deeded property is property that is platted and deeded to the HCWA. Deeded property must be provided by the Developer/Owner. The minimum size of deeded property associated with a sanitary sewage lift station is 100-feet by 100-feet square. Sanitary sewage lift station plans shall not receive final approval until deeded property is approved and acquired. The required size of the deeded property may be modified at the discretion of the HCWA Engineer.

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SECTION 1.6 - INSTALLATION

1.6.1 General

Water distribution and sanitary sewerage systems shall be constructed in accordance with HCWA approved plans and specifications. A set of HCWA approved plans shall be present on the job site whenever work is being performed on the water distribution and/or sanitary sewerage system, and the plans shall be made available to the HCWA Inspector upon request. Installation of water distribution and/or sanitary sewerage systems shall not commence until HCWA has granted final approval of the construction plans and specifications and the appropriate agency has issued a Development/Land Disturbance Permit. Water distribution and sanitary sewerage systems shall be constructed by an HCWA approved utility contractor.

1.6.2 Approved Utility Contractors

Utility contractors must be licensed by the state of GA and approved by the HCWA prior to performing any work on the HCWA water distribution and sanitary sewerage system. Utility Contractors can obtain an Approved Contractor Application form at the HCWA or by visiting the Development page on the HCWA web site at www.hcwa.com. The Approved Contractor Application requires that the Utility Contractor submit copies of their State Utility Contractor's License, insurance information, and references. When the application and references have been reviewed and found satisfactory, the Utility Contractor will be placed on probationary status. When the contractor has successfully completed 3 projects under the direction of the HCWA Engineer, the Utility Contractor will be placed on the Authority's Approved Contractors List. Approved Contractors will be re-evaluated as determined by the HCWA (typically this will be performed on an annual basis). During re-evaluation, if the contractor, in the opinion of the HCWA, has not consistently performed up to the standards required for an "Approved Contractor", that Utility Contractor may be removed from the Approved Contractors List.

1.6.3 Inspections

A HCWA Inspector, under the direction of the HCWA Engineer, will inspect the installation of the water distribution and/or sanitary sewerage system on a regular basis during all phases of construction to ensure that the system is being constructed in accordance with the HCWA approved plans and specifications.

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All work shall be inspected prior to backfill. It is the Developer/Owner's and/or Utility Contractor's responsibility to schedule inspections and verify that work has been inspected before it is backfilled. Any work that is backfilled prior to inspection shall be exposed when directed by the HCWA Inspector.

The HCWA Inspector will inform the Developer/Owner and/or Contractor when there are deficiencies in workmanship, or when there are deviations from the approved plans and specifications. Developer/Owner and/or Utility Contractor shall address the deficiencies in a timely manner as determined by the HCWA Inspector. Failure to address deficiencies in a timely manner may result in the HCWA issuing a Stop Work order. Failure to address deficiencies and/or disregarding a Stop Work order may result in additional fees and the water distribution and/or sanitary sewerage system will not be permitted to connect to the HCWA system.

Inspection by the HCWA does not relieve the Developer/Owner and/or Utility Contractor of their responsibility for constructing the water distribution and/or sanitary sewerage system in accordance with the approved construction plans and specifications herein.

The presence of an HCWA Inspector, or the HCWA Engineer, on the site of work shall not be construed, in any manner, to relieve the Developer/Utility Contractor of their responsibility for strict compliance with the approved development plans, and specifications herein.

The HCWA Inspector shall not change or modify the approved water distribution and/or sanitary sewer system plans, or specifications herein, without written approval from the HCWA Engineer.

1.6.4 Pre-Construction Meetings

Prior to beginning construction of any water distribution and/or sanitary sewerage system, there are two (2) pre-construction meetings with the HCWA that are required.

A. Office Meeting

Developer/Owner and/or Utility Contractor shall arrange a pre-construction meeting with the HCWA Engineer, or Engineer's Designee. The pre-construction meeting shall be held prior to beginning construction, and the Developer/Owner's Utility Contractor MUST be present.

B. Field Meeting

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The HCWA Inspector assigned to the project will conduct a separate, second pre-construction meeting with field personnel prior to commencement of work.

1.6.5 Testing

Water distribution and sanitary sewerage systems shall be tested at the expense of the Developer/Owner. Testing methods and practices shall be as specified in these Standards and Specifications, Division Four – Construction Standards, Section 7 - Testing.

1.6.6 Warranty

The Developer/Owner shall provide a warranty for the water distribution and/or sanitary sewerage system against all defects in materials and workmanship for a period of two (2) years after Final Acceptance. This warranty shall be backed by a two (2) year Letter of Credit, Maintenance Bond, or Escrow Agreement with HCWA.

During the warranty period, the Developer/Owner shall be responsible for any damage to the water distribution and/or sanitary sewerage system.

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SECTION 1.7 - CONNECTING TO THE HCWA SYSTEM

1.7.1 Connecting to the HCWA System

Connection to the HCWA water distribution and/or sanitary sewerage system will only be allowed provided that the Developer/Owner and/or Contractor has complied with HCWA policies and procedures and the water distribution and/or sanitary sewerage system has been installed in accordance with the HCWA approved plans and specifications.

The HCWA Inspections Department shall be notified a minimum of 48-hours in advance of making a connection to the HCWA water distribution or sanitary sewerage system.

A HCWA Inspector shall be present when the connection is made to the HCWA water distribution or sanitary sewerage system.

All materials, equipment, and methods used in making a connection to the HCWA water distribution or sanitary sewerage system shall be approved by the HCWA Inspector.

After the connection has been made to the HCWA water distribution and/or sanitary sewerage system, the Developer/Owner's system shall be immediately valved-off or plugged until Final Acceptance of the system.

Any unauthorized connection, or connection that is made without the presence of a HCWA Inspector, shall be subject to a fine and/or refusal of service.

Any noncompliant connection, or any damage to the HCWA system, shall be repaired and/or replaced at the expense of the Developer/Owner and/or Contractor. Methods of repair and/or replacement shall comply with these Standards and Specifications.

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SECTION 1.8 - FINAL ACCEPTANCE

1.8.1 General

Prior to Final Acceptance of the water distribution and/or sanitary sewerage system for meter sales and final platting, the HCWA will make a final inspection after all pavement is installed and the Developer/Owner shall provide the following items to the HCWA.

- A. Deed of Conveyance
- B. Contribution of Fixed Assets form
- C. Lien waiver(s)
- D. Corporate Owner's Affidavit
- E. Corporate Contractor's Affidavit
- F. Two-year Letter of Credit/Bond/Escrow Agreement with HCWA
- G. PDF of the As-Built Drawings and Digital copy of As-Built CAD file
- H. PDF of the Recorded Final Plat
- I. Sanitary sewer television inspection report and video
- J. Total coliform analysis
- K. All required fees (water testing fees, recording fees, etc.)
- L. Field corrections

Water will not be left on, and meters will not be set, until all required documents and information are delivered to the HCWA.

1.8.2 Deed of Conveyance

A Deed of Conveyance is a legal document signed, sealed and delivered to affect a transfer of property, and to show the legal right to possess it. A Deed of Conveyance shall be provided for all easements and property to be dedicated to the HCWA.

1.8.3 Contribution of Fixed Assets Form

The Contribution of Fixed Assets form itemizes the public assets that are being dedicated to the HCWA. This form shall only include "public" materials and appurtenances. "Private" materials and appurtenances shall not be included on the form. The Contribution of Fixed Assets form can be obtained by visiting the Development page on the HCWA web site at www.hcwa.com.

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1.8.4 Lien Waivers

The HCWA must ensure that all materials being dedicated as public assets have been paid for; therefore, a lien waiver shall be secured from each supplier where materials and/or equipment were purchased.

1.8.5 Corporate Owner's Affidavit

The HCWA must ensure that all labor and materials required to construct a project have been paid for and that there are no liens on the property; therefore, the Developer/Owner shall prepare a Corporate Owner's Affidavit and submit it to the HCWA. A Corporate Owner's Affidavit form can be obtained by visiting the Development page on the HCWA web site at www.hcwa.com.

1.8.6 Corporate Contractor's Affidavit

The HCWA must ensure that the utility contractor has been paid in full and that there are no liens on the property; therefore, the utility contractor shall prepare a Corporate Contractor's Affidavit and submit it to the HCWA. A Corporate Contractor's Affidavit form can be obtained by visiting the Development page on the HCWA web site at www.hcwa.com.

1.8.7 Two-Year Letter of Credit/Bond/Escrow Agreement

A Letter of Credit, Bond or Escrow Agreement shall be provided to the HCWA as a warranty for the materials and workmanship for the water distribution and/or sanitary sewerage system. The term of the Letter of Credit, Bond or Escrow Agreement shall be two (2) years and the amount of shall be 10 percent of the total cost of the labor and materials required to construct the water distribution and/or sanitary sewerage system.

Prior to the expiration of the Letter of Credit, Bond or Escrow Agreement, a warranty inspection will be conducted by the HCWA. The Developer/Owner will be required to correct any deficiencies that are found. Upon satisfactory repair of any deficiencies that are found, the HCWA will release the Letter of Credit, Bond or Escrow Agreement. A sample Letter of Credit can be obtained by visiting the Development page on the HCWA web site at www.hcwa.com under Conveyance Package.

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1.8.8 As-Built Drawings

As-Built Drawings shall be submitted to the HCWA prior to final acceptance of the water distribution system and/or sanitary sewerage system.

As-Built Drawings shall:

- A. Be sealed, signed, and dated by a design professional licensed by the Georgia State Board of Registration for Professional Engineers and Land Surveyors;
- B. Shall show all street names, right-of-way widths, easements, lot numbers and addresses, and location, size, and material of all water distribution and/or sanitary sewerage system components. Plan and Profile information shall be provided for gravity sewers and sanitary sewer force mains; and
- C. Shall be checked and signed by the HCWA Engineering Inspector prior to final submittal.

Submit Final PDF of As-Built drawings and Digital copy of As-Built CAD file.

1.8.9 Digital Data Submission Standards

Digital As-Built CAD file shall be prepared in accordance with HCWA “Digital As-Built CAD Standards” which can be obtained by visiting the Development page on the HCWA web site at www.hcwa.com.

1.8.10 Final Plat

Submit PDF of the Recorded Final Plat.

1.8.11 Television Inspection Report and Video

All new sanitary sewer lines must be cleaned and visually inspected (using a television camera), to ensure that they are installed correctly and are clean prior to being placed into service. The HCWA inspector must be present when the television inspection is conducted, and a copy of the video inspection report must be submitted to the HCWA.

1.8.12 Total Coliform Analysis

Prior to system acceptance, all new water lines and existing water lines that are affected by the new construction must be disinfected prior to being placed into service. After the Contractor has disinfected the water line in accordance with these Standards and Specifications, the HCWA

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Inspector will collect required water sample(s) and the samples will be tested by the HCWA laboratory at the expense of the Developer/Owner and/or Contractor.

1.8.13 Fees

All fees due to the HCWA shall be paid in full. A current fee schedule can be obtained by visiting the Development page on the HCWA web site at www.hcwa.com.

1.8.14 Field Corrections

Prior to Final Acceptance, Developer/Owner and/or Contractor shall make all corrections to the water distribution and/or sanitary sewerage system as directed by the HCWA Inspector.

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SECTION 1.9 - SANITARY SEWER LIFT STATIONS

1.9.1 Ownership

In accordance with Article 11 of the Henry County Sewer Ordinance, no sanitary sewer lift station serving multiple buildings, facilities and/or lots shall be privately owned or maintained. All lift stations constructed or installed by a private individual or entity shall be dedicated to, and accepted by, the HCWA for operation and maintenance. The following shall be required before a lift station can be placed into operation and the same accepted by the HCWA.

- A. Gravity sanitary sewer collection systems that flow into the lift station shall be designed and installed in accordance with these Standards and Specifications.
- B. The lift station and the associated sanitary sewage force main shall be designed and installed in accordance with these Standards and Specifications.
- C. The design of the gravity flow sanitary sewer line flowing into the lift station, the lift station, and the associated sanitary sewage force main shall be submitted to the HCWA in accordance with these Standards and Specifications. Prior to construction and/or installation, the design of the gravity flow sanitary sewer line flowing into the lift station, the lift station, and the associated sanitary sewage force main shall be approved by the HCWA.
- D. Prior to installation/construction of the gravity flow sanitary sewer line flowing into the lift station, the lift station, and the associated sanitary sewage force main system, the person or entity seeking to construct the lift station shall pay to the HCWA a non-refundable fee in the amount of \$50,000.00 for the operation and maintenance of any lift station that will be deeded to the HCWA for ownership.
- E. Prior to acceptance of any lift station, or any gravity flow sewer line and sanitary sewer force main system, the HCWA shall inspect the same to ensure that all applicable rules, regulations, design, installation, and construction standards have been complied with.

1.9.2 Interbasin Transfer

The HCWA has delineated Henry County into certain sanitary sewage drainage basins. In accordance with Article 11 of the Henry County Sewer Ordinance, pumping sanitary sewage from one drainage basin to another drainage basin is only allowed under the combined following conditions:

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- A. The sewage is generated by a public entity for a facility that is being used for a public purpose.
- B. The drainage area where the wastewater treatment facility is located has capacity in excess of the amount needed for the proposed development, as calculated by the HCWA.

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SECTION 1.10 - FIRE FLOW TESTS

1.10.1 General

All fire flow tests shall be conducted or witnessed by the HCWA (pressure monitoring is also available).

1.10.2 Requesting Fire Flow Data

A request for available fire flow data can be made by submitting a "Request for Fire Flow Test" application to the HCWA. A copy of this application can be obtained by visiting the Development page on the HCWA web site at www.hcwa.com. If current fire flow test information is available, this information will be provided to the requestor at no charge. If there is no data available at the time of the request, the requestor has the option to request that the HCWA either conduct a fire flow test or observe a fire flow test that will be conducted by the requestor. A fee is applicable in both situations. Current fees are presented on the "Request for Fire Flow Test" application as well as on the website www.hcwa.com.

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SECTION 1.11 - NEW CONVEYOR CAR WASH FACILITIES

1.11.1 General

All new in-bay and conveyor car wash facilities for which the HCWA provides water service are required to install, utilize, and maintain a water recycling system which recycles and reuses at least 50 percent of wash and rinse water.

1.11.2 Failure to Comply

When a facility fails to use a recycling water system that reuses at least 50 percent of the wash and rinse water, the HCWA will provide the violator with written notice of the violation, providing further that the violator has thirty (30) days to cease and correct the violation and provide HCWA with written certification from a Georgia licensed plumber or engineer stating that the facility is presently recycling and reusing at least 50 percent of its wash and rinse water. If the violation is not corrected within thirty (30) days, the HCWA will terminate water service until such time as the facility has been brought into compliance.

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DIVISION 2 – DESIGN REQUIREMENTS

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SECTION 2.1 - WATER DISTRIBUTION SYSTEMS

2.1.1 General

All water distribution systems that will be connected to the HCWA water system shall be designed in accordance with these standards. Any deviation from these standards shall be approved in writing by the HCWA Engineer.

2.1.2 Design Usage Rates

- A. The following Design Usage Rates shall be used in the design of water distribution systems.
 - 1. Residential: 300 gallons per day per connection
 - 2. Apartment/Townhome: 200 gallons per day per unit
 - 3. Hotel/Motel: 100 gallons per day per room
 - 4. Commercial: As required by use (provide justification to the HCWA for the usage rate utilized for design)
 - 5. Fire Flow:
 - a) Residential: 750 gallons per minute at 20 PSI residual pressure
 - b) Commercial: 1,000 gallons per minute at 20 PSI residual pressure

2.1.3 Design Pressures

The water distribution system shall be designed to maintain a minimum pressure of 20 PSI (at ground level) at each service connection and at all points in the distribution system under all conditions of flow.

2.1.4 Water Line Size and Material

- A. Minimum Water Main Size: 8 inch Diameter
- B. Minimum Water Main Size within Commercial, Industrial, or Manufacturing Development: 12 inch Diameter, unless otherwise approved by the HCWA Engineer.
- C. Acceptable Water Line Materials:
 - 1. 4 inch to 12 inch Diameter Water Line: Pressure Class 350 Ductile Iron Pipe
 - 2. Greater than 12 inch Diameter Water Line: Minimum Pressure Class 250 Ductile Iron Pipe

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2.1.5 Water Line Location

- A. Locate in right-of-way or in a permanent easement specifically designated for the water line.
- B. Locate 8 feet behind back of curb or edge of pavement, unless otherwise approved by the HCWA Engineer.
- C. Water mains shall be laid at least 10 feet horizontally from any existing or proposed sanitary sewer or sewer manhole unless otherwise approved by the HCWA Engineer. Distances shall be measured from outside of pipe to outside of pipe/structure.
- D. Water lines that cross an existing or proposed sanitary sewer or storm drain line shall have a minimum clearance of 18 inches vertically, preferably above the top of the sewer line being crossed unless otherwise approved by the HCWA Engineer.
- E. At crossings, one (1) full length of water line shall be located so that both pipe joints will be as far from the sanitary sewer line or storm drain line as possible. Pipes should be restrained as determined by HCWA.
- F. Use appropriate HCWA Standard Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.
- G. No trees, light poles or other service provider boxes shall be installed directly above our service line, maintain a 5 ft. horizontal separation.

2.1.6 Water Line Bury Depth

- A. Water lines shall have a minimum of 48 inch of cover as measured from crown of pipe to ground surface. Mains larger than 12 inch diameter require a minimum of 60 inches of cover as measured from crown of pipe to ground surface. Where the ground surface above the water line is higher than the edge of pavement of the existing or proposed roadway, the minimum cover shall be measured from the crown of pipe to the edge of pavement.
- B. Use appropriate HCWA Standard Details located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.1.7 Fire Hydrants

A. Location

1. Locate fire hydrants within the street right-of-way or in a permanent easement.

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2. Locate 2 feet inside right-of way when possible.
3. A fire hydrant shall be placed at the end of all cul-de-sacs and dead-end streets.
4. Use appropriate HCWA Standard Details located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

B. Orientation

1. Pumper nozzle shall be oriented toward the street unless otherwise approved by the HCWA.

C. Spacing

1. Residential Spacing: Maximum 525 feet as measured along the edge of pavement.
2. Commercial Spacing: Maximum 400 feet as measured along the edge of pavement.

2.1.8 Blow-Off Valves

- A. Blow-off valves, when required by the HCWA Engineer, shall be located at critical high points and low points along the water line.
- B. Fire hydrants may be provided in lieu of blow-off valves.
- C. Blow-off valves at high points shall be tapped into the top of the water line.
- D. Blow-off valves at low points shall be tapped into the bottom of the water line.
- E. Blow-off valves shall be a minimum of 2 inches in diameter and must be capable of providing a minimum flushing velocity of 2.5 feet per second in the water line.
- F. Blow-off valves shall not be directly connected to any sanitary sewerage line or storm drainage line nor shall the blow-off be subject to flooding.
- G. Use Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.1.9 Isolation Valves

A. Type

1. Gate valves shall be used on water lines with nominal diameters less than or equal to 12 inches.
2. Butterfly valves shall be used on water lines with nominal diameters greater than 12 inches.
3. Use appropriate HCWA Standard Detail when applicable located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications.

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B. Location and Spacing

1. Locate isolation valves immediately downstream of all 3-way and 4-way connections. Additional valves may be required at the discretion of HCWA.
2. Maximum spacing for isolation valves shall be 2,000 feet.
3. Use appropriate Standard HCWA Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.1.10 Air Release Valves

- A. Air release valves shall be provided at all locations along the water main deemed appropriate as determined by the design engineer.
- B. Air release valve locations are subject to review by the HCWA.
- C. Air release valves shall be sized in accordance with the manufacturer's recommendations.
- D. Use appropriate HCWA Standard Details located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.1.11 Thrust Restraint

- A. All fittings, valves, and dead-ends shall have two (2) forms of thrust restraint.
- B. Acceptable thrust restraint includes restrained joint glands, field lock gaskets, threaded rods, and concrete blocking. The design engineer shall be responsible for calculating the thrust strength requirements. Calculations shall be submitted to HCWA.
- C. Use appropriate HCWA Standard Details located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.1.12 Water Service Connections

A. Residential Connections

1. Residential service connection shall be 1-inch diameter.
2. There shall be one (1) service connection per residence.
3. A 2 inch PVC or 2½ inch HDPE casing pipe shall be provided under the street on all long side service connections.
4. Use appropriate HCWA Standard Details located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

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B. Commercial Connections

1. Commercial service connection shall be a minimum 1-inch diameter.
2. There shall be one (1) service connection per parcel.
3. A minimum 2 inch PVC or 2½ inch HDPE casing pipe shall be provided under the street on all long side service connections.
4. Use appropriate HCWA Standard Detail as applicable.

2.1.13 Water Meters

A. Residential

1. Residential water meters will be provided and installed by HCWA (meter fees apply).

B. Commercial

1. Commercial water meters 2 inch size and smaller will be provided and installed by HCWA (meter fees apply), except with fire meter installations.
2. A Utility Contractor on HCWA's Approved Contractor's List shall provide and install all meters associated with fire meter and/or master meter installations.

C. Sub-Unit Metering

1. All multi-family buildings (apartments, town homes, condominiums, etc.) and multi-tenant commercial buildings shall have a private sub-unit meter installed at each individual unit.
2. Sub-unit meters shall be provided by and installed by the Developer/Owner.

D. Fire Flow

1. All new fire flow lines shall be metered. A meter must also be installed when there are substantial renovations to any existing facility with an unmetered fire line.
2. Fire flow meters shall be provided by and installed by a Utility Contractor on HCWA's Approved Contractor's List.
3. Existing fire flow lines that are unmetered and have more than three consecutive months of usage shall be required to install a fire line meter at the Owner's expense in accordance with the HCWA Fire Line Meter policy.
4. Use appropriate HCWA Standard Details located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

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2.1.14 Backflow Prevention

- A. Backflow preventers shall be installed on all service connections.
- B. Residential Service Connections: backflow preventers shall be provided by HCWA on all residential service connections.
- C. Commercial Service Connections: backflow preventers shall be provided by Developer/Owner on all commercial connections.
- D. All commercial domestic service connections will be required to have a testable Reduced Pressure Zone Assembly backflow. Testable Double Check Valve Assembly will be allowed on fire except where chemicals are present. If Chemicals are present in the fire system a Reduced Pressure Zone Assembly backflow will be required.
- E. A Reduced Pressure Zone Assembly is required on high risk customers.
- F. A Reduced Pressure Zone Assembly is required on all commercial irrigation systems.
- G. Use appropriate HCWA Standard Detail when applicable located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications.
- H. For more specific information, reference the Cross-Connection Control Program Manual located at www.hcwa.com under Development and the Backflow Prevention tab.

2.1.15 Irrigation Systems

A. Universal Landscape Irrigation Requirements

- 1. All new landscape irrigation systems except commercial agricultural operations as defined in the Official Code of Georgia Section 1-3-3 and athletic fields, golf courses or public turf grass recreational areas must include:
 - a) A backflow prevention assembly in accordance with the applicable plumbing code requirements.
 - b) A WaterSense controller.
 - c) A rain sensor shutoff device installed in an area that is unobstructed by trees, roof overhangs, or anything else that might block rain from triggering the rain sensor shutoff device.

B. Large Landscape Irrigation Requirements

- 1. As of January 1, 2019, all new large irrigations systems, (greater than one acre or 43,560 sq. ft. and excluding single-family homes) must include:

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- a) All of the items in Part A of the Universal Landscape Irrigation Requirements above
 - b) A master shut-off valve (such as a gate valve, ball valve, or butterfly valve) installed as close as possible to the point of connection of the water but downstream of the backflow prevention assembly.
 - c) Pressure-regulating devices such as valve pressure regulators, sprinkler head pressure regulators, inline pressure regulators, or other devices shall be installed as needed to achieve the manufacturer's recommended pressure range at the emission devices for optimal performance.
 - d) At least one flow sensor connected to the WaterSense controller that will detect and report high flow conditions and shut master valves.
2. Homeowner's Associations should add together all of their owned irrigated property to determine if it is a large landscape (greater than one acre).
 3. Irrigation systems that use water withdrawn from private wells or surface water by an owner or operator of a property do not apply if solely on their property.
 4. The landscape irrigation system shall be designed, installed and maintained to prevent runoff from leaving the target landscape due to low-head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, parking lots, or structures.

C. Plan Review Process

1. All plans for development that will result in a new water service connection shall:
 - a) Include clear language specifying if such development will or will not include any landscape irrigation systems.
 - b) Include sufficient detail through written statements or drawings showing that all landscape irrigation system requirements will be met.
 - c) Before initiating service to a new connection, all plans must be in compliance with all landscape irrigation system requirements.

2.1.16 Jack and Bore Installations

- A. Unless otherwise approved, water mains that cross a GDOT roadway, Henry County DOT roadway, or railroad right-of-way shall be installed with cased jack and bores.

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- B. Use appropriate HCWA Standard Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.1.17 Creek Crossings

- A. All pipe used in creek crossings shall be ductile iron.
- B. All crossings shall be perpendicular to the creek unless otherwise approved.
- C. HCWA reserves the right to require casing for any creek crossing. The casing shall extend to a minimum of 10 feet beyond the top of the bank.
- D. The minimum depth of cover above the casing pipe shall be 12 inches.
- E. Use appropriate HCWA Standard Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

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SECTION 2.2 - GRAVITY FLOW SANITARY SEWER SYSTEMS

2.2.1 General

All gravity flow sanitary sewer systems that will be connected to the HCWA sanitary sewage system shall be designed in accordance with these standards. Any deviation from these standards shall be approved in writing by the HCWA Engineer.

2.2.2 Design Flow Rates

A. General

1. Sanitary sewer systems shall be designed for the estimated build-out population of the drainage basin.
2. Sanitary sewer systems shall be designed and installed, and/or extended, to the uppermost property line of the development being served, as deemed necessary by HCWA.

B. Average Daily Flow Rates

1. The following average daily flow rates shall be used in the design of sanitary sewerage systems.
 - a) Residential: 300 GPD per residential unit.
 - b) Apartment/Townhome: 200 GPD per apartment unit.
 - c) Hotel/Motel: 100 GPD per hotel/motel room.
 - d) Commercial/Manufacturing/Industrial: As required by use (provide justification to the HCWA for the average daily flow rate used)
2. The projected Average Daily Flow Rate for areas outside of the proposed development shall be calculated using the following typical flow rates.
 - a) Low Density Residential: 100 GPD/acre
 - b) Medium Density Residential: 600 GPD/acre
 - c) High Density Residential: 1,200 GPD/acre
 - d) Open/Park Areas: 100 GPD/acre
 - e) Commercial/Manufacturing/Industrial: 2,000 GPD/acre

C. Peak Hour Flow Rates

- A. The peak hour flow rate for new residential developments shall be calculated using a peaking factor of 3.0.

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- B. The peak hour flow rate for new commercial developments shall be calculated using a peaking factor based upon the proposed use of the development. The minimum peaking factor shall be 2.0.
- C. The peak hour flow rate for undeveloped areas shall be calculated using the following equation.

$$Q_{PHF} = Q_{ADF} \times \frac{18 + \sqrt{P}}{4 + \sqrt{P}}$$

Where:

Q_{PHF} = Peak Hourly Flow Rate

Q_{ADF} = Average Daily Flow Rate

P = Population in Thousands Based on 100 GPD/Capita

2.2.3 Hydraulics

- A. Sanitary sewer systems shall be designed using Manning's equation.

$$Q = \frac{1.49}{n} (A)(r_h)^{2/3}\sqrt{S}$$

Where:

Q = Flow Rate, ft³/s

n = Manning's Coefficient

A = Pipe Cross-Sectional Area, ft²

r_h = Hydraulic Radius

S = Slope, ft/ft

- B. The value of the Manning's Coefficient, n, shall be 0.013 for all pipe materials.
- C. Sanitary sewer systems shall be designed to carry the Peak Hourly Flow rate at 75 percent of the full depth ($d/d_{FULL} = 0.75$).
- D. Sanitary sewers shall be designed with a minimum velocity of 2 ft/s, flowing full, based on the Manning's equation and using a Manning's Coefficient of 0.013.
- E. The following table presents the minimum allowable slopes for sanitary sewer mains; however, slopes greater than these are desirable.

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Nominal Sewer Size	Minimum Slope in Feet per 100 Feet
8 inch	0.50
10 inch	0.28
12 inch	0.22
15 inch	0.15
16 inch	0.14
18 inch	0.12
20 inch	0.11
21 inch	0.10
24 inch	0.08
27 inch	0.07
30 inch	0.06
36 inch	0.05
42 inch	0.04
48 inch	0.04

- F. The maximum slope of a gravity flow sanitary sewer shall be 15 percent unless approved by HCWA.
- G. Sanitary sewer mains with slopes greater than 15 percent shall be anchored with concrete anchors (dead-mans). The Developer's design professional shall be responsible for calculating the size and spacing of the concrete anchors. Calculations shall be submitted to HCWA.
- H. Sanitary sewer laterals must have consistent positive flow to the main (minimum of 1% slope typical for 6 inch diameter laterals).

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- I. The angle formed between the inlet sewer line and outlet sewer line in a manhole shall be greater-than or equal to 90° and less-than or equal to 270°.
- J. Surcharging of manholes shall be prohibited.

2.2.4 Sanitary Sewer Size and Material

- A. Minimum sanitary sewer size
 - 1. Sanitary sewer outfalls and mains: 8 inch Diameter
 - 2. Sanitary sewer laterals: 6 inch Diameter
- B. Acceptable Sanitary Sewer Materials:
 - 1. Ductile iron pipe
 - 2. PVC - SDR 26 or approved equal
- C. Use ductile iron pipe when depth of cover is less than 5 feet or greater than 16 feet.
- D. Use ductile iron pipe when slope of sewer line is greater-than or equal to 15 percent.
- E. All creek crossings shall be ductile iron pipe.
- F. All water line and storm water line crossings with less than 18 inches of clearance shall be ductile iron pipe.

2.2.5 Sanitary Sewer Location

- A. Sanitary sewer manhole lids, located under pavement, along a paved road corridor, shall be located as close to the center line of the road as possible.
- B. Sanitary sewer line segments located under pavement, along a paved road corridor, shall be located a minimum of 3 feet inside the asphalt pavement.
- C. Sanitary sewer lines located in sanitary sewer easements shall be located in the center of the easement.
- D. Sanitary sewer lines running parallel to an existing or proposed water line shall be located a minimum of 10 feet horizontally from the water line unless otherwise approved by the HCWA Engineer. Distances shall be measured from outside of pipe to outside of pipe.
- E. Sanitary sewer lines that cross an existing or proposed water line shall have a minimum clearance of 18 inches vertically above or below the water line unless otherwise approved by the HCWA Engineer. At water line crossings, the sanitary sewer line shall cross in the middle of one (1) full length of water line so that both pipe joints on the water

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line will be as far from the sanitary sewer line as possible. In cases where the HCWA Engineer allows a vertical clearance of less than 18 inches, the first two joints on each side of the crossing shall be restrained and the pipe shall be protected as required by HCWA.

- F. Use appropriate HCWA Standard Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.
- G. No trees, light poles or other service provider boxes shall be installed directly above our service line, 5ft. horizontal separation.
- H. For public gravity sewer extensions, pipe bedding and trench sidewalls, up to the pipe crown, shall not be installed in fill conditions, unless otherwise approved by HCWA.

2.2.6 Sanitary Sewer Bury Depth

- A. Sanitary sewer lines shall have a minimum of 48 inches of cover as measured from crown of pipe to ground surface. Where the ground surface above the sanitary sewer line is higher than the edge of pavement of the existing or proposed roadway, the minimum cover shall be measured from the crown of pipe to the edge of pavement, existing or proposed, whichever is lower.
- B. Minimum cover within a paved street shall not be less than 6 feet, unless otherwise approved by HCWA.
- C. The maximum cover depth for gravity sewer mains shall not exceed 20 feet., unless otherwise approved by HCWA.
- D. Manhole and pipe bedding shall be in-situ soil.
- E. Use appropriate HCWA Standard Details located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.2.7 Sanitary Sewer Manholes

A. General

1. Sanitary sewer manholes shall be precast concrete structures with tongue and groove joints.
2. The minimum inside diameter of manholes shall be 48 inches.
3. Manholes shall be provided with reinforced plastic manhole steps. Steps shall have a maximum spacing of 12 inches.

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4. Manholes shall have a minimum 0.10 foot drop from the influent invert to the effluent invert.
5. Manholes shall have a maximum inside drop of 2 feet. Manholes that require a drop greater than 2 feet shall be constructed with outside drops. Drops (outside or inside) in manholes are typically approved only for situations where there is a physical conflict with a storm drain, etc. that cannot be rectified by other means.
6. Manhole section joints shall be sealed watertight using a preformed butyl joint seal.
7. Pipe to manhole connections shall be sealed watertight using resilient connectors.
8. An observation manhole shall be installed where sanitary and grease interceptor flow combines.
9. Use appropriate HCWA Standard Details located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

B. Location and Spacing

1. Manholes shall be installed at the end of each line; at all changes in grade, size, or alignment; and at all intersections.
2. Maximum distance between manholes shall be 400 linear feet.

C. Rim Elevation

1. Manholes located in the street, in a sidewalk, or in a landscaped area shall have their lids installed flush with grade.
2. Manholes located outside of streets and sidewalks in non-landscaped areas shall have their lids installed a minimum of 2 feet above grade, unless otherwise approved by HCWA.
3. Use appropriate HCWA Standard Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

D. Manhole Lids

1. Manhole lids shall have a minimum clear opening of 22 inches.
2. All manholes located outside of the pavement that do not require adjustment to grade shall have the frame cast into the cone section by the manufacturer with bolt-down, watertight lids.
3. Use appropriate HCWA Standard Details located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

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2.2.8 Corrosion Protection for Sanitary Sewer Systems

- A. Manholes that have a sanitary sewage force main discharging into them and manholes that are subject to corrosion shall be lined with an elastomeric polyurethane lining system (SprayRoq, or approved equal by HCWA).
- B. The manhole that the sanitary sewage force main discharges into, plus all manholes located within 1,600 feet downstream of the discharge manhole, shall be lined with the above described system.
- C. Existing manholes that exhibit corrosion and leakage shall be repaired using polyurethane grouts to stop infiltration and repair mortars to repair the structure prior to coating with a elastomeric polyurethane lining system or HCWA approved equal.
- D. The sanitary sewer lines that connect these lined manholes shall be PVC or ductile iron pipe with approved protective lining.

2.2.9 Sanitary Sewer Flow Meters

- A. All developments, both residential and non-residential, that generate an average daily flow rate of 100,000 GPD or more shall provide a sanitary sewer flow meter in the last manhole before the flow leaves the development, or as determined by HCWA. The type of flow meter that is used shall be approved by HCWA.

2.2.10 Jack and Bore Installations

- A. Unless otherwise approved, sanitary sewer lines that cross a GDOT roadway, Henry County DOT roadway, or railroad right-of-way shall be installed with cased jack and bores.
- B. Use appropriate HCWA Standard Detail when applicable located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications.

2.2.11 Creek Crossings

- A. All pipe used in creek crossings shall be ductile iron, unless otherwise approved by HCWA.
- B. All crossings shall be perpendicular to the creek unless otherwise approved.
- C. HCWA reserves the right to require casing for any creek crossing. The casing shall extend to a minimum of 10 feet beyond the top of the bank.

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- D. The minimum depth of cover above the casing pipe shall be 12 inches.
- E. Use appropriate HCWA Standard Detail when applicable.

2.2.12 Aerial Crossings

- A. Aerial crossings shall be avoided whenever possible. All aerial crossings shall be pre-approved by HCWA.
- B. Any piping system that crosses a perennial or annual stream shall not cause an impedance to navigation or cause water to pool upstream of the pipe.
- C. All pipe used in aerial crossings shall be ductile iron.
- D. Aerial pipe supports shall be designed by a structural engineer licensed by the Georgia State Board of Registration for Professional Engineers and Land Surveyors.
- E. Aerial pipe supports shall be situated on suitable soils. The soils on which an aerial support will be placed shall be tested by a soils testing company for bearing capacity and suitability for construction. A soils report shall be submitted with the construction plans and specifications.

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SECTION 2.3 - SANITARY SEWER FORCE MAINS

2.3.1 Sanitary Sewer Force Mains

- A. All sanitary sewer force mains that will be connected to the HCWA sanitary sewer system shall be designed in accordance with these standards. Any deviation from these standards shall be approved in writing by the HCWA Engineer.

2.3.2 Hydraulics

- A. Sanitary sewage force mains shall be designed to have a minimum velocity of 2.5 ft/s and a maximum velocity of 6 ft/s. The minimum velocity in the force main when all pumps are operating shall be 3.5 ft/s.

2.3.3 Force Main Size and Material

- A. Minimum Sanitary Sewer Force Main Size: 4 inch Diameter, unless otherwise approved by the HCWA Engineer.
- B. Acceptable Sanitary Sewer Force Main Materials:
 - 1. C900 PVC Pipe (C905 or C909). Pressure Class of pipe shall be specified to fit application.
 - 2. Pressure Class 350 Ductile Iron Pipe and Fittings, lined with PROTECTO 401 Ceramic Epoxy

2.3.4 Force Main Location

- A. Sanitary sewer force mains located in the right-of-way shall be located 5 feet inside the right-of-way and on the opposite side of the road as the water line whenever possible.
- B. Sanitary sewage force mains located in sanitary sewer easements shall be located in the center of the easement.
- C. Sanitary sewage force mains shall be located a minimum of 10 feet horizontally from any existing or proposed water main and 18 inches vertically below any existing or proposed water main. Distances shall be measured outside of pipe to outside of pipe.
- D. Sanitary sewage force mains running parallel to an existing or proposed water line shall be located a minimum of 10 feet horizontally from the water line unless otherwise

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approved by the HCWA Engineer. Distances shall be measured outside of pipe to outside of pipe.

- E. Sanitary sewage force mains that cross an existing or proposed water line shall have a minimum clearance of 18 inches vertically above or below the water line unless otherwise approved by the HCWA Engineer. At water line crossings, the sanitary sewage force main shall cross in the middle of one (1) full length of water line so that both pipe joints on the water line will be as far from the sanitary sewage force main as possible. In cases where the HCWA Engineer allows a vertical clearance of less than 18 inches, the first two joints on each side of the crossing shall be restrained and the pipe shall be protected as required by HCWA.
- F. Tracer wire shall be installed on all non-metallic sanitary sewage force mains.
- G. Use appropriate HCWA Standard Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.3.5 Force Main Bury Depth

- A. Sanitary sewage force mains shall have a minimum of 60 inch of cover as measured from crown of pipe to ground surface. Where the ground surface above the sanitary sewage force main is higher than the edge of pavement of the existing or proposed roadway, the minimum cover shall be measured from the crown of pipe to the edge of pavement.
- B. Use appropriate HCWA Standard Details located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.3.6 Isolation Valves

- A. All valves on sanitary sewage force mains shall be eccentric plug valves.
- B. Use appropriate HCWA Standard Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.3.7 Combination Air/Vacuum Valves

- A. Combination air/vacuum valves shall be provided at all locations along the sanitary sewage force main deemed appropriate as determined by the design engineer.
- B. Combination air/vacuum valve locations are subject to review by HCWA.

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- C. Combination air/vacuum valves shall be sized in accordance with the manufacturer's recommendations.
- D. Use HCWA Standard Details located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.3.8 Thrust Restraint

- A. All fittings, valves, and dead-ends shall have two (2) forms of thrust restraint.
- B. Acceptable thrust restraint includes restrained joint glands, field lock gaskets, threaded rods, and concrete blocking. The design engineer shall be responsible for calculating the thrust restraint requirements.
- C. Use HCWA Standard Details located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.3.9 Jack and Bore Installations

- A. Unless otherwise approved, sanitary sewage force mains that cross a GDOT roadway, Henry County DOT roadway, or railroad right-of-way shall be installed with cased jack and bores.

2.3.10 Creek Crossings

- A. All pipe used in creek crossings shall be ductile iron, unless otherwise approved by HCWA.
- B. All crossings shall be perpendicular to the creek unless otherwise approved.
- C. HCWA reserves the right to require casing for any creek crossing. The casing shall extend to a minimum of 10 feet beyond the top of bank.
- D. The minimum depth of cover above the casing pipe shall be 12 inches.
- E. Use appropriate HCWA Standard Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

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SECTION 2.4 - SANITARY SEWER LIFT STATIONS

2.4.1 General

- A. This section shall be used as a guideline for the design of sanitary sewage lift stations capable of pumping up to 700 GPM. Pump stations greater than 700 GPM may require additional HCWA guidelines and will require GA EPD approval.
- B. Lift stations are to be avoided whenever possible.
- C. Lift stations will only be allowed when pre-approved by the HCWA (see Section 1.9).
- D. When sanitary sewage lift stations are allowed/required, the HCWA reserves the right to design and construct the necessary lift station(s), with appropriate charges being made to the Developer/Owner. The HCWA may elect to size the lift station to serve the overall drainage basin, rather than just sizing it to serve the development proposed.
- E. Pumps, motors, and associated lift station appurtenances shall be furnished as a package from a single manufacturer.
- F. The sanitary sewage lift station shall include a standby power system and remote monitoring system described in Sections 2.4.8 and 2.4.9.
- G. In addition to complete construction plans and specifications, the following information shall be submitted to the HCWA Engineer as part of the sanitary sewage lift station design package.
 - 1. Average and peak hour design flow rate calculations
 - 2. Total head calculations
 - 3. System head curve plotted on the manufacturer's pump curve
 - 4. Brake Horsepower (BHP) calculations
 - 5. Net Positive Suction Head Available (NPSHA) calculations
 - 6. Net Positive Suction Head Required (NPSHR) data
 - 7. 100-year flood elevation at the proposed sanitary sewage lift station site
 - 8. Minimum wet well volume calculations/pump cycle time calculations
 - 9. Wet well buoyancy calculations

2.4.2 Hydraulics

- A. Total head shall be calculated using the following equation.

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$$TH = h_s + h_f + h_m + h_p + \frac{V^2}{2g}$$

Where:

h_s = Static Head, ft

h_f = Head Loss due to Friction, ft

h_m = Minor Head Losses, ft

h_p = Pressure Head, ft

$V^2/2g$ = Velocity Head, ft

V = Velocity of the fluid in the piping system, ft/s

g = Acceleration due to Gravity, 32.2 ft/s²

B. Friction losses shall be calculated using the Hazen-Williams equation.

$$h_f = 10.44 \times \frac{Q^{1.85} \times L}{C^{1.85} \times d^{4.8655}}$$

Where:

h_f = Head Loss due to Friction, ft

Q = Flow Rate, GPM

L = Length of Pipe, ft

C = Hazen-Williams Coefficient

d = Inside Diameter of Force Main, inches

C. Minor head losses shall be calculated as a fraction of the velocity head.

$$h_m = K \times \frac{V^2}{2g}$$

Where:

h_m = Minor Head Loss, ft

K = Minor Loss Coefficient. The minor loss coefficient is the sum of the head loss coefficients for all of the minor loss elements in the piping system. Use standard published values for "K."

V = Velocity of the fluid in the piping system, ft/s

g = Acceleration due to Gravity, 32.2 ft/s²

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2.4.3 Location of Sanitary Sewer Lift Stations

- A. The location of all sanitary sewage lift stations shall be coordinated with and approved by the HCWA prior to beginning design.
- B. Sanitary sewage lift stations shall be accessible during a 100-year storm event.
- C. All mechanical components of the sanitary sewage lift station shall be located above the 100-year flood elevation.
- D. All electrical components shall be located a minimum of 3 feet above the 100-year flood elevation.

2.4.4 Sanitary Sewer Lift Station Property and Access

- A. Sanitary sewage lift stations shall be located on a minimum 100 foot by 100 foot piece of property. This property shall be platted and deeded to the HCWA at no cost. HCWA may require a larger piece of property depending on site conditions.
- B. Any roads required to access the sanitary sewage lift station from the public street right-of-way shall be included as part of the platted and deeded property. The minimum width of the access property shall be 30 feet.
- C. Use HCWA Standard Details located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.4.5 Lift Station Components

A. General

- 1. Sanitary sewage lift stations shall be above ground Gorman-Rupp Auto-Start Lift Stations. The above ground lift station shall be a pre-engineered unit that only requires the connection of the inlet and outlet pipes and incoming power. Gorman-Rupp Auto-Start Lift Station shall be manufacturer's standard design.
- 2. If conditions prohibit the use of suction lift pumps, then Flygt submersible, heavy duty sewage pumps shall be used with N type impeller whenever possible.

B. Pumps

- 1. Pumps for above ground sanitary sewage lift stations shall be Gorman-Rupp T-Series, Super T-Series, or Ultra V Series self-priming centrifugal, heavy duty solids-handling pumps.

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2. If conditions prohibit the use of suction lift pumps, pumps shall be Flygt submersible, heavy duty sewage pumps.
3. A minimum of two (2) pumps shall be provided.
4. The sanitary sewage lift station shall be capable of pumping the peak hour flow rate with the largest pump out-of-service.
5. Pumps shall be capable of passing a 3 inch diameter sphere.
6. One (1) complete spare parts kit shall be provided with each pump.
7. Suction-lift pumps shall be provided with a pump drain kit consisting of 10 feet of plastic hose with a quick-connect female cam-lock fitting on one end of the hose and two sets of fittings for pump drains (stainless steel pipe nipple, stainless steel bushing, stainless steel ball valve, and aluminum quick connect cam-lock fitting).

C. Motors

1. Motors for above ground sanitary sewage lift stations shall be horizontal, open drip-proof, NEMA B design, induction type, with Class F insulation.
2. Motors for submersible pumps shall be NEMA B design, induction type with squirrel cage rotor, shell type design, housed in an air filled, watertight chamber.
3. Motors shall operate on 480 Volt, 3 phase, 60 HZ power, and shall have a 1.15 service factor unless otherwise approved by HCWA.
4. Motor shall be non-overloading at all points along the pump curve.

D. Piping

1. Piping shall be appropriately sized ductile iron pipe. Minimum diameter shall be 4 inches. All fasteners shall be stainless steel.
2. A bypass connection shall be provided on the discharge header of the pump station. The size of the discharge connection shall be equal in size to the discharge connection of the pump, but no less than 4 inches.

E. Valves

1. Check Valves
 - a) A lever and weight type check valve or lever and spring type check valve shall be provided on the discharge of each pump and at other locations as required.

F. Plug Valves

1. An eccentric plug valve shall be provided on the discharge of each pump.

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2. An eccentric plug valve shall be installed on the force main within the lift station property. Location to be coordinated with HCWA.

G. Pressure Gauge

1. A pressure gauge shall be installed on the discharge header of the sanitary sewage lift station.
2. Above ground sanitary sewage lift stations shall have a combination pressure/vacuum gauge installed on the suction side of the pumps.
3. Pressure gauges shall be liquid filled and shall be provided with a diaphragm seal and isolation ball valve.

H. Flow Meter

1. An HCWA approved inline sewer flow meter shall be installed on the lift station force main.

I. Enclosure

1. Above ground sanitary sewage lift stations shall be provided with a molded fiberglass reinforced enclosure which houses all pumps and equipment. Enclosure shall be capable of withstanding 150 MPH wind loads. Exterior surface shall be colored green and interior surface shall be colored white.
2. The enclosure shall be the standard enclosure for Gorman-Rupp Auto-Start Lift Stations and shall be provided with the following additional features.
 - a) 120 V, 40 W, two (2) lamp fluorescent light fixture
 - b) 1,600 CFM, 120 V exhaust fan with thermostat
 - c) Two (2) thermally actuated fresh air intake vents
 - d) Two (2) sets of thermally actuated exhaust vents for each engine provided
3. HCWA reserves the right to require that another style enclosure be provided (i.e. brick, block, stucco, etc.) depending on the location of the sanitary sewage lift station.

2.4.6 General Electrical Requirements

- A. All wiring shall be in accordance with NEC standards.
- B. All electrical components shall be mounted in NEMA 4X enclosure(s).
- C. Power shall be 480 V, 3-phase, 60 HZ unless otherwise approved by HCWA.

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- D. Use appropriate HCWA Standard Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.4.7 Controls

A. Pump Controls

1. Pump controls shall be designed and provided by the pump manufacturer.
2. Control panels located in non-hazardous locations shall be NEMA 4X, Type 304 stainless steel. Control panels located in hazardous locations shall be NEMA 7, Type 316 stainless steel.
3. Controls shall be provided which will allow the pumps to be operated either manually or automatically.

B. Level Control

1. A submersible pressure transducer shall be used to measure the water level in the wet well and turn the pumps on and off.
2. The pressure transducer shall be in 02" PVC casing (Gorman Rupp) or 04" PVC casing (Flygt) and secured to the wet well with stainless steel straps and anchor bolts.
3. Casing shall extend through the top of the wet well and be a minimum of 06" from bottom of wet well.
4. A stainless-**steel** bolt shall be installed through the bottom of the pipe such that transducer is contained within the casing.

C. Float Switch

1. A low-level float switch and high-level float switch shall be provided as an emergency backup to the submersible level transducer. A cable weight shall be provided with each float switch.

2.4.8 Backup Power System

- A. All sanitary sewage lift stations shall be provided with a backup power system.
- B. Gorman-Rupp Auto-Start Ground Lift Stations
 1. Backup power system shall be propane or natural gas driven Auto-Start Lift Station standby engine which is part of the Gorman-Rupp Auto-Start Lift Station package.

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- C. Engine shall be equipped with all controls and components required for manual and automatic operation.
- D. Submersible Lift Stations
 1. Backup power system for submersible lift stations shall be a diesel fuel driven generator. Diesel fuel driven generators shall be provided with a fuel storage tank that provides a minimum of 24 hours of operation. Natural gas or propane driven units can be used if approved by HCWA and meet the design specifications.
 2. Generator shall be sized to operate all pumps and appurtenances without exceeding 85 percent of the generator's full capacity.
 3. Generator shall have an acoustical enclosure that reduces the noise level to at least 75 dB at 3 feet.
 4. Generators shall be provided with a platform that provides access to all entry points to the enclosure.
 5. Generators shall be Precision Systems, Inc. Power-Pac Above Grade, Tip-up Power Package, or HCWA approved equal.
 6. Generator shall have the manufacturer's standard equipment plus the following additional equipment.
 - a) Insulated fiberglass enclosure
 - b) Exterior flashing alarm light
 - c) Critical exhaust silencer
 - d) Inside insulated exhaust
 - e) Sound attenuation
 - f) Heater

2.4.9 Supervisory Control and Data Acquisition (SCADA) System

A. General Description

The Supervisory Control and Data Acquisition (SCADA) operates as an autonomous system, monitoring sensors, displaying data, operating controls, activating alarms and logging information to facilitate and optimize the plant processes and on-going operations. It shall be capable of polling, transmitting and receiving data, at high rates of speed, using secure protocols and error avoidance methods. The SCADA shall be capable of remote interrogation and re-configuration, while providing access for remote

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viewing and control of screens, logs, and files. The Remote Telemetry Unit (RTU) shall be the controller responsible for acquiring and executing the data.

B. Scope

The work covered by this section includes furnishing all labor, materials, and equipment required to install, test and place into satisfactory operation SCADA equipment required for the project.

C. Submittals

1. At minimum, the submittals shall contain, but not limited to, the following information to establish compliance with these specifications:
 - a) Drawings showing plan, elevations, appropriate cross sections, critical dimensions, connections, fasteners and anchors of the equipment being provided.
 - b) Complete engineering data including, but not limited to, descriptive data and material specifications to support the design of the equipment being provided.
 - c) Manufacturer's installation instructions.
2. All SCADA documentation and test results must be approved by the HCWA SCADA Department prior to purchase and installation of materials and equipment.

D. Storage and Protection

1. RTU and other electrical components shall be securely stored indoors until installation.
2. Antenna cable shall have both ends protected from water intrusion at all times.
3. Tower shall be protected from damage.

E. Project Closeout Submittals

1. The HCWA SCADA Department shall receive, in electronic format and 2 printed copies, all final documentation including as-builts. This includes, but not limited to:
 - a) Site drawings
 - b) Panel drawings
 - c) Loop drawing and electrical schematics of I/O wiring
 - d) Test results of radio path study
 - e) Test results of coax cable sweep
 - f) Programs installed on RTUs

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F. Products – Approved System Integrators

1. An HCWA approved System Integrator shall be used to integrate the various process controls, instrumentation, SCADA system, HMI (Human Machine Interface) system, local area network, improvements/upgrade of the HMI system and programming of the existing SCADA system. This requirement is to insure continuity and point source responsibility for total system operation.
2. The System Integrator must be certified by Inframark/MR Systems. The contractor shall provide written evidence to the owner that the Integrator has current certification from Inframark/MR for the specified systems and software for no less than 1 year. Failure to provide this certification will result in disqualification of the system integrator by the owner.
3. The System Integrator must be qualified and trained to successfully display all necessary data on the VTScada platform from any SCADA hardware equipment.
4. The approved System Integrator shall provide evidence of a VTScada installation of similar or greater scope with no less than 2 references. The System Integrator shall also provide references and phone numbers of successful projects completed within the past 3 years using any SCADA PLC hardware. These letters shall be delivered to the owner via the consulting Engineer prior to execution of the contract and issuance of the Notice to Proceed.
5. Failure to provide evidence of certification and work experience will result in disqualification of the System Integrator. Should the System Integrator be disqualified, the General Contractor shall offer another System Integrator with proper certification and work experience at no additional cost to the HCWA.
6. Work performed on the SCADA system shall conform to the standards set by the SCADA Dept. This shall include but not limited to:
 - a) All IP addresses will be assigned by the SCADA Dept.

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- b) All tags shall conform to a set nomenclature which shall be approved by the SCADA Dept.
- c) All programs shall utilize function block.
- d) All screens shall be similar in design and approved.

G. PLC/RTU Guidelines

Any device that performs a logical function in the operation of equipment must be approved by the HCWA SCADA Department. The currently specified RTU has the ability and functions of a PLC and shall be utilized for this feature. This will entail the removal of unneeded equipment and passing their operation down to the RTU control, which will reduce the number of devices required to run and monitor equipment.

H. RTU Specification Guidelines

The Programmable Logic Controller (PLC) shall be a Bristol Babcock Control Wave Micro (CWM) with the following requirements:

1. The PLC base unit shall be a minimum size of 4 slots. There shall be a minimum of 2 spare card slots unused.
2. CPU shall be a minimum of 150MHz, 1M SR, 4M SD, 16M Flash
3. PLC shall support 10/100 Mbps Ethernet 802.3/u compliant data port
4. There shall be a minimum of 1 ethernet port, 2 RS232 port, and 1 RS485 port
5. PLC shall be capable of operating at 12vdc and 24vdc. 24vdc will be utilized to power all new installations.
6. The following I/O boards shall be utilized first to maintain consistency in the system. Any other I/O boards required for the job shall be analog isolated or digital cards with LEDs.
 - a) 16DI/4DO Card w/LEDs
 - b) 4AO Card, isolated
 - c) 8AI Card, internally, externally sourced
7. A display shall be provided for each PLC/RTU to monitor local data. The display shall be no less than 4 lines X 20 characters and shall be mounted to the external front door of the panel. The display shall be sealed to prevent moisture intrusion.
8. No Serial MODBUS communications to the RTU will be allowed. All

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communications shall conform to the TCP/IP Standard.

I. Enclosure Specification Guidelines

A NEMA rated stainless steel enclosure shall be installed for each Remote Telemetry Unit (RTU). For indoor applications, a NEMA 12 rating and for outdoor applications a NEMA 4x stainless steel 316 enclosure. All PLC/RTU enclosures must contain a ventilation system, to prevent equipment malfunction due to heat build-up. The ventilation system shall be designed to minimize foreign object intrusion without hindering proper air flow. All PLC/RTU enclosure shall contain, at minimum, the following items:

1. Power for the RTU enclosure and equipment breaker shall be obtained from a dedicated breaker per current NEC and local electrical codes.
2. AC surge protection shall be installed in the enclosure.
3. All I/O wires from PLC shall be terminated on a terminal block which will be mounted on a DIN rail.
4. 110vAc GFI outlet shall be provided inside the enclosure and installed per current NEC and local electrical codes.
5. The enclosure shall be capable of being secured with a 3/16" diameter shackle padlock.
6. Power supply(s) rated for the RTU equipment and radio shall be installed. The power supply(s) shall provide a battery charging circuit to maintain the proper voltage on the battery. The following power supplies are approved:
 - a) Phoenix Contact Quint-PS/1AC/24vDC/5amp
 - b) Phoenix Contact Quint-PS/1AC/24vDC/10ampThe following UPS is approved:
 - a) Phoenix Contact Quint-UPS 24vDC/20amp
7. A minimum of 2-7AH batteries shall be provided. These batteries shall be located at the bottom of the RTU box to prevent leakage to any other equipment. The batteries shall be capable of maintaining equipment for no less than 3 hrs. And shall be tested to ensure proper operation.
8. There shall be a network switch installed in each panel with a minimum of 2 spare ports available. The following switches are approved:
 - a) N-Tron 106FX2-SC

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- b) N-Tron 110FX2-SC
- c) Phoenix Contact FL Switch SFNB 5TX

J. Antenna Tower

The antenna tower shall be self-supporting and set in concrete caisson bases. The tower will be designed for a basic wind speed of 71 mph with ½” of radial ice in accordance with ANSI/TIA/EIA-222-F-1996. If soil tests are not performed, the dimensions of the base shall conform to poor soil conditions. Poor soil conditions shall consist of soil capacity of 2 ksf, water table 4’ below surface, and dry density of 100pcf. The required height will be determined by the RF Study. Tower must be capable of future extension up to 20% higher or per prior arrangements made by HCWA SCADA Dept. This additional height shall be obtained by adding sections to the top of the existing tower as needed.

1. If caisson bases are not possible due to underground piping, utilities or inadequate footprint requirements, then a concrete base will be the only other option. In either case the tower base design documents shall be strictly adhered to, no exceptions.
2. The following Tower Manufacturer has been pre-approved.
 - a) Sabre Towers & Poles Model S3TL

K. Antenna

The antenna(s) shall be installed once the tower has been erected. The number of antennas shall be determined by the RF study. The vertical and directional antennas shall use Type N connectors rated for the required frequency. The antenna shall have a minimum of 10db gain and shall be tuned for the frequency required. The antenna shall be mounted per manufacturer installation instructions and proper vertical separation maintained.

L. Grounding

Grounding shall be installed per local and NEC code. This shall include:

1. A delta ground system installed at the base of the tower. The tower shall be bonded to this ground system.
2. A static discharger provided at the top of the tower and bonded to the tower.
3. Helix cable is to be bonded to the tower at the base.
4. All ground connections shall be protected with zinc oxide to prevent corrosion.

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5. The RTU chassis and polyphaser shall be bonded to the building and electrical ground.

M. Heliax Cable

Heliax cable shall be installed to obtain the least amount of db loss for the required frequencies. The size of the cable shall be determined based upon the RF study. The cable shall be installed with Type N connectors and secured to the tower to prevent movement. The cable connections shall be sealed to prevent moisture intrusion and corrosion. A polyphaser lightning protection shall be installed at the point the coax cable enters the RTU box. Upon completion of the cable installation, a sweep test of the cable shall be performed and turned over to the owner before acceptance.

1. The following cable has been pre-approved:
 - a) Andrew ½" Foam Heliax Cable – LDF4-50A
 - b) Andrew 7/8" Foam Heliax Cable – LDF5-50A

N. Radios

Radio selection for any site will be based on the results of a Radio Path Study. The study will determine at what frequency a particular sight must communicate. The following radios are approved for this project:

1. The Dataradio ViPR SC-900 from Cal Amp Corp.
2. The Dataradio ViPR SC-400 from Cal Amp. Corp.

O. Radio Path Study

An RF Engineer shall perform a radio path study. This study shall include terrain, trees, buildings and foliage for the different seasons. This study will determine the proper height of the antennas, type of cable required and direction of antenna. The study shall obtain a clear radio line of sight. If a clear radio line of sight cannot be obtained, then an alternative radio path will be considered. A minimum fade margin of 20db above the receiver sensitivity threshold must be obtained.

P. FCC Licenses

The contractor, working with the integrator and HCWA SCADA, shall be responsible for ensuring that the radio is covered under a current frequency license or apply for a new/corrected license if required.

Q. Testing

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The Contractor shall field test all SCADA related equipment in the presence of a representative from the HCWA SCADA Department to demonstrate that the instrumentation and controls operate as specified. This test includes but is not limited to:

- 1) Proper I/O signals
- 2) Program operation
- 3) Communication with all equipment
- 4) Battery backup operation
- 5) Verification of all RTU voltages

2.4.10 Wet Well

- A. Circular wet wells shall have a minimum inside diameter of 72 inches.
- B. Rectangular wet wells shall be minimum 72 inches by 72 inches square.
- C. The volume between the “Lead Pump On” elevation and the “Pump Off” elevation shall be calculated using the following equation.

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

Where:

V_{\min} = Minimum Wet Well Volume, gallons

Q = Flow Rate of Largest Pump, GPM

t = Pump Cycle Time, minutes

- D. The minimum pump cycle time, t, shall be 10 minutes (6 starts per hour). A longer pump cycle time, t, shall be used if required by the pump manufacturer.
- E. The gravity sewer line that is connected to the sanitary sewage lift station shall not be included in the minimum wet well volume.
- F. The distance from the bottom of the wet well to the “Pump Off” level shall be per the pump manufacturer’s recommendation.
- G. The distance between the “Lead Pump On” elevation and the “Lag Pump On” elevation shall be a minimum of 6 inches.
- H. The distance between the “Lag Pump On” elevation and the “High Level Alarm” shall be a minimum of 6 inches.
- I. The distance between the “High Level Alarm” and the invert of the gravity sewer line entering the wet well shall be a minimum of 6 inches.

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- J. Wet well walls and piping shall be coated with a corrosion resistant coating system (SprayRoq or approved equal).
- K. Wet well buoyancy calculations shall be prepared by the design engineer and submitted to HCWA.
- E. Use appropriate HCWA Standard Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.4.11 Fence and Gate

- A. A 6 foot tall chain link fence shall be installed around the lift station.
- B. Fence shall have three (3) strands of barbed wire.
- C. A 16 foot double gate (two 8-foot wide gate panels) shall be provided.
- D. Use appropriate HCWA Standard Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.4.12 Security Light

- A. A security light and light pole shall be provided by the local electrical service provider.

2.4.13 Potable Water Service Line

- A. A potable water service line shall be provided to the lift station property that terminates at a frost proof yard hydrant.
- B. A reduced pressure zone (RPZ) backflow preventer shall be provided on the potable water line. RPZ backflow preventer shall be protected from freezing.
- C. Use appropriate HCWA Standard Detail located at www.hcwa.com under the Development tab/Standard Water & Sewer Specifications when applicable.

2.4.14 Landscape

- A. Property outside of the fenced area shall be landscaped.
- B. Install weed barrier fabric over all areas to receive landscaping.
- C. Install evergreen shrubbery spaced no greater than five (5) feet apart around the fenced area. Shrubby shall have a minimum height of three (3) feet at the time of planting and shall have a mature height of at least six (6) feet. Prepare soil and plant shrubbery in accordance with shrubbery planting instructions.

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- D. Install wood mulch, free of dirt, around shrubbery and to the edge of the property. Mulch shall have a minimum depth of 3 inches.

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SECTION 2.5 - PROTECTED WATERSHEDS

2.5.1 Protected Watersheds

- A. HCWA reviews watershed protection measures for the following protected watersheds:
 - 1. Towaliga River
 - 2. Indian Creek
 - 3. Long Branch Creek
 - 4. Tussahaw Creek
 - 5. Shoal Creek
- B. General Watershed Delineation Maps can be obtained from HCWA Engineering or at www.hcwa.com.
- C. Applicant must meet all requirements described by the current Watershed Protection, Rules, Regulations and Ordinances.
- D. A hydrology report shall accompany all new plan submittals for projects in a protected watershed.

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DIVISION 3 – MATERIAL SPECIFICATIONS

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SECTION 3.1 - GENERAL

3.1.1 General

- A. All materials and equipment used on water distribution and sanitary sewerage systems shall be new.

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SECTION 3.2 - DUCTILE IRON PIPE AND FITTINGS

3.2.1 Ductile Iron Pipe

A. Ductile Iron Pipe

1. Ductile Iron Pipe shall meet the following specifications:
 - a) Ductile iron pipe shall be designed and manufactured in accordance with ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51.
2. Ductile iron used to manufacture ductile iron pipe shall meet the following minimum physical properties.
 - a) Minimum Tensile Strength – 60,000 PSI
 - b) Minimum Yield Strength – 42,000 PSI
 - c) Minimum Elongation – 10 percent
3. Ductile iron pipe thickness shall be in accordance with ANSI/AWWA C150/A21.50.
 - a) 4-inch through 12-inch ductile iron pipe shall be Pressure Class 350.
 - b) Greater than 12-inch ductile iron pipe shall be minimum Pressure Class 250.

B. Joints:

1. Buried Pipe:
 - a) Push-on joints in accordance with ANSI/AWWA C111/A21.11.
2. Above Grade (Non-Buried) Pipe:
 - b) Flanged joints in accordance with ANSI/AWWA C115/A21.15.

C. Gaskets:

1. Standard Push-on Joints:
 - a) Plain rubber gasket in accordance with ANSI/AWWA C111/A21.11.
2. Restrained Push-on Joints:
 - a) Plain rubber gasket with restraining teeth meeting the requirements of ANSI/AWWA C111/A21.11.
 - b) Acceptable manufacturers of restrained joint gaskets:
 - 1) American Ductile Iron Pipe Company Fast-Grip Gasket
 - 2) Griffin TALON RJ Gasket
 - 3) McWane SURE STOP 350 Gasket
 - 4) U.S. Pipe FIELD LOK 350 Gasket

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5) HCWA Approved Equal

3. Flanged Joints:

- a) Full face, 1/8 inch thick, red styrene-butadiene rubber (SBR) with a Durometer “Shore A” hardness of 65, a tensile strength of 1,000 PSI in accordance with ASTM F152, and an elongation of 400%.
- b) Gaskets shall meet the dimensions of ANSI/AWWA C115/A21.15.

D. Hardware:

1. Flanged Joints:

- a) Bolts shall be heavy hex type, low carbon steel, zinc plated in accordance with ASTM A307, Grade B.
- b) Nuts shall be heavy hex type, low carbon steel, zinc plated in accordance with ASTM A563, Grade A.
- c) Washers shall be SAE flat washers, low carbon steel, zinc plated in accordance with ASTM F844.

E. Coatings:

1. Buried Pipe:

- a) Interior:
 - 1) Non-corrosive conditions: Standard thickness cement-mortar in accordance with ANSI/AWWA C104/A21.4.
 - 2) Corrosive conditions: PROTECTO 401 Ceramic Epoxy
- b) Exterior:
 - 1) Asphaltic coating in accordance with ANSI/AWWA C151/A21.51.

2. Above Grade (Non-Buried) Pipe:

- a) Interior:
 - 1) Non-corrosive conditions: Standard thickness cement-mortar in accordance with ANSI/AWWA C104/A21.4.
 - 2) Corrosive conditions: PROTECTO 401 Ceramic Epoxy.
- b) Exterior:
 - 1) Universal primer

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3.2.2 Ductile Iron Fittings

A. Ductile Iron Fittings

1. Ductile Iron Fittings shall meet the following specifications:
 - a) Standard ductile iron fittings shall be designed and manufactured in accordance with ANSI/AWWA C153/A21.10.
 - b) Compact ductile iron fittings shall be designed and manufactured in accordance with ANSI/AWWA C153/A21.53.
 - c) Ductile iron used to manufacture ductile iron fittings shall meet the following minimum physical properties:
 - 1) Minimum Tensile Strength – 70,000 PSI
 - 2) Minimum Yield Strength – 50,000 PSI
 - 3) Minimum Elongation – 5 percent

B. Joints:

1. Buried Fittings:
 - a) Mechanical joints in accordance with ANSI/AWWA C111/A21.11.
 - b) Mechanical joints that require restraining shall be restrained with wedge type mechanical joint retainer glands for ductile iron pipe. Retainer glands shall be manufactured from high strength ductile iron in accordance with ASTM A536, Grade 65-45-12. Retainer gland dimensions shall be in accordance with ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A21.53.
 - c) Acceptable manufacturers of retainer glands:
 - 1) EBBA Mega-Lug Series 1100
 - 2) Sigma ONE-LOK Series D-SLDE
 - 3) Romac Romagrip
 - 4) HCWA Approved Equal
2. Above Grade (Non-Buried) Fittings:
 - a) Flanged joints in accordance with ANSI/AWWA C110/A21.10.

C. Gaskets:

1. Mechanical Joints:
 - a) Plain rubber mechanical joint gasket in accordance with ANSI/AWWA C111/A21.11.

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2. Flanged Joints:

- a) Full face, 1/8 inch thick, red styrene-butadiene rubber (SBR) with a Durometer “Shore A” hardness of 65, a tensile strength of 1,000 PSI in accordance with ASTM F152, and an elongation of 400%.
- b) Gaskets shall meet the dimensions of ANSI/AWWA C115/A21.15.

D. Hardware:

1. Mechanical Joints:

- a) Bolts shall be low carbon steel, zinc plated, tee-head bolts in accordance with ANSI/AWWA C111/A21.11.
- b) Nuts shall be low carbon steel, zinc plated in accordance with ANSI/AWWA C111/A21.11.

2. Flanged Joints:

- a) Bolts shall be heavy hex type, low carbon steel, zinc plated in accordance with ASTM A307, Grade B.
- b) Nuts shall be heavy hex type, low carbon steel, zinc plated in accordance with ASTM A563, Grade A.
- c) Washers shall be SAE flat washers, low carbon steel, zinc plated in accordance with ASTM F844.

E. Coatings:

1. Buried Fittings:

- a) Interior:
 - 1) Non-corrosive conditions: Double thickness cement-mortar in accordance with ANSI/AWWA C104/A21.4.
 - 2) Corrosive conditions: PROTECTO 401 Ceramic Epoxy.
- b) Exterior:
 - 1) Asphaltic coating in accordance with ANSI/AWWA C151/A21.51.

2. Above Grade (Non-Buried) Fittings:

- a) Interior:
 - 1) Non-corrosive conditions: Double thickness cement-mortar in accordance with ANSI/AWWA C104/A21.4.
 - 2) Corrosive conditions: PROTECTO 401 Ceramic Epoxy.

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b) Exterior:

1) Universal primer

F. Manufacturer

1. All ductile iron pipe and fittings used on a project shall be new and shall be the product of a single manufacturer, unless otherwise approved by the HCWA Engineer.
2. Acceptable manufacturers of ductile iron pipe and fittings:
 - a) American Cast Iron Pipe Company
 - b) McWane, Inc./Clow Water Systems Company
 - c) U.S. Pipe and Foundry Company
 - d) HCWA Approved Equal

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SECTION 3.3 - CASING PIPE

3.3.1 Steel Casing Pipe for Road Crossings

- A. Steel casing pipe shall be new, seamless steel pipe in accordance with ASTM A252, Grade 2.
 - 1. Minimum Thickness: ¼ inch
 - 2. Minimum Tensile Strength: 60,000 PSI
 - 3. Minimum Yield Strength: 35,000 PSI
 - 4. Minimum Elongation in 2 Inches: 25%
 - 5. Casing pipe shall have no mid-welds.

3.3.2 PVC Casing Pipe for Water Service Lines

- A. Polyvinyl chloride (PVC) casing pipe for service lines shall be new Schedule 40 PVC in accordance with ASTM D1784.

3.3.3 HDPE Casing Pipe for Water Service Lines

- A. High Density Polyethylene (HDPE) casing pipe for service lines shall be new DR 17 HDPE in accordance with ASTM D3035 or ASTM F714. HDPE pipe materials shall be in accordance with ASTM D3350.

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SECTION 3.4 - CASING SPACERS

3.4.1 Casing Spacers

- A. Panel and riser shall be Type 304 stainless steel, cross-linked epoxy coated carbon steel, or thermoplastic powder coated carbon steel.
- B. Liner shall be elastomeric PVC, 0.09 inches thick, with a Durometer "Shore A" hardness of 85-90 and a minimum 58,000 volt dielectric strength in accordance with ASTM D149.
- C. Runners shall be glass reinforced polymer (nylon).
- D. Acceptable Manufacturers:
 - 1. Advance Products & Systems, Inc., Model SSI or Model SI
 - 2. Pipeline Seal and Insulator, Inc., Model S or Model C
 - 3. Power Seal Corporation, Model 4810
 - 4. HCWA Approved Equal

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SECTION 3.5 - POLYETHYLENE ENCASEMENT

3.5.1 Polyethylene Encasement (Wrapping)

- A. Polyethylene encasement material shall be minimum 8-mil, linear low density, flat tube, virgin polyethylene film in accordance with ANSI/AWWA C105/A21.5.
- B. Polyethylene encasement shall have the following properties.
 - 1. Tensile Strength: Minimum 3,600 PSI
 - 2. Elongation: Minimum 800%
 - 3. Dielectric Strength: Minimum 800 V/mil
 - 4. Impact Resistance: Minimum 600 grams
 - 5. Propagation Tear Resistance: Minimum 2,550 grams force
- C. Polyethylene encasement shall be marked with the following information.
 - 1. Year of manufacture
 - 2. Type of resin
 - 3. Specification conformance
 - 4. Applicable pipe sizes
- D. Polyethylene encasement shall be the following color.
 - 1. Water Service – Blue
 - 2. Sanitary Sewage Service – Green
- E. Securing tape shall be 2-inch wide PVC pipe tape, minimum 10-mil thickness, 245-percent elongation, and 30 PSI tensile strength.

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SECTION 3.6 - COPPER TUBING

3.6.1 Domestic Made Copper Tubing for Water Service Lines

- A. Buried services line shall be Type K, seamless soft copper tubing in accordance with ASTM B88.
- B. All above grade (non-buried) service lines shall be Type K, copper pipe in accordance with ASTM B88.

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SECTION 3.7 - PVC PIPE FOR GRAVITY SANITARY SEWERS

3.7.1 PVC PIPE FOR GRAVITY SANITARY SEWERS

- A. Polyvinyl chloride (PVC) gravity sewer pipe 8 inch to 15 inch in diameter shall be minimum SDR 35 in accordance with ASTM D3034.
- B. PVC gravity sewer pipe 18 inch in diameter and greater shall be minimum PS 46 in accordance with ASTM F679.
- C. PVC shall meet the requirements of cell classification 12454-B in accordance with ASTM D1784.
- D. PVC gravity sewer pipe joints shall be bell and spigot type in accordance with ASTM D3212.
- E. Gaskets for PVC gravity sewer pipe shall be plain rubber gaskets in accordance with ASTM F477.
- F. PVC gravity sewer pipe shall be colored green.

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SECTION 3.8 - C900 PVC PIPE

3.8.1 C900 PVC Pipe for Sanitary Sewage Force Mains

- A. C900 PVC pipe for sanitary sewage force mains shall be in accordance with AWWA C900.
- B. Pipe pressure class shall be as required for application.
- C. PVC shall meet the requirements of cell classification 12454 in accordance with ASTM D1784.
- D. Joint assembly for C900 PVC pipe shall be in accordance with ASTM D3139.
- E. Gaskets for C900 PVC pipe shall be plain rubber gaskets in accordance with ASTM F477.
- F. C900 PVC pipe shall be colored green.

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SECTION 3.9 - VALVES

3.9.1 Butterfly Valves

- A. Resilient seated butterfly valves in accordance with AWWA C504.
- B. Valve body shall be ASTM A126, Class B ductile iron.
- C. Valve disc shall be ASTM A126, Class B ductile iron with Type 316 stainless steel edge.
- D. Valve stem shall be Type 304 stainless steel in accordance with ASTM A276.
- E. Minimum 150 PSI working pressure.
- F. Valves shall open counter-clockwise (left).
- G. End Connections:
 - 1. Buried Valves: MJ x MJ
 - 2. Non-Buried Valves: FLG x FLG
- H. Interior and exterior surfaces shall be coated with fusion-bonded epoxy coating in accordance with ANSI/AWWA C550.
- I. Valve shall be NSF/ANSI Standard 61 compliant.
- J. Acceptable Manufacturers:
 - 1. Henry Pratt Company
 - 2. Val-Matic Valve & Manufacturing Corporation
 - 3. Dezurick
 - 4. M & H Valve
 - 5. HCWA Approved Equal

3.9.2 Gate Valves

- A. Resilient-seated gate valves for water supply service in accordance with AWWA C515.
- B. Valve body and bonnet shall be ASTM A126, Class B ductile iron.
- C. Disc shall be cast iron and shall be encapsulated in rubber.
- D. Valve stem shall be cast bronze.
- E. Minimum 200 PSI working pressure.
- F. Operators:
 - 1. Buried Valves: Non-Rising Stem (NRS)
 - 2. Non-Buried Valves: Outside Stem and Yoke (OS&Y)
 - 3. Valves shall open counter-clockwise (left).

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- G. End Connections:
 - 1. Buried Valves: MJ x MJ
 - 2. Non-Buried Valves: FLG x FLG
- H. Interior and exterior surfaces shall be coated with fusion-bonded epoxy coating in accordance with AWWA C550.
- I. Valve shall be NSF/ANSI Standard 61 compliant.
- J. Acceptable Manufacturers:
 - 1. M&H Valve Company, Style 4067
 - 2. Mueller Company, 2360 Series
 - 3. U.S. Pipe Valve and Hydrant Division, A-USP0-20
 - 4. East Jordan Iron Works
 - 5. HCWA Approved Equal

3.9.3 Plug Valves

- A. Plug valves shall be eccentric.
- B. Valve body shall be ASTM A126, Class B cast iron in accordance with the latest revision of AWWA C517.
- C. Plug valve shall be cast iron with resilient coating and stainless steel bearings.
- D. Minimum 175 PSI working pressure for valves less than or equal to 12 inch in size.
Minimum 150 PSI working pressure for valves greater than 12 inch in size.
- E. Operators:
 - 1. Rotary type actuator
- F. End Connections:
 - 1. Buried Valves: MJ x MJ
 - 2. Non-Buried Valves: FLG x FLG
- G. Interior and exterior surfaces shall be coated with fusion-bonded epoxy coating.
- H. Acceptable Manufacturers:
 - 1. M&H Valve Company
 - 2. Val-Matic Valve & Manufacturing Corporation
 - 3. HCWA Approved Equal

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3.9.4 Pressure Reducing Valves

- A. Pressure reducing valves shall be hydraulically operated, single diaphragm-actuated, globe pattern valve that maintains a constant downstream pressure regardless of changing flow rate and/or inlet pressure.
- B. Valve body and cover shall be ASTM A536 ductile iron.
- C. Disc guide, seat, cover bearing, stem, nut, and spring shall be Type 303 stainless steel.
- D. Disc shall be Buna-N rubber.
- E. Diaphragm shall be nylon reinforced Buna-N rubber.
- F. Minimum 250 PSI working pressure.
- G. End connections shall be FLG x FLG.
- H. Interior and exterior surfaces shall be coated with fusion-bonded epoxy coating.
- I. Valve shall be NSF/ANSI Standard 61 compliant.
- J. Pressure reducing valves shall have the following added options.
 - 1. Opening speed control
 - 2. X101 visual valve position indicator
 - 3. Inlet and outlet pressure gauge pre-piped with pilot tubing
 - 4. Wye-strainer on pilot tubing
 - 5. Check valve on pilot tubing
- K. Pilot Control Valve
 - 1. Pressure reducing pilot control valve shall be direct-acting, adjustable, spring-loaded, normally open, diaphragm valve with fixed orifice.
 - 2. Valve body shall be ASTM B62 bronze.
 - 3. Valve trim shall be Type 303 stainless steel.
 - 4. Diaphragm shall be Buna-N rubber.
 - 5. Minimum 400 PSI working pressure.
 - 6. Spring settings shall range from 0 to 450 PSI.
- L. Pilot system shall include an opening speed control and shall be connected to main valve with copper tubing and fittings.
- M. Acceptable Manufacturers:
 - 1. Cla-Val Model 90-01
 - 2. HCWA Approved Equal

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3.9.5 Altitude Valves

- A. Altitude valves shall be hydraulically operated, single diaphragm-actuated, globe or angle pattern, non-throttling type valve that controls the high water level in a reservoir without the need for floats or other devices.
- B. Valve body and cover shall be ASTM A536 ductile iron.
- C. Disc guide, seat, cover bearing, stem, nut, and spring shall be Type 303 stainless steel.
- D. Disc shall be Buna-N rubber.
- E. Diaphragm shall be nylon reinforced Buna-N rubber.
- F. Minimum 250 PSI working pressure.
- G. End connections shall be FLG x FLG.
- H. Interior and exterior surfaces shall be coated with fusion-bonded epoxy coating.
- I. Valve shall be NSF/ANSI Standard 61 compliant.
- J. Altitude valve shall have the following added options.
 - 1. X101 visual valve position indicator
 - 2. Inlet and outlet gauges
 - 3. Wye-strainer in pilot piping
- K. Pilot Control Valve
 - 1. Pilot control valve shall be diaphragm-actuated, three-way type valve that operates on the differential pressure between the valve and the water surface elevation in the reservoir and an adjustable spring load.
 - 2. Valve body shall be ASTM B62 bronze.
 - 3. Valve trim shall be Type 303 stainless steel.
 - 4. Diaphragm shall be Buna-N rubber.
 - 5. Minimum 150 PSI working pressure.
 - 6. Spring settings shall range from 5 to 200 feet.
 - 7. Pilot valve shall have valve position indicator.
- L. Pilot system shall be connected to main valve with copper tubing and fittings.
- M. Acceptable Manufacturers:
 - 1. Cla-Val Model 610-16
 - 2. HCWA Approved Equal

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3.9.6 Check Valves for Submersible Sanitary Sewage Lift Stations

A. Check valves

1. Swing Type Metal Check Valves (4-Inches and Larger)
 - a) Rubber flapper type swing check valves in accordance with ANSI/AWWA C508 with spring assisted closure to minimize surge and water hammer. Check valve shall be of the full body type with a domed access cover, flexible disc, spring, mechanical position indicator, and screw-type backflow actuator.
 - b) Valve Body and Cover: ASTM A536 Grade 65-45-12 ductile iron.
 - c) Valve Disc: Buna-N (NBR) rubber.
 - d) Spring shall be stainless steel.
 - e) Working Pressure: Minimum 250 PSI
 - f) Interior and exterior of valves shall be coated with an ANSI/NSF 61 approved epoxy coating.
 - g) Acceptable Manufacturers:
 - 1) Series 7200 Surgebuster manufactured by Val-Matic Valve and Manufacturing Corporation
 - 2) Figure SB200D Slaminator manufactured by GA Industries
 - 3) Pratt Model PSI Surge Inhibitor Check Valve [Addendum No. 1]
 - 4) HCWA approved equal
2. Bronze Check Valves (3" and Smaller)
 - a) Bronze check valves with renewable seats conforming to MSS SP-139.
 - b) Body: Lead-Free Bronze (ASTM B584)
 - c) Cold Working Pressure: Minimum 200 PSI
 - d) End Connections: FNPT x FNPT
 - e) Manufacturers:
 - 1) Conbraco Industries, Apollo Valves
 - 2) Nibco, Inc.
 - 3) HCWA approved equal.

3.9.7 Corporation Stops

- A. Brass corporation stops in accordance with AWWA C800.

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- B. Minimum 300 PSI working pressure.
- C. Connections: AWWA Standard Thread (CC) x Copper Tube Size (CTS) Compression.
- D. Acceptable Models:
 - 1. Model 74101B-22 by A. Y. McDonald Company
 - 2. Model B1000-4-NL by Ford Meter Box
 - 3. HCWA Approved Equal

3.9.8 Curb Stops

A. Standard Curb Stops

- 1. Brass curb stops in accordance with AWWA C800.
- 2. Minimum 300 PSI working pressure.
- 3. Connections: Copper Tube Size (CTS) Compression x FNPT.
- 4. Acceptable Models:
 - a) Model 76102W-22 by A. Y. McDonald Company
 - b) Model B43-344W-NL by Ford Meter Box
 - c) HCWA Approved Equal

B. Angled Curb Stops

- 1. Brass curb stops in accordance with AWWA C800.
- 2. Minimum 300 PSI working pressure.
- 3. Connections: Copper Tube Size (CTS) Compression x CTS Compression.
- 4. Acceptable Models:
 - a) Model 74640B-22 by A. Y. McDonald Company
 - b) BA43-344WNL by Ford Meter Box
 - c) HCWA Approved Equal

3.9.9 Backflow Preventers

A. Dual Backflow Preventers/Inline Check Valve

- 1. Dual check backflow or inline check valve preventers shall be in-line accessible, straight cartridge style dual check valve. No lead brass.
- 2. Acceptable Models:
 - a) Model HHCH31NL-323 by Ford Meter Box Company – $\frac{3}{4}$ inch
 - b) Model HHCH31NL-344 by Ford Meter Box Company – 1 inch

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- c) Model 7111-3JE-43 by A.Y.McDonald –3/4 inch
- d) Model 7111-4JF-54 by A.Y.McDonald –1 inch
- e) HCWA Approved Equal

B. Double Check Backflow Preventers

1. Double Check Backflow Preventers shall be in accordance with ASTM C510.
2. Acceptable Manufacturers:
 - a) ¾ inch to 2 inch Double Check Backflow Preventers:
 - 1) Ames Fire & Waterworks, Series 2000B
 - 2) Watts Water Technologies, Series 007
 - 3) Wilkens/Zurn, Model 350
 - 4) HCWA Approved Equal
 - b) 2 ½ inch to 10 inch Double Check Backflow Preventers:
 - 1) Ames Fire & Waterworks, Series 2000SS-OSY
 - 2) Watts Water Technologies, Series 774-OSY
 - 3) Wilkens/Zurn, Model 350-OSY
 - 4) HCWA Approved Equal

C. Reduced Pressure Zone (RPZ) Backflow Preventers

1. Reduced Pressure Zone (RPZ) Backflow Preventers shall be in accordance with ASTM C511.
2. All commercial accounts serving multi-unit outparcels with a meter 2” or smaller require a Reduced Pressure Zone Assembly.
3. Please reference Section 2.1.14 and the Cross-Connection Control Manual at www.hcwa.com under Backflow Prevention for more information.
4. Acceptable Manufacturers:
 - a) ¾ inch to 2 inch RPZ Backflow Preventers:
 - 1) Ames Fire & Waterworks, Series 4000B
 - 2) Watts Water Technologies, Series 009
 - 3) Wilkens/Zurn, Model 375
 - 4) HCWA Approved Equal

3.9.10 Air Release Valves

- A. Air release valves shall be suitable for potable water or sanitary sewage service.

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- B. Valve body shall be stainless steel.
- C. Maximum Operating Pressure: 250 PSI
- D. Operating Range: 0 to 250 PSI
- E. Air Release Capacity: 135 CFM
- F. Connection: 2 inch FNPT
- G. Connection nipples and isolation ball valve shall be Type 316 stainless steel.
- H. Acceptable Manufacturers:
 - 1. H-Tec Model 983
 - 2. HCWA Approved Equal

3.9.11 Combination Air/Vacuum Valves

- A. Combination air/vacuum valve shall be suitable for potable water or sanitary sewage service.
- B. Valve body shall be stainless steel.
- C. Maximum Operating Pressure: 250 PSI
- D. Operating Range: 0 to 250 PSI
- E. Air Release Capacity: 135 CFM
- F. Connection:
 - 1. 2 inch to 3 inch: FNPT
 - 2. 4 inch and larger: AWWA C115/ANSI B16.1
- G. 2 inch to 3 inch connection nipples and isolation ball valves shall be Type 316 stainless steel.
- H. Interior and exterior of 4 inch and larger valves shall be fusion bonded epoxy coated.
- I. Acceptable Manufacturers:
 - 1. H-Tec Model 986
 - 2. HCWA Approved Equal

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SECTION 3.10 - VALVE BOXES

3.10.1 Valve Boxes

- A. Two-piece, adjustable, ductile iron valve box screw type with water lid, 24x36 (foreign acceptable)
- B. Two-piece, adjustable, ductile iron valve box screw type with water lid, 36x48 (foreign acceptable)
- C. HCWA approved equal.
- D. The word "WATER" shall be cast into the lid on valve boxes used for water service.
- E. The word "SEWER" shall be cast into the lid on valve boxes used for sanitary sewage service.

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SECTION 3.11 - WATER TAPPING SLEEVES

3.11.1 Water Tapping Sleeves

- A. Tapping sleeves shall meet requirements of AWWA C223 and shall be NSF/ANSI Standard 61 certified.
- B. Tapping sleeve for water mains up to 10" diameter shall be Stainless Steel.
- C. Tapping sleeve for water mains 12" diameter or greater shall be fabricated carbon steel epoxy coated.
- D. Body shall be carbon steel in accordance with ASTM A283, Grade C and neck shall be carbon steel in accordance with ASTM A53.
- E. Flange shall be carbon steel in accordance with ASTM A36 and shall accept a tapping valve.
- F. Fabricated tapping sleeve gasket shall be NSF/ANSI Standard 61 certified, heavy duty, Buna-N (Nitrile) rubber.
- G. Bolts shall be heavy hex type, low carbon steel, zinc plated in accordance with ASTM A307, Grade B.
- H. Nuts shall be heavy hex type, low carbon steel, zinc plated in accordance with ASTM A563, Grade A.
- I. Washers shall be SAE flat washers, low carbon steel, zinc plated in accordance with ASTM F844.
- J. Carbon steel tapping sleeve shall be epoxy coated in accordance with AWWA C213.
- K. Flange Gaskets:
 - 1. Full face, plain rubber, 1/8" thickness, in accordance with ANSI/AWWA C110/A21.10 and ANSI/AWWA C115/A21.15 (Ductile Iron Fittings)
- L. Acceptable Manufacturers:
 - 1. Ford Meter Box Style FTSC
 - 2. Smith-Blair Style 622
 - 3. JCM 462
 - 4. HCWA Approved Equal

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SECTION 3.12 - WATER SERVICE SADDLES

3.12.1 Water Service Saddles

- A. Double strap service saddle in accordance with AWWA C800.
- B. Ductile iron body in accordance with ASTM A536.
- C. AWWA Standard Thread (CC) outlet ($\frac{3}{4}$ " & 1" Taps are CC Thread and 2" taps are IP thread)
- D. Carbon steel straps in accordance with ASTM A108.
- E. Nuts shall be heavy hex type, low carbon steel, zinc plated in accordance with ASTM A563, Grade A.
- F. Washers shall be SAE flat washers, low carbon steel, zinc plated in accordance with ASTM F844.
- G. NSF/ANSI Standard 61 certified, heavy duty, Buna N outlet gasket.
- H. Acceptable Manufacturers:
 - 1. Ford Meter Box Style F202
 - 2. Smith-Blair Style 313
 - 3. JCM 402
 - 4. Power Seal 3413
 - 5. HCWA Approved Equal

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SECTION 3.13 - WATER METERS

3.13.1 Residential

- A. All residential water meters are provided by HCWA (meter fees apply).

3.13.2 Commercial and Industrial

- A. All commercial water meters 2-inches and less in size are provided by HCWA (meter fees apply) except in fire meter installations.
- ~~B.~~ Developer/Contractor shall provide and install all water meters associated with fire meter or master meter installations.
- C. Acceptable Manufacturers:
 - 1. Sensus
 - a. Sensus 1-inch iPerl
 - b. Sensus 2-inch Omni Compound (C2) – 17” lay length
 - c. Sensus 4-inch Omni F2 (OMNI-614) FLM with 2” locking ball valve on test outlet
 - d. Sensus 6 inch Omni F2 (OMNI-616) FLM with 2” locking ball valve on test outlet
 - e. Sensus 8 inch Omni F2 (DS-W-OMF-08-0611-01-A) FLM with 2” locking ball valve on test outlet
 - f. Sensus 10 inch Omni F2 (DS-W-OMF-10-0611-01-A) FLM with 2” locking ball valve on test outlet
 - 2. Master Meter Octave Ultrasonic (Sensus Touch Pad required)
 - a. Master Meter Octave Composite 2 inch – 17” lay length
 - b. Master Meter Octave 4 inch with 2” locking ball valve on test outlet
 - c. Master Meter Octave 6 inch with 2” locking ball valve on test outlet
 - d. Master Meter Octave 8 inch with 2” locking ball valve on test outlet
 - e. Master Meter Octave 10 inch with 2” locking ball valve on test outlet
 - f. Master Meter Octave 12 inch with 2” locking ball valve on test outlet

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3.13.3 Water Meter Boxes

- A. Water meter box shall be high density polyethylene or fiber reinforced plastic.
- B. Water meter boxes for $\frac{3}{4}$ inch and 1 inch services shall be a jumbo meter box with base measurements of 12 inch deep by 19 $\frac{1}{2}$ inch wide by 25 $\frac{1}{2}$ inch long.
- C. Water meter boxes for 1 $\frac{1}{2}$ inch to 2 inch services shall be a super jumbo meter box that measures minimum 17 inch wide by 30 inch long by 18 inch deep.
- D. Water meter box color: Black
- E. Water meter box lids shall be plastic and supplied with the box from the manufacturer and have rebar installed for locating purposes with a 2 inch diameter hole offset and recessed to one end for touch reader and/or MXU installation.
- F. Water meter boxes shall have the words "WATER METER" embossed on the lid.
- G. Acceptable Manufacturers:
 - 1. Jumbo Meter Box
 - a) Carson L Series 1530-18
 - b) DFW Plastics, Inc. 1600 Series (DFW1600.12.1 MT DEEP)
 - c) NDS D1600 Series
 - d) HCWA Approved Equal
 - 2. Super Jumbo Meter Box
 - a) DFW Plastics, Inc. 1700 Series
 - b) Carson 1730-18
 - c) NDS D1700 Series
 - d) HCWA Approved Equal

3.13.4 Meter Vaults and Valve Vaults

- A. Meter vaults and valve vaults shall be precast concrete in accordance with ASTM C478.
- B. Concrete Compressive Strength: 4,000 PSI @ 28 days.
- C. Vaults must be one piece with a concrete slab top. Tongue and groove joints are not allowed.
- D. Meter vault and valve vaults shall have a minimum 48-inch x 48-inch aluminum access hatch. Access hatch shall be hinged with tamper proof bolts, shall have automatic hold open arm, shall have flush aluminum drop handle, and shall have a factory installed

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locking tab. All hardware shall be Type 316 stainless steel. Access hatch shall be U.S. Fabrication Model APD300, or HCWA approved equal.

- E. Steps shall be located at hatch, and hatch shall be offset so that steps are accessible. Vault should also be fully accessible by permanent easement with a minimum width of 10 feet per section 1.5.3.A.

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SECTION 3.14 - FIRE HYDRANTS

3.14.1 Fire Hydrants

- A. Six inch, dry barrel, fire hydrant in accordance with AWWA C502.
- B. Minimum Working Pressure: 250 PSI
- C. 6 inch MJ base connection.
- D. Minimum 4½ inch main valve.
- E. Fire hydrant shall have automatic drain that closes fully when the main valve is opened.
- F. Nozzles:
 - 1. One (1) 4½ inch pumper nozzle
 - 2. Two (2) 2½ inch hose nozzles
- G. 1½ inch National Standard pentagon operating nut. Open counter-clockwise.
- H. Color: Silver (factory painted)
- I. Minimum Depth of Bury: 4 feet
- J. Acceptable Manufacturers:
 - 1. M&H Valve Company Style 129
 - 2. Mueller Valve Company Super Centurion A-421

3.14.2 Yard Hydrants

- A. Non-freezing, compression, post type hydrant with self-draining barrel.
- B. Suitable for 150 PSI working pressure.
- C. Hose Connection Size: ¾ inch.
- D. Handle shall be capable of locking with a padlock.
- E. Acceptable Manufacturers:
 - 1. Simmons 800 Series
 - 2. HCWA Approved Equal

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SECTION 3.15 - PRESSURE GAUGES

3.15.1 Pressure Gauges

- A. Pressure gauges shall be minimum 2½ inch diameter, liquid filled, Type 316 stainless steel gauges.
- B. Range of gauge shall be approximately 2 times the normal operating pressure.
- C. Acceptable Manufacturers:
 - 1. Ametek
 - 2. Ashcroft
 - 3. Terice
 - 4. HCWA Approved Equal

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SECTION 3.16 - DIAPHRAGM SEALS

3.16.1 Diaphragm Seals

- A. Diaphragm seals shall be Type 316 stainless steel seals with flushing connections.
- B. Acceptable Manufacturers:
 - 1. Ametek
 - 2. Ashcroft
 - 3. Terice
 - 4. HCWA Approved Equal

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SECTION 3.17 - MANHOLES

3.17.1 Precast Manholes

- A. Precast concrete eccentric manholes in accordance with ASTM C478.
- B. Concrete Compressive Strength: 4,000 PSI @ 28 days.
- C. Tongue and groove joints with preformed butyl joint seals.
- D. Acceptable Manufacturers:
 - 1. Foley
 - 2. Old Castle
 - 3. HCWA Approved Equal

3.17.2 Preformed Butyl Joint Seal

- A. Preformed butyl joint seals shall be in accordance with ASTM C990.
- B. Preformed butyl joint seals shall be provided in rope form. Additional joint sealing methods/measures may be required as conditions warrant.
- C. Acceptable Manufacturers:
 - 1. Hamilton Kent, Inc. (Kent Seal No. 2)
 - 2. Henry Company (Ram-Nek Joint Sealant)
 - 3. Press-Seal Gasket Corporation (EZ-STIK)
 - 4. HCWA Approved Equal

3.17.3 Pipe-to-Manhole Connectors

- A. Pipe-to-manhole connectors shall be resilient connectors with stainless steel clamps in accordance with ASTM C923.
- B. Acceptable Manufacturers:
 - 1. A-Lok Products, Inc.
 - 2. Trelleborg Pipe Seals Milford, Inc. (Kor-N-Seal)
 - 3. HCWA Approved Equal

3.17.4 Manhole Steps

- A. Manhole steps shall be copolymer polypropylene type with ½ inch Grade 60 steel reinforcing rod conforming to ASTM C478.

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B. Acceptable Manufacturers:

1. American Step Company, Inc.
2. A. Industries, Inc.
3. HCWA Approved Equal

3.17.5 Frames and Covers

A. Frames and covers shall be heavy duty ductile iron castings.

B. Standard manhole frame and covers for sanitary sewer manholes acceptable manufacturers:

1. U.S. Foundry, Model 362-CK
2. East Jordan 1480 Iron Works
3. HCWA approved equal

C. Bolt-down, watertight, manhole frame and covers for sanitary sewer manholes acceptable manufacturers:

1. U.S. Foundry, Model 362-CK-BWT
2. East Jordan Model 2480
3. HCWA Approved Equal

D. Manhole frame and cover for air release valve and combination air/vacuum (CAV) valves acceptable manufacturers:

1. Neenah Foundry, Model R-1563
2. HCWA approved equal

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SECTION 3.18 - PIPE SUPPORTS/PIPE HANGERS

3.18.1 Pipe Supports/Pipe Hangers

- A. Pipe supports, saddles, hangers, etc. shall be manufactured from carbon steel and shall be prime coated in the factory.
- B. Pipe supports shall be adjustable.
- C. Hardware shall be Type 316 Stainless Steel.
- D. Acceptable Manufacturers:
 - 1. Anvil International
 - 2. Cooper B-Line
 - 3. HCWA Approved Equal

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SECTION 3.19 - CAST IN-PLACE CONCRETE

3.19.1 Cast-In-Place Concrete

- A. Concrete mix design shall be in accordance with ACI 318.
 - 1. 28-Day Strength: 4,000 PSI
- B. Cement Content: Minimum 560 pounds per cubic yard
- C. Air Content: 5% to 7% in accordance with ASTM C231
- D. Water to Cement Ratio: Maximum 0.44
- E. Slump Range: 3 to 5 inches in accordance with ASTM C143
- F. Use of fly ash must be approved by HCWA Engineer
- G. Use of admixtures must be approved by HCWA Engineer
- H. Materials
 - 1. Cement
 - a) Domestic Portland cement in accordance with ASTM C150, Type II.
 - 2. Fine Aggregate
 - a) Washed, inert, natural sand in accordance with ASTM C33.
 - 3. Coarse Aggregate
 - a) No. 57 stone in accordance with ASTM C33.
 - 4. Water
 - a) Clean, potable water free from injurious amounts of oils, acids, alkalis, salts, organic matter, or other deleterious substances.

3.19.2 Reinforcement

- A. Steel reinforcing bars shall be in accordance with ASTM A615, Grade 60.
- B. Welded wire reinforcement shall be in accordance with ASTM A185.

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SECTION 3.20 - CHAIN LINK FENCE AND GATES

3.20.1 Chain Link Fence and Gates

A. Chain Link Fence Fabric

1. Chain link fence shall be galvanized fabric in accordance with ASTM A392, Type II, Class 2, 2.0 ounces per square foot.
2. Fence height shall be six (6) feet.
3. Core Wire Gauge: No. 9

B. Pattern: 2-inch diamond-mesh

C. Posts

1. Intermediate/Line Posts
 - a) Schedule 40 galvanized steel pipe in accordance with ASTM F1083.
 - b) Diameter: 2.375 inch
 - c) Weight: Minimum 3.65 pounds per foot
 - d) Zinc Coating: Minimum 1.8 ounces per square foot
2. End, Corner, Angle, Pull, and Gate Posts
 - a) Schedule 40 galvanized steel pipe in accordance with ASTM F1083.
 - b) Diameter: 4 inch
 - c) Weight: Minimum 9.1 pounds per foot
 - d) Zinc Coating: Minimum 1.8 ounces per square foot

D. Top and Brace Rails

1. Schedule 40 galvanized steel pipe in accordance with ASTM F1083.
2. Diameter: 1.66 inch
3. Weight: Minimum 2.27 pounds per foot
4. Zinc Coating: Minimum 1.8 ounces per square foot

E. Gate Frame Posts

1. Schedule 40 galvanized steel pipe in accordance with ASTM F1083.
2. Diameter: 1.90 inch
3. Weight: Minimum 2.72 pounds per foot
4. Zinc Coating: Minimum 1.8 ounces per square foot

F. Interior Bracing Posts for Gates

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1. Schedule 40 galvanized steel pipe in accordance with ASTM F1083.
2. Diameter: 1.66 inch
3. Weight: Minimum 2.27 pounds per foot
4. Zinc Coating: Minimum 1.8 ounces per square foot

G. Fence Fittings

1. All fence fittings shall be in accordance with ASTM F626.
2. Barbed wire support arms shall have 45 degree angle and shall support three (3) strands of barbed wire.

H. Tension Wire

1. Zinc-coated steel marcelled tension wire in accordance with ASTM A824, Type II.
2. Diameter: 0.177 inch (7 gauge)

I. Zinc Coating: 1.20 ounces per square foot

J. Barbed Wire

1. Zinc-coated barbed wire in accordance with ASTM A121.

a. Line Wire:

- 1) Two (2) strands of twisted wire
- 2) Diameter: 12½ gauge
- 3) Zinc Coating: 0.80 ounces per square foot

b. Barbs:

- 1) Number of Points: 4
- 2) Length: Minimum 3/8 inch
- 3) Diameter: 14 gauge
- 4) Spacing: 5 inch

K. Gates

1. Gates shall be designed and fabricated in accordance with ASTM F900.

L. Gate Accessories

1. Provide gate hinges that are structurally capable of supporting the gate leaf and allow the gate to open and close without binding. Hinges shall be designed to allow the gate to open 180 degrees.
2. Single gates shall be provided with a gate latch that holds the gate in a closed position and has provisions for a gate lock.

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3. Double gates shall be provided with a drop rod or plunger bar type gate latch arranged to engage the gate stop. Locking devices shall be constructed so that the center drop rod or plunger cannot be raised when the gate is locked. Gate latch shall have provisions for a gate lock.
4. Double gates shall be provided with gate stops.
5. Gates with gate leafs greater than 5 feet must be provided with gate keepers.

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SECTION 3.21 - WATERPROOFING

3.21.1 Waterproofing

- A. Water repellent for above grade concrete, brick, and CMU surfaces that are not scheduled to be painted shall be a colorless, totally clean, penetrating water repellent made up of silanes and oligomeric alkoxy siloxanes.
- B. Acceptable Manufacturers:
 - 1. PROSOCO, Inc. Sure Klean Weather Seal Siloxane WB Concentrate
 - 2. HCWA Approved Equal

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SECTION 3.22 - COATING SYSTEMS FOR WET WELL COMPONENTS

3.22.1 Coating Systems for Wet Wells

- A. TNEMEC product names and numbers are specified herein. Equivalent materials produced by HCWA approved manufacturers shall be acceptable.
- B. Coating Systems
 - 1. Ductile Iron Pipe, Pumps, and Valves – Interior Exposed
 - a) System Type: Epoxy/Epoxy
 - b) Surface Preparation: Per manufacturer’s recommendation
 - c) Prime Coat: TNEMEC Series N69 Hi-Build Epoxoline, 3 to 5 mils DFT
 - d) Finish Coat: TNEMEC Series N69 Hi-Build Epoxoline, 4 to 6 mils DFT
 - e) Total DFT: 7 to 11 mils
 - 2. Ductile Iron Pipe, Pumps, and Valves – Exterior Exposed
 - a) System Type: Epoxy/Epoxy/Polyurethane
 - b) Surface Preparation: Per manufacturer’s recommendation
 - c) Prime Coat: TNEMEC Series N69 Hi-Build Epoxoline, 3 to 5 mils DFT
 - d) Intermediate Coat: TNEMEC Series 69 Hi-Build Epoxoline, 4 to 6 mils DFT
 - e) Finish Coat: TNEMEC Series 73 Endura-Shield, 2 to 3 mils DFT
 - f) Total DFT: 9 to 14 mils
 - 3. Ductile Iron Pipe, Pumps, and Valves – Below Grade (Buried) and Immersed
 - a) System Type: Epoxy/Coal Tar Epoxy
 - b) Surface Preparation: Per manufacturer’s recommendation
 - c) Prime Coat: TNEMEC Series N69 Hi-Build Epoxoline, 3 to 5 mils DFT
 - d) Finish Coat: TNEMEC Series 46H-413 Hi-Build Theme-Tar, 14 to 20 mils DFT
 - e) Total DFT: 17 to 25 mils
 - 4. Wet Well Piping (Tnemec, Sauereisen, Dudick, SprayRoq)
 - a) Surface Preparation: NAPF 500-03-04 Abrasive Blast Cleaning
 - b) Prime Coat: Series N140-1211 Pota-Pox Plus, DFT 4.0 to 6.0 Mills
 - c) Finish Coat: Series 431 Perma-Shield PI, DFT 40.0 Mills
 - d) Total DFT: 44.0 to 46.0 Mills
 - 5. Structural Steel – Interior Exposed

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- a) System Type: Epoxy/Epoxy
 - b) Surface Preparation: SSPC-SP6/NACE 3
 - c) Prime Coat: TNEMEC Series N69 Hi-Build Epoxoline, 3 to 5 mils DFT
 - d) Finish Coat: TNEMEC Series N69 Hi-Build Epoxoline, 3 to 5 mils DFT
 - e) Total DFT: 6 to 10 mils
6. Structural Steel – Exterior Exposed
- a) System Type: Epoxy/Polyurethane
 - b) Surface Preparation: SSPC-SP6/NACE 3
 - c) Prime Coat: TNEMEC Series N69 Hi-Build Epoxoline, 3 to 5 mils DFT
 - d) Intermediate Coat: TNEMEC Series N69 Hi-Build Epoxoline, 2 to 3 mils DFT
 - e) Finish Coat: TNEMEC Series 73 Endura-Shield, 2 to 5 mils DFT
 - f) Total DFT: 7 to 13 mils
7. Structural Steel – Below Grade (Buried) and Immersed
- a) System Type: Epoxy/Coal Tar Epoxy
 - b) Surface Preparation: SSPC-SP10/NACE 2
 - c) Prime Coat: TNEMEC Series N69 Hi-Build Epoxoline, 3 to 5 mils DFT
 - d) Finish Coat: TNEMEC Series 46H-413 Hi-Build Tneme-Tar, 14 to 20 mils DFT
 - e) Total DFT: 17 to 25 mils
8. Structural Steel – Severe Atmosphere (Inside Pump Station Wet Wells)
- a) System Type: Vinyl Ester
 - b) Surface Preparation: SSPC-SP5/NACE 1
 - c) Prime Coat: TNEMEC Series 120-5002 Vinester, 12 to 18 mils DFT
 - d) Finish Coat: TNEMEC Series 120-5001 Vinester, 12 to 18 mils DFT
 - e) Total DFT: 24 to 36 mils
- C. Coating systems not listed shall be approved by the HCWA Engineer.

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SECTION 3.23 - MANHOLE REPAIR SYSTEMS

3.23.1 Manhole Repair Systems

A. Polyurethane Grouts for Stopping Leaks

1. Hydrophobic Polyurethane Grout
 - a) Hydrophobic polyurethane grout is designed to fill large voids in rock fissures, gravel layers, joints, and cracks in concrete structures, and is designed to stop the infiltration of water.
 - b) Acceptable Manufacturers:
 - 1) Hydro Active CUT, De Neef Construction Chemicals, Inc.
 - 2) Prime Flex EXP, Prime Resins, Inc.
 - 3) HCWA Approved Equal

B. Hydrophilic Polyurethane Gel

1. Hydrophilic polyurethane gel is designed to foam or gel and quickly cures to a flexible, impermeable foam or gel mass when it comes in contact with water. It is unaffected by mildly corrosive environments.
2. Acceptable Manufacturers:
 - a) Hydro Active MultiGel NF, De Neef Construction Chemicals, Inc.
 - b) Prime Flex Hydro Gel SX, Prime Resins, Inc.
 - c) HCWA Approved Equal

C. Hydrophilic Polyurethane Resin

1. Hydrophilic polyurethane resin is designed to expand quickly and cure to a tough, flexible, adhesive, closed-cell foam when it comes in contact with water. It is essentially unaffected by mildly corrosive environments.
2. Acceptable Manufacturers:
 - a) Hydro Active Sealfoam NF, De Neef Construction Chemicals, Inc.
 - b) Prime Flex 900 XLV, Prime Resins, Inc.
 - c) HCWA Approved Equal

D. Repair Mortars

1. Calcium Aluminate Repair Mortar

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- a) Calcium aluminate repair mortar shall be a blend of quartz silica, fibers, and calcium aluminate cement designed for areas of moderate hydrogen sulfide concentration.
- b) Calcium aluminate repair mortar shall have the following characteristics:
 - 1) Compressive Strength: Minimum 8,000 PSI in accordance with ASTM C109 (Modified)
 - 2) Flexural Strength: Minimum 1,200 PSI in accordance with ASTM C293
 - 3) Shrinkage: Maximum 0.040% in accordance with ASTM C596
 - 4) Tensile Strength: Minimum 600 PSI in accordance with ASTM C496
 - 5) Freeze/Thaw After 100 Cycles: No effect in accordance with ASTM C666
 - 6) Bond Strength: Minimum 1,500 PSI in accordance with ASTM C882 (Modified)
- c) Acceptable Manufacturers:
 - 1) Cem Tec Silatec CAM, A.W. Cook Cement Products
 - 2) HCWA Approved Equal

E. Microsilica Repair Mortar

- 1. Microsilica repair mortar shall be a blend of Portland cement, dry prozzolanic materials, and a densified microsilica powder admixture.
- 2. Microsilica repair mortar shall have the following characteristics.
 - a) Compressive Strength: Minimum 8,000 PSI in accordance with ASTM C109
 - b) Split Tensile Strength: Minimum 570 PSI in accordance with ASTM C496
 - c) Flexural Strength: Minimum 1,000 PSI in accordance with ASTM C293
 - d) Density: Minimum 118 pounds per cubic foot
- 3. Acceptable Manufacturers:
 - a) Reliner MSP Cement, Standard Cement Material, Inc.
 - b) HCWA Approved Equal

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SECTION 3.24 - MANHOLE LINER SYSTEMS

3.24.1 Manhole Liner Systems

A. Flexible Polyurethane Elastomer Liner

1. Flexible urethane elastomer liner shall be a 100% solids material having the following characteristics.
 - a) Abrasion Resistance: 1 kg, 1,000 cycles, CS-17 Wheel – 106 mg loss in accordance with ASTM D4060
 - b) Adhesion: 300 PSI, concrete failure in accordance with ASTM D4541
 - c) Dielectric Strength: Minimum 430 V/mil in accordance with ASTM D149, Method A
 - d) Direct Impact: Steel pipe, 160 inches/pound, no failures in accordance with ASTM D2794
 - e) Durometer Hardness: Shore D 43 in accordance with ASTM D2240
 - f) Elongation: Recoverable 45% at 77 °F in accordance with ASTM D638
 - g) Flexibility: No effect bending 0.5 mm plate coated with 20 mils over mandrel of 8 mm diameter in accordance with ASTM D1737
 - h) Permeability: 0.189 grains per hour per square foot per inch Hg in accordance with ASTM E96
 - i) Thermal Conductivity: 0.133 BTU per hour per foot per °F at 77 °F in accordance with ASTM C177
 - j) Tensile Strength: 1,988 PSI at 77 °F in accordance with ASTM D638

B. Coating System

1. SprayWall

- a) Surface Preparation: SSPC-SP13/NACE 6, concrete cured a minimum of 28 days
- b) Finish Coat: SprayWall, 250 mils DFT

C. Acceptable Manufacturers:

- a) SprayRoq, Inc.
- b) HCWA Approved Equal

D. Fiberglass Reinforced Modified Epoxy Resin Liner System

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1. Fiberglass reinforced liner system shall resist corrosion and shall eliminate all sources of groundwater infiltration and voids in the manhole structure.
2. Reinforcing fabric shall be a bonded fabric of Type E glass with the following characteristics.
 - a) Tensile Strength: 500,000 PSI
 - b) Modulus of Elasticity: 10,500,000 PSI
 - c) Elongation: Maximum 4.8%
3. Modified epoxy resin shall be bisphenol A epoxy resin cross linked with a modified polyamide curing agent. Epoxy resin shall have the following characteristics.
 - a) Hardness: 68 to 70 Shore D in accordance with ASTM D2240
 - b) Tensile Strength: 12,400 PSI in accordance with ASTM D638
 - c) Compressive Strength: 16,800 PSI in accordance with ASTM D695
 - d) Flexural Strength: 13,900 PSI in accordance with ASTM D790
 - e) Impact Resistance: 160 inch pounds in accordance with NCS PS 55
 - f) Heat Distortion Temperature: 220 °F in accordance with ASTM D648
 - g) Ultimate Elongation: 4.5% in accordance with ASTM D638
4. Acceptable Manufacturers:
 - a) PerpetuWall Lining System, Protective Liner Systems, Inc.
 - b) HCWA Approved Equal

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SECTION 3.25 - MISCELLANEOUS MATERIALS

3.25.1 Stabilization Stone

- A. Stabilization stone shall be No. 57 Coarse Aggregate (maximum stone size of 1½ inch) in accordance with ASTM C33.
- B. Stabilization stone shall be clean, durable particles of crushed stone or gravel capable of withstanding the effects of handling, spreading, and compacting without degradation.

3.25.2 Select Earth Backfill

- A. Select earth backfill shall be excavated SM and ML material that is free from rocks larger than 3 inches in diameter, ashes, cinders, refuse, organic material, frozen soil, and other deleterious material.
- B. Material containing more than 10-percent gravel, stones, or shale particles is not acceptable.
- C. Provide imported material if required to accomplish work.

3.25.3 Tracer Wire

- A. Direct burial #14 AWG solid, soft drawn, high strength copper clad steel wire.
- B. 30 volt rating.
- C. 30-mil high molecular weight, high density, polyethylene jacket complying with ASTM D1248.
- D. Colors:
 - 1. Water Service – Blue
 - 2. Sanitary Sewage Service – Green
- E. Tracer wires shall be connected together using moisture displacement connectors with strain relief.
- F. Acceptable Manufacturers:
 - 1. Copperhead Industries, LLC
 - 2. Pro-Line Safety Products Company
 - 3. HCWA Approved Equal

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SECTION 3.26 - OTHER MATERIALS

3.26.1 Other Materials

- A. Materials not covered in these specifications shall be in accordance with the approved plans.

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DIVISION 4 – CONSTRUCTION STANDARDS

Henry County Water Authority Standards and Specifications

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SECTION 4.1 - CONSTRUCTION STANDARDS

4.1.1 General

- A. Water distribution and sanitary sewerage systems shall be constructed by a HCWA approved utility contractor.
- B. Water distribution and sanitary sewerage systems shall be constructed in accordance with the standards and specifications herein, and the construction plans approved by the HCWA.

4.1.2 Permits

- A. Construction activities shall not commence until HCWA has granted final approval of the construction plans and specifications and Henry County has issued a Development Permit.
- B. Developer/Owner and/or Contractor shall be responsible for obtaining all permits and approvals required for working in the county or state right-of-way.

4.1.3 Work Hours

- A. Work shall be executed Monday through Friday during normal work hours (7:00 AM to 5:00 PM) unless otherwise approved by HCWA.
- B. Requests for work outside of normal working hours must be received in writing by the HCWA a minimum of 48 hours in advance of performing the work.
- C. An inspection fee equal to the employee's time and benefits will be assessed if the Contractor elects to work outside of normal working hours or on Saturday or Sunday.
- D. A fee will be assessed to any Contractor who works on Saturday or Sunday without prior approval from the HCWA.

4.1.4 Utility Notification

- A. Contractor shall notify Utility Protection Center a minimum of three (3) days prior to beginning any clearing, grading, or excavating activities.

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4.1.5 Site Safety

- A. Contractor shall be responsible for site safety. Contractor shall identify a site safety officer who shall be responsible for conducting daily safety meetings and ensuring a safe work environment.
- B. All work shall be conducted in accordance with OSHA standards. In accordance with Safety Resolution 2005-12, HCWA will issue a “Stop Work” order if an unsafe condition exists.
- C. All equipment and tools used in the construction of water distribution and/or sanitary sewerage systems shall be in good working order.
- D. Contractor shall provide, erect and maintain all necessary barricades, signs, lights, and danger signals necessary for the protection of the work and the safety of the public. Contractor shall provide a sufficient number of flagmen whenever it is deemed necessary.
- E. All work shall be planned and performed by the Contractor in such a manner as to minimize interference with vehicular and pedestrian traffic. Whenever work will cause disruption to the normal flow of traffic or pose a potential hazard, the Contractor shall be responsible for implementing safety measures and traffic control procedures in accordance with the “Manual on Uniform Traffic Control Devices,” latest edition, published by the U.S. Department of Transportation, Federal highway Administration. Contractor shall obtain approval from the Henry County DOT and/or Georgia DOT prior to working in any public right-of-way.

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SECTION 4.2 - MATERIALS

4.2.1 General

- A. All materials and equipment provided for the project shall be new and shall be in accordance with these Standards and Specifications.
- B. Contractor shall be responsible for the delivery, handling, storage, and protection of all materials and equipment used on the project.
- C. All materials and equipment shall be boxed, crated, or otherwise protected during transportation, handling, and storage.

4.2.2 Delivery

- A. Contractor shall coordinate the delivery of all materials and equipment.
- B. Contractor shall provide all equipment and tools required for unloading and moving materials and equipment.

4.2.3 Handling

- A. Materials and equipment shall be handled in accordance with the manufacturer's instructions.
- B. Any materials or equipment that are dropped, dumped, improperly handled, or otherwise damaged during construction shall be subject to rejection by the HCWA without further justification.
- C. Contractor shall provide all equipment and tools required for moving materials and equipment to, from, and around the project site.

4.2.4 Storage and Protection

- A. Materials and equipment shall be stored in accordance with the manufacturer's instructions.
- B. Contractor shall be responsible for the storage and protection of all materials and equipment.
- C. Pipe may be stored along the route; however, pipe shall not be strung out for more than 1,000 feet beyond the point that the pipe is being installed.

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- D. Contractor shall be responsible for making the necessary arrangements for obtaining all storage locations/sites required to properly store and protect materials and equipment.
- E. Materials and equipment shall be protected from exposure to the elements and shall be kept dry at all times. The materials and equipment shall be stored above ground level and shall be adequately supported using wood blocking, wood pallets, or other approved support material.
- F. Pumps, motors, valves, electrical and instrumentation equipment, and other mechanical equipment shall be stored in a weather-tight enclosure which is maintained at a minimum air temperature of 60 °F.

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SECTION 4.3 - EROSION AND SEDIMENTATION CONTROL

4.3.1 Erosion and Sedimentation Control

- A. Contractor shall be responsible for complying with all requirements of Henry County, the Georgia EPD, and the United States Army Corps of Engineers related to erosion and sediment control. This shall include obtaining all required permits and designing and implementing all erosion and sediment control measures.

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SECTION 4.4 - EXCAVATION

4.4.1 General

- A. Prior to beginning any excavation, an investigation shall be conducted to determine the location of existing underground structures and conflicts. The Contractor shall be responsible for repairing damage to existing structures.
- B. When obstructions not indicated on the plans interfere with the progress of work, an alteration of the plans may be required. All alterations or deviations in line and grade, or the removal, relocation, or reconstruction of the obstruction shall be approved in writing by the HCWA.

4.4.2 Clearing and Grubbing

- A. Areas to be cleared and grubbed shall be limited to the areas shown on the HCWA approved plans.
- B. Trees located within the area to be cleared or along the clearing limits that are not specified to be removed shall be protected with tree protection fence.
- C. All materials that are cleared and grubbed from the project site shall be properly disposed of offsite.
- D. Burning of debris onsite may be permitted; however, the Contractor must obtain a permit from the appropriate agency prior to burning.

4.4.3 Pavement Removal

- A. When approved by Georgia DOT, Henry County DOT, and/or HCWA, pavement and road surfaces shall be removed as required in order to install the water distribution and/or sanitary sewerage system appurtenances.
- B. Pavement shall be cut using a rotary saw in order to ensure straight lines. If the adjacent pavement is damaged, the damaged pavement shall be cut out.
- C. The width of pavement removal for pipe trenches shall be 12 inches greater than the width of the trench on each side.
- D. Driveways and sidewalks shall be removed to their full width and from control joint to control joint.
- E. Curb and gutter shall be removed from control joint to control joint.

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- F. All materials shall be properly disposed of offsite.

4.4.4 Soil Excavation

- A. Excavate soil to the lines, grades, and dimensions shown on the HCWA approved plans and as necessary to accomplish work. Do not over excavate without authorization from the HCWA Engineer.
- B. Excavated soil shall be stockpiled in locations designated on the HCWA approved plans. If a stockpile area is not designated, soil shall be stockpiled in a manner such that it will not obstruct the work nor endanger the workers or the public, obstruct sidewalks, driveways, roadways, or other structures.
- C. Excavated soil shall not be placed against tree trunks.
- D. Excavated soil that is unsuitable or exceeds the quantity required for fill or backfill shall be disposed of offsite.

4.4.5 Rock Excavation

- A. When rock excavation is necessary, all rock shall be removed to provide a clearance below and on each side of all pipe, valves, and fittings of at least 6 inches for nominal pipe sizes of 24 inches or less and at least 9 inches for nominal pipe sizes greater than 24 inches. Clearance for structures shall be at least 12 inches.
- B. Contractor shall obtain written approval from the HCWA prior to conducting any blasting activities.
- C. Rock blasting shall be conducted in accordance with Chapter 120-3-10-0.4 of the “Rules and Regulations for Explosives and Blasting Agents” and all other applicable local, state, and federal regulations.
- D. A Blasting Report consisting of a pre-blast report, drilling log, and a post-blast report shall be submitted to HCWA after rock blasting is complete.
- E. Rock blasting shall be conducted by a licensed blasting contractor.
- F. After rock removal, trench shall be backfilled with No. 57 stabilization stone up to the grade of the pipe or structure to be installed.
- G. Excavated rock shall be disposed of offsite unless otherwise approved by HCWA.

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4.4.6 Trench Excavation

- A. Trenches shall be excavated to the required alignment, depth, and width required to install the pipe or structure and shall conform to all federal, state, and local regulations for the protection of workers.
- B. The Contractor is responsible for trench safety. HCWA will issue a “Stop Work” order if unsafe conditions exist.
- C. The width of the trench shall be of sufficient width to install the pipe, accommodate compaction equipment, and make necessary inspections. When required, trenches shall be made wider to permit the placing of shoring.
- D. Trench bottom shall be constructed to provide a firm, stable, and uniform support for the full length of the pipe. Blocking shall not be used to change pipe grade or to intermittently support pipe across excavated sections.
- E. If unsuitable soil exists, the trench shall be over-excavated to remove the unsuitable soil and backfilled with No. 57, or suitable HCWA approved, stabilization stone. The HCWA Inspector shall determine the depth of over excavation.
- F. Open trenches shall be limited to 300 feet in length and shall be backfilled at the end of each work day.
- G. Open trenches shall be barricaded or covered until they are completely backfilled.
- H. Excavated soil that is unsuitable or exceeds the quantity required for backfill shall be disposed of offsite.

4.4.7 Dewatering

- A. Where running or standing water occurs in an excavation or where the soil in the bottom of an excavation displays a “quick condition” tendency, the water shall be removed by pumping.
- B. The excavation shall be kept free from water during installation operations by suitable means, such as well points, until the pipe has been installed and backfill placed and compacted to a sufficient height to prevent pipe flotation.
- C. Contractor shall provide all labor, materials, and equipment required to remove and control water as required to accomplish work.

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- D. Contractor shall properly dispose of water in a manner that will not cause erosion or flooding, or otherwise damage existing facilities, completed work, or adjacent property. Contractor shall be responsible for any damage caused by the dewatering operation.
- E. Contractor shall be responsible for obtaining any required permits, required by regulatory agencies, for discharging water from dewatering operations.

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SECTION 4.5 - INSTALLATION

4.5.1 General

- A. Pipe shall be laid and maintained on lines and grades established by the HCWA approved plans and specifications.
- B. Fittings, valves, hydrants, manholes, valve vaults, and other structures shall be installed at the locations shown on the HCWA approved plans unless otherwise approved in writing by the HCWA.
- C. Prior to installation, the interior of pipes, fittings, valves, and other appurtenances shall be cleaned free of dirt and debris.
- D. Materials shall be installed in accordance the manufacturer's recommendations.
- E. Contractor shall provide all labor, materials, and equipment required to install water distribution and/or sanitary sewerage system appurtenances.

4.5.2 Ductile Iron Pipe

A. Water Lines

- 1. Ductile iron pipe shall be bedded in accordance with ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, Type 2 Laying Condition.
 - a) Ductile iron pipe shall be laid on a flat bottom trench and bedded to its centerline with lightly consolidated select earth backfill.
 - b) Backfill from centerline of pipe to 12 inches below the finished grade with select earth backfill. Backfill shall be placed in 6-inch lifts and manually compacted to a minimum of 90 percent of the maximum dry density, as determined by ASTM D698, prior to placing succeeding lifts.
 - c) Backfill final 12 inches of trench with select earth backfill. Backfill shall be placed in 6-inch lifts and mechanically compacted to 90 percent of the maximum dry density, as determined by ASTM D698, prior to placing succeeding lifts.
 - d) Ductile iron pipe that is installed above grade (non-buried) shall be properly supported with pipe supports, as approved by HCWA.

B. Gravity Flow Sanitary Sewers

- 1. Ductile iron pipe shall be bedded in accordance with ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, Type 5 Laying Condition.

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- a) Ductile iron pipe shall be bedded to its centerline with No. 57 stabilization stone. There shall be a minimum of 4 inches of No. 57 stabilization stone under the pipe. Stabilization stone shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D698.
- b) Backfill from centerline of pipe to top of pipe with No. 57 stabilization stone or select earth backfill. Backfill shall be placed in 6-inch lifts and manually compacted to a minimum of 90 percent of the maximum dry density, as determined by ASTM D698, prior to placing succeeding lifts.
- c) Backfill from top of pipe to finished grade with select earth backfill. Backfill shall be placed in 6-inch lifts and mechanically compacted to a minimum of 90 percent of the maximum dry density, as determined by ASTM D698, prior to placing succeeding lifts.
- d) For public gravity sewer extensions, pipe bedding and trench sidewalls, up to the pipe crown, shall not be installed in fill conditions, unless otherwise approved by HCWA.

C. Sanitary Sewer Force Mains

- 1. Ductile iron pipe shall be bedded in accordance with ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51, Type 3 Laying Condition.
 - a) Ductile iron pipe shall be bedded on a minimum of 4 inches of loose select earth backfill.
 - b) Ductile iron pipe shall be backfilled to the crown of the pipe with lightly consolidated select earth backfill.
 - c) Install tracer wire on ductile iron sanitary sewage force mains. Install tracer wire along the entire length of the pipe.
 - d) Backfill from top of pipe to 12 inches below the finished grade with select earth backfill. Backfill shall be placed in 6-inch lifts and mechanically compacted to a minimum of 90 percent of the maximum dry density, as determined by ASTM D698, prior to placing succeeding lifts.
 - e) Backfill final 12 inches of trench with select earth backfill. Backfill shall be placed in 6-inch lifts and mechanically compacted to 90 percent of the maximum dry density, as determined by ASTM D698, prior to placing succeeding lifts.

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2. Install PVC force main markers at grade along the centerline of the pipe. Install at intervals as determined by HCWA. Markers will be provided by HCWA.

D. Non-Buried Ductile Iron Pipe

1. Ductile Iron Pipe that is installed above grade (non-buried) shall be properly supported with pipe supports, as approved by HCWA.

4.5.3 PVC Pipe

A. Gravity Flow Sanitary Sewers

1. SDR 35/ SDR 26 PVC pipe shall be bedded in accordance with AWWA C605, Type 5 Bedding.
 - a) PVC pipe shall be bedded to crown of pipe with No. 57 stabilization stone. There shall be a minimum of 4 inches of No. 57 stabilization stone under the pipe. Stabilization stone shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D698.
 - b) Backfill from top of pipe to finished grade with select earth backfill. Backfill shall be placed in 6-inch lifts and mechanically compacted to a minimum of 90 percent of the maximum dry density, as determined by ASTM D698, prior to placing succeeding lifts.

B. Sanitary Sewage Force Mains

1. C900 PVC pipe shall be bedded in accordance with AWWA C605, Type 3 Bedding.
 - a) C900 PVC pipe shall be bedded on a minimum of 4 inches of loose select earth backfill.
 - b) C900 PVC pipe shall be backfilled to the crown of the pipe with lightly consolidated select earth backfill.
 - c) Install tracer wire on C900 PVC pipe sanitary sewage force mains. Install tracer wire along the entire length of the pipe.
 - d) Backfill from top of pipe to 12 inches below the finished grade with select earth backfill. Backfill shall be placed in 6-inch lifts and mechanically compacted to a minimum of 90 percent of the maximum dry density, as determined by ASTM D698, prior to placing succeeding lifts.

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- e) Backfill final 12 inches of trench with select earth backfill. Backfill shall be placed in 6-inch lifts and mechanically compacted to 90 percent of the maximum dry density, as determined by ASTM D698, prior to placing succeeding lifts.

C. PVC Force Main Markers

- 1. Install PVC force main markers at grade along the centerline of the pipe. Install at intervals as determined by HCWA. Markers will be provided by HCWA.

4.5.4 Valves

- A. Valves shall be installed plumb with the operator straight up and the valve aligned with the direction of the pipe.
- B. Valves shall be properly supported so that they do not place any undue stress on the pipe.
- C. A valve box shall be installed plumb over the valve operator and adjusted so that it is flush with the finished grade. A precast concrete collar shall be placed around the top of the valve box.
- D. Valves installed above grade (non-buried) shall be properly supported with pipe supports.

4.5.5 Fire Hydrants

- A. Fire hydrants shall stand plumb with the hose nozzles parallel with or at right angles to the curb and the pumper nozzle facing the curb in the locations shown on the HCWA approved plans.
- B. Fire hydrant shall be placed on top of a minimum of 18 inches of No. 57 stabilization stone. No. 57 stabilization stone shall extend up 6 inches above the drain hole and shall extend out 12 inches in all directions from the fire hydrant. Minimum 8 cubic feet of No. 57 stabilization stone.

4.5.6 Yard Hydrants

- A. Yard hydrants shall be set plumb in the locations shown on the HCWA approved plans.
- B. Yard hydrant shall be placed on top of a minimum of 18 inches of No. 57 stabilization stone. No. 57 stabilization stone shall extend up 6 inches above the drain hole and shall

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extend out 6 inches in all directions from the yard hydrant. Minimum 2 cubic feet of No. 57 stabilization stone.

4.5.7 Thrust Restraint

- A. Thrust restraint shall be installed at all bends, tees, dead-ends, and locations where thrust may be developed in the pressurized pipeline.
- B. Thrust restraint shall consist of cast-in-place concrete, tie rods, combinations thereof, or other methods approved by the HCWA Engineer.
- C. Thrust blocking, using cast in place concrete, shall be placed against undisturbed ground.
- D. A minimum 10-mil plastic sheet shall be placed between the concrete and the pipe and fittings. Concrete shall not cover the bolts and nuts on the valves and fittings.
- E. Pipe that is encased in concrete shall be poly-wrapped.

4.5.8 Manholes and Wet Wells

- A. Manholes and wet wells shall be set plumb in the locations shown on the HCWA approved plans.
- B. Manholes and wet wells shall be placed on top of a minimum of 12 inches of No. 57 stabilization stone. No. 57 stabilization stone shall extend a minimum of 12 inches beyond the outside of the structure in all directions. Unsuitable ground conditions may require additional and/or larger stabilization stone.
- C. Manholes shall be positioned such that the influent and effluent pipes enter the center of their respective openings and do not pinch the resilient seal. Pipe shall not rest on the invert of the opening.
- D. Prior to joining sections, tongue and groove joints shall be cleaned free of dirt and debris.
- E. Manhole sections shall be aligned such that the interior manhole steps are vertically aligned.
- F. Resilient pipe seal clamps shall be tightened in accordance with the manufacturer's instructions.
- G. Manhole lifting holes and all inside joints shall be sealed using non-shrink grout.

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- H. Manholes and wet wells shall be backfilled with select earth backfill. Backfill shall be placed in 6-inch lifts and mechanically compacted to a minimum of 95 percent of the maximum dry density, as determined by ASTM D698, prior to placing succeeding lifts.
- I. An invert shall be built in each manhole to transition flow from the influent pipe to the effluent pipe. The invert shall have a “U” shape.
- J. Manholes that that have a sanitary sewage force main discharging into them plus all manholes located within 1,600 feet downstream of the discharge manhole and all other manholes that are subject to corrosion shall be lined with an elastomeric polyurethane lining system, (SprayRoq, or HCWA approved equal). Liner shall be installed after the manhole has been set and backfilled. After liner is installed, the manhole shall be Holiday tested to verify coating does not contain any discontinuities. Additional joint sealing methods/measures may be required as conditions warrant.

4.5.9 Meter Boxes

- A. Meter boxes shall be set plumb in the locations shown on the HCWA approved plans.
- B. The top of the meter box shall be set flush with grade and shall not be set in a depression.
- C. Backfill around the meter box shall be manually compacted.

4.5.10 Meter Vaults and Valve Vaults

- A. Meter vaults and valve vaults shall be set plumb in the locations shown on the HCWA approved plans.
- B. Meter vaults and valve vaults shall be placed on top of a minimum of 12 inches of No. 57 stabilization stone. No. 57 stone shall extend a minimum of 12 inches beyond the outside of the vault in all directions.
- C. Meter vaults and valve vaults are not allowed in pavement.
- D. The top of the meter vaults or valve vaults shall be 6 inches above grade, and shall not be set in a depression. Surface water shall be directed away from the vault lids.
- E. Openings for pipe shall be sealed using non-shrink grout.
- F. Meter vaults and valve vaults shall be backfilled with select earth backfill. Backfill shall be placed in 6-inch lifts and mechanically compacted to a minimum of 95 percent of the maximum dry density, as determined by ASTM D698, prior to placing succeeding lifts.

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4.5.11 Pavement Replacement

- A. Pavement shall be replaced in accordance with Georgia DOT and/or Henry County DOT standard specifications.

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SECTION 4.6 - COATINGS AND LININGS

4.6.1 Coatings and Linings

The following items/materials shall be painted or lined with the appropriate coating system:

- A. Above grade concrete, brick, and CMU that is scheduled to be painted
- B. Above grade (non-buried) and submerged ductile iron pipe and fittings
- C. Valves
- D. Pipe supports
- E. Structural steel
- F. Equipment and appurtenances
- G. Pump station wet wells
- H. Manholes that a force main discharges into plus all manholes within 1,600 feet of the discharge manhole.
- I. Other manholes subject to corrosion as determined by the HCWA Engineer
- J. All above grade concrete, brick, and CMU surfaces that are not scheduled to be painted shall be applied with a clear water repellent.

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SECTION 4.7 - TESTING

4.7.1 Hydrostatic Testing - Distribution Lines & San. Sew. Force Mains

- A. Water distribution system piping and sanitary sewage force mains shall be hydrostatically tested in accordance with AWWA C600.
- B. Hydrostatic test shall be witnessed by a HCWA Inspector.
- C. Pipe shall be slowly filled with potable water until all air is removed and the line is pressurized to the test pressure. Service lines shall be included as part of the hydrostatic test.
- D. Test pressure shall be 1.5 times the maximum working pressure or 150 PSI, whichever is greater as measured at the lowest point in the system.
- E. Test pressure shall not vary by more than ± 5 PSI for the duration of the test.
- F. Test shall last a minimum of two (2) hours.
- G. Makeup water shall be added, as required, to maintain the pressure within 5 PSI of the test pressure. The maximum amount of makeup water allowed shall be determined by the following formula.

$$L = \frac{SD\sqrt{P}}{133,200}$$

Where:

L = Testing Allowance (Makeup Water), GPH

S = Length of Pipe Tested, ft

D = Nominal Diameter of Pipe, in

P = Test Pressure, PSIG

- H. Test shall be considered acceptable if pressure remains within the acceptable limits for the entire test period and the makeup water volume does not exceed the maximum allowable.
- I. When unsatisfactory test results are obtained, repair pipe and retest until pipe passes hydrostatic test. Repair visible leaks regardless of quantity of leakage.

4.7.2 Air Pressure Testing of Gravity Sewer Lines

- A. Gravity sewer piping shall be low pressure air tested in accordance with UNI-B-6.
- B. Low pressure air test shall be witnessed by the HCWA Inspector.

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- C. Gravity sewer lines shall be tested from manhole to manhole. Lines shall be free of dirt and debris and no personnel shall be permitted in the manholes when the test is being conducted.
- D. The gravity sewer line shall be pressurized to 4.0 PSIG greater than the average back pressure of any groundwater above the pipe, but no greater than 9.0 PSIG.
- E. After temperatures have equalized and the pressure has stabilized at 4.0 PSIG (greater than the average groundwater back pressure), the air supply shall be shut off.
- F. The pressure shall then be decreased to no less than 3.5 PSIG (greater than the average groundwater back pressure).
- G. The time shall then start and the pressure shall not drop more than 1.0 PSIG during the testing period. The minimum test time for various diameter pipes is presented below.

Nominal Pipe Diameter (inches)	Minimum Test Time (min:sec)	Maximum Length for Minimum Test Time (feet)	Test Time for Longer Length (L) Sections (seconds)
8	7:34	298	1.520 L
10	9:26	239	2.374 L
12	11:20	199	3.418 L
15	14:10	159	5.342 L
16	15:07	149	6.078 L
18	17:00	133	7.692 L
20	18:54	119	9.497 L
24	22:40	99	13.674 L
30	28:20	80	21.366 L
36	34:00	66	30.768 L

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- H. In general, lateral sewers may be ignored when computing required test time. However, if a section fails to pass the air test when lateral sewers have been ignored, the test time shall be recomputed to include all lateral sewers using the method of calculation in UNI-B-6.
- I. Test shall be considered acceptable if pressure does not drop more than 1.0 PSIG during the test period.
- J. When unsatisfactory test results are obtained, repair pipe and retest until pipe passes low pressure air test. Repair visible leaks regardless of quantity of leakage.

4.7.3 Television Inspection of Gravity Sewer Lines

- A. Gravity sewer lines shall be television inspected after the trench is backfilled and compacted.
- B. Prior to television inspection, gravity sewer lines shall be cleaned using high pressure water. Water usage for cleaning gravity sewer lines shall be metered.
- C. Television inspection shall be performed by an approved contractor using pan and tilt camera.
- D. Television inspection shall be witnessed by the HCWA Inspector.
- E. Television inspection shall be recorded.
- F. At a minimum, the television inspection shall look for the following deficiencies.
 - 1. Cracks in the pipe and/or lining
 - 2. Rolled gaskets
 - 3. Leaking joints
 - 4. Deviations from line and grade
 - 5. Pipe deformations
 - 6. Other deficiencies
- G. A television inspection report containing the following information shall be submitted to the HCWA.
 - 1. Length of pipe between manholes
 - 2. Location of services
 - 3. Deficiencies
- H. No paving shall be done until gravity sewer lines are passed by the HCWA.

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4.7.4 Mandrel Testing of Gravity Sewer Lines

- A. If the television inspection indicates that there is excessive deflection of the sewer line or that the sewer line is egg shaped, the sewer lines shall be tested for deformation using a mandrel in accordance with ASTM D3034.
- B. The sewer line shall be capable of passing a mandrel which has a diameter that is 95 percent of the diameter of the sewer line.
- C. Any sewer line that fails the mandrel test shall be re-laid or replaced as required.

4.7.5 Clean-out Box

- A. Clean-out box shall be high density polyethylene plastic.
- B. Clean-out box shall be 10 inch diameter round valve box.
- C. Clean-out box lid shall be high density polyethylene plastic T-cover.
- D. Clean-out boxes shall have the words "SEWER" embossed on the lid.
- E. Clean-out box color: GREEN
- F. Acceptable Manufacturer's:
 - 1. Carson L Series 910
 - 2. DFW Plastics, Inc. 1100 Series
 - 3. HCWA Approved Equal

4.7.6 Hydrostatic Testing of Water Retaining Structures

- A. Water retaining structures shall be hydrostatically tested in accordance with ACI 350.1 and 350.1R.
- B. Hydrostatic test shall be witnessed by the HCWA Inspector.
- C. Hydrostatic testing shall not begin until concrete has cured for a minimum of 14 days.
- D. Water retaining structures shall be filled with potable water to the maximum operating level within the structure. Water level shall be maintained at this level for 72 hours prior to beginning the actual test.
- E. Test shall be considered acceptable when there is no visible sign of flowing or seeping water and no measurable loss of water (HST-NML) which means the drop in the water surface shall not exceed 1/8 inch in three (3) days.

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- F. When unsatisfactory test results are obtained, repair water retaining structure and retest until structure passes hydrostatic test. Repair visible leaks regardless of quantity of leakage.

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SECTION 4.8 - DISINFECTION

4.8.1 General

- A. All newly installed water distribution piping and existing water distribution piping affected during construction shall be disinfected in accordance with AWWA C651.
- B. The HCWA Inspector shall be present during the disinfection process.
- C. A HCWA water meter is required for all flushing procedures.
- D. All water samples will be collected and tested by the HCWA. A Coliform analysis fee applies and can be found at www.hcwa.com under the Development tab/Permit and Impact Fees.

4.8.2 Disinfection Procedures

- A. Prior to chlorination, the water line shall be slowly filled with water to remove air pockets and then flushed to remove foreign debris. A minimum flushing velocity of 2.5 ft/s shall be maintained. Line shall be flushed until water is clear of suspended solids and color.
- B. All water used shall meet drinking water standards with the active distribution system being appropriately protected from cross contamination.
- C. Chlorine shall be injected into the system in sufficient quantity to obtain a concentration of 25 mg/l.
- D. All valves, hydrants, services, etc. shall be operated to ensure disinfection.
- E. Chlorine solution shall be retained in the system for a minimum of 24 hours. At the end of the 24 hour period, a residual of not less than 10 mg/l shall remain. If the residual is less than 10 mg/l, the disinfection procedure shall be repeated.
- F. Flush all lines until the chlorine residual is equal to the existing system. After system is flushed, all valves shall be closed.
- G. After chlorination and flushing is complete, HCWA will collect a sample from the disinfected water distribution system and perform a total coliform analysis. If the system does not pass the total coliform analysis, the disinfection procedure shall be repeated.
- H. System shall not be placed into service until all tests are acceptable and HCWA gives Final Approval to place the system into operation.

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SECTION 4.9 - FIELD TESTING AND STARTING OF SYSTEMS

4.9.1 Field Testing and Starting of Systems

- A. Contractor is responsible for start-up of all equipment and mechanical systems.
- B. Contractor shall provide all labor and materials required to perform start-up of all equipment and mechanical systems.
- C. Contractor shall obtain the services of the equipment manufacturer(s), as required, to certify the installation.
- D. Equipment manufacturer(s) shall certify in writing that their equipment has been installed properly, the equipment functions properly, and the equipment warranty is valid. Written certification shall be on the manufacturer's letterhead.
- E. Contractor shall obtain the services of the equipment manufacturer(s), as required, to train HCWA personnel on the operation and maintenance of their equipment.
- F. A copy of the start-up test report and manufacturer's certification shall be given to the HCWA.

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SECTION 4.10 - SITE CLEAN UP

4.10.1 Site Clean Up

- A. Contractor shall remove all unused material, excess soil and rock, and all other debris from the construction site as closely behind the work as practical. If the Contractor fails to maintain clean-up responsibilities as directed by the HCWA Inspector, the HCWA may issue a “Stop Work” order.
- B. All trenches shall be backfilled and tamped before the end of each work day.
- C. Prior to requesting final completion, the Contractor shall complete the following cleanup tasks.
 - 1. Remove and properly dispose of all accumulated debris and all excess material of any kind from the job site.
 - 2. Repair or replace any work, trees, lawns, shrubs, fences, flower beds, drainage culverts, or any other property damaged by the construction. All items damaged beyond repair shall be replaced with new material of equal or better quality.
 - 3. Clean all road surfaces.

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DIVISION 5 – HCWA PRE-TREATMENT REQUIREMENTS

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SECTION 5.1 - GENERAL

5.1.1 General

HCWA has implemented an Industrial Pre-Treatment Program and a Grease Management Program for the purposes of protecting the HCWA sanitary sewerage system. Industries that discharge wastewater to the HCWA sanitary sewer collection system are required to comply with the HCWA Industrial Pre-Treatment Program. Commercial facilities that discharge fats, oils, and grease into the HCWA sanitary sewer collection system are required to comply with the Grease Management Program. The Grease Management Program rules and regulations are presented in this section.

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SECTION 5.2 - GREASE MANAGEMENT PROGRAM

5.2.1 Purpose

- A. The purpose of the HCWA Grease Management Program is to minimize the introduction of fats, oils, and grease into the HCWA sanitary sewerage system. The main components of the program are the proper sizing, installation, and maintenance of grease interceptors. The administrative and inspection requirements of food service facilities are established herein.

5.2.2 General Criteria

- A. Installation Requirements for New Food Service Facilities
 1. All food service facilities inside the HCWA sanitary sewerage service area shall be required to properly size, install, operate, and maintain an approved grease interceptor.
 2. All interceptor units shall be installed outside of the food service facility building unless the user can demonstrate to the HCWA that an interceptor located outside of the food service facility is not feasible.
 3. All grease interceptor units shall be of the type and capacity approved by Henry County and the HCWA.
 4. Dumpster drains shall be connected upstream of a 1,500 gallon grease interceptor.
- B. Prohibited Discharges
 1. Domestic wastewater shall not be discharged into the grease interceptor unless specifically approved, in writing, by the HCWA.
- C. Requirements for Existing Food Service Facilities
 1. All existing food service facilities inside the HCWA sanitary sewerage service area are expected to conduct their operations in such a manner that grease is captured on the user's premises and then properly disposed.
 2. Existing food service facilities will be handled under HCWA's Grease Management Program in the following manner.
 - a) HCWA will periodically inspect each food service facility on an as needed basis to ensure that each facility is complying with the intent of the Grease

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Management Program. The frequency of the inspection shall be determined by the HCWA.

- b) Each food service facility in the vicinity of an identified problem area will be inspected. The facilities grease control practices and the adequacy of their grease control interceptor/equipment will be assessed. Maintenance records will also be reviewed.
- c) Following the inspections, HCWA will send written notice to the inspected food service facility. The written notice will contain a summary of the policy requirements and the results of the inspection. The inspections will typically result in one of the following actions.
 - 1) After notice and an opportunity to be heard, facilities that are not in compliance shall be required to develop and submit to HCWA a proposed plan designed to achieve compliance through improved housekeeping and/or increased maintenance and pumping on the existing grease interceptor/equipment.
 - 2) Facilities that are not successful in achieving compliance with the intent of the Grease Management Program through improved housekeeping and increased maintenance and pumping on the existing grease interceptor/equipment will be required to install the necessary grease interceptor/equipment to bring the facility into compliance.

D. Waste Minimization Plan

- 1. Food service facilities shall develop and implement a Waste Minimization Plan pertaining to the disposal of grease, oils, and food particles.
- 2. Educational materials are available from HCWA regarding the minimization of these wastes.

E. Floor Drains

- 1. Only floor drains which discharge or have the potential to discharge grease shall be connected to the grease interceptor.

F. Location

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1. Each grease interceptor shall be installed and connected so that it is easily accessible for inspection, cleaning, and removal of the intercepted grease at any time.
2. Grease interceptors required under this ordinance shall be installed outside of the food service facility. The best location is in an area outside of an exterior wall, but upstream of the domestic wastewater drain line(s).
3. A grease interceptor shall not be installed inside any part of a building unless approved, in writing, by the HCWA. The user bears the burden of demonstrating that an outside grease interceptor is not feasible.
4. The top of the interceptor shall be a maximum of 3 feet from finished grade.

5.2.3 Design Criteria

A. Construction of Interceptors

1. Grease interceptors shall be constructed in accordance with Henry County plumbing standards and shall have a minimum of two compartments with fittings designed for grease retention.

B. Access

1. Grease interceptors shall be provided with two (2) manhole lids installed flush with grade (in pavement) or 1" above grade outside of pavement.
2. All grease interceptors shall be designed and installed to allow complete access for inspection and maintenance of the inner chamber(s) as well as viewing and sampling of the wastewater that is discharged to the sanitary sewer system.

C. Load Bearing Capacity

1. In areas where additional weight loads may exist, the grease interceptor shall be designed to have adequate load-bearing capacity (i.e. for vehicular traffic in parking or driving areas).

D. Inlet and Outlet Piping

1. Wastewater discharging to the grease interceptor shall enter only through the inlet pipe of the interceptor structure.
2. The inlet pipe bottom tee branch shall extend one (1) foot below the liquid level in the grease interceptor.

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3. The outlet pipe bottom tee branch shall be submerged to 2/3 of the liquid depth in the grease interceptor.
4. Grease interceptor shall have only one (1) inlet pipe and one (1) outlet pipe.

E. Interceptor Sizing

1. Grease interceptors shall have a minimum capacity of 1,500 gallons and an individual grease interceptor unit shall have a maximum capacity of 3,000 gallons. If the calculated capacity using one of the following formulas exceeds 3,000 gallons, then multiple grease interceptor units shall be installed in series in order to meet the capacity requirement.
2. Dumpsters that drain into the sanitary sewer system shall be protected by a grease interceptor. A minimum of 1,500 gallon capacity is required in addition to the calculation below.
3. The capacity of the grease interceptor shall be calculated using the following equations. The capacity of the grease interceptor shall be the larger of the two results.

a) Equation #1

$$\text{Interceptor Capacity (in gallons)} = S \times 25 \times \frac{HR}{12}$$

Where:

S = Number of Seats

HR = Maximum Hours of Daily Operation (including preparation and cleanup)

b) Equation #2

$$\text{Interceptor Capacity (in gallons)} = \text{Sum of Fixture Flows} \times 20$$

Type of Fixture	Flow Rate (GPM)
Restaurant Hand Sink	15
Pre-Rinse Sink	15
Single-Compartment Sink	20

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Double-Compartment Sink	25
Two Double-Compartment Sinks	35
Triple-Compartment Sinks	30
Dishwasher up to 30 gallons	15
Dishwasher up to 40 gallons	20
Dishwasher up to 50 gallons	25
Dishwasher up to 100 gallons	40
Other Fixtures	Manufacturer Peak

4. Grease interceptor designs represent minimum standards for normal usage. Installations with heavier usage require more stringent measures for which the user is responsible and shall pay the costs to provide additional measures if required by the HCWA.
5. Sizing calculations shall be provided by the applicant's design professional for review and approval by HCWA.
6. HCWA reserves the right to evaluate interceptor sizing on an individual basis for facilities with special conditions, such as highly variable flows, high levels of grease discharge, or other unusual situations that are not adequately addressed by the formula.

5.2.4 Grease Interceptor Maintenance

A. Pumping

1. All grease interceptors shall be maintained by the user at the user's expense.
2. Maintenance shall include the complete removal of all contents, including floating materials, wastewater, and bottom sludge and solids.
3. Decanting or discharging of removed waste back into the interceptor for the purpose of reducing the volume to be disposed of is strictly prohibited.

B. Pumping Frequency

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1. Grease interceptors must be pumped out completely a minimum of once every three (3) months.
2. Under-sink and in-line grease interceptors must be pumped/cleaned out completely a minimum of once every month.
3. Grease interceptors may need to be pumped more frequently as needed to prevent carry over grease into the sanitary sewer collection system.
4. Pumping frequency may be extended past the minimum period if the user can demonstrate that the grease interceptor can function properly with a longer pumping frequency. Extended pumping frequencies must be approved by the HCWA.

C. Notice of Violation

1. Grease interceptor inspections will be performed at the food service facility.
2. If the oil and grease concentrations exceed HCWA's maximum discharge limits and/or the combined depth of bottom and top solids exceeds 33 percent of the total depth of the trap, the facility will be notified in writing of the findings and the user will be given seven (7) days to achieve compliance.
3. If the interceptor is not cleaned or HCWA is not notified of the interceptor being cleaned within this time period, a Notice of Violation (NOV) letter will be issued to the user. In the NOV, the user will be given three (3) days to comply.
4. If compliance is not achieved within the three day period, the user's water service will be terminated. Water service, once terminated, will not be restored until the user has achieved compliance.

D. Disposal of Interceptor Pumped Material

1. All waste removed from each grease interceptor shall be recorded on a proper manifest form.
2. In no way shall the pumped material be returned to any private or public portion of the sanitary sewer collection system.

E. Additives

1. No additives shall be used at any time.

F. Chemical Treatment

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1. Chemical treatments such as drain cleaners, enzymes, acids, and other chemicals designed to dissolve, purge, or remove grease shall not be allowed to enter the grease interceptor.

5.2.5 Administrative Requirements

A. Administrative Fees

1. No fee will be charged for an inspection by HCWA; however, if the user's grease interceptor is not in compliance with the Grease Management Program, a re-inspection fee will be charged for each inspection thereafter until compliance is achieved. The current re-inspection fee can be obtained on the HCWA web site at www.hcwa.com.

B. Inspection and Entry

1. Authorized personnel of the HCWA, bearing proper credentials and identification, shall have the right to enter upon all properties subject to the Grease Management Program at any time and without prior notification for the purpose of inspection, observation, measurement, sampling, testing, or record review.

C. Record Retention and Reporting

1. All users must keep a record of any cleaning or maintenance performed on their grease interceptor.
2. The following records must be kept on-site at the food service facility for a minimum of two (2) years.
 - a) Manifests are required for all grease interceptors and shall contain the following information.
 - 1) Food service facility (generator) information including name, address, volume pumped, date and time of pumping, and generator signature verifying the information;
 - 2) Transporter information including company name, address, license plate number, permit number, driver name, and driver signature verifying transporter information;
 - 3) Receiving information including facility name, address, date and time of receiving, EPD permit number, and signature verifying receipt of waste.

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- 4) Manifests must be mailed, faxed, or electronically submitted to HCWA within fourteen (14) days after the interceptor maintenance was performed.
- 5) A manifest may not be required for under-sink or in-line grease interceptors if the user can present a valid reason to HCWA as to why one is not necessary.
- 6) Maintenance logs are required for all grease interceptors and shall indicate the date and time that the maintenance was performed and shall have a description of the maintenance that was performed.

5.2.6 Enforcement

- A. Enforcement of these regulations shall be in accordance with the provisions of the HCWA Enforcement Response Plan.
- B. Failure to comply with the Grease Management Program will be grounds for discontinuation of water service.

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DIVISION 6 – SEWER CREDIT FOR EVAPORATION

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SECTION 6.1 - SEWER CREDIT FOR EVAPORATION

6.1.1 General

Efficiently maintained cooling tower systems lose large amounts of makeup water to evaporation. Since this water does not enter the HCWA sewer system, a sewer credit can be applied where the evaporation amount is verified via metering. Credit can be considered for hospitals and large industrial users only. The rules and regulations are presented below.

6.1.2 Requirements

A. Meters

1. Customers applying for this sewer credit must install an approved water meter on the makeup and blowdown sides of the cooling tower.
2. HCWA approved water meters must be used. Non-mechanical meters shall be used whenever possible.
3. HCWA approved communication units must be installed such that all meters can be read without entering the facility.
4. Meters must be installed such that water is in the meter at all times. (Air in the lines can significantly affect meter readings and cause over/under billing).
5. There is no limit to the number of cooling towers that can be credited, however HCWA will only allow three separate makeup/blowdown metering installations per customer. (I.e. multiple cooling units can use one set of meters)

B. Customer Responsibility

1. The customer is responsible for all expenses necessary to establish and maintain the credit.
2. Customer is responsible for sizing of meters.
3. Customer must provide HCWA a schematic showing a sufficient level of detail for determining that the plumbing/meter configuration is acceptable for providing a sewer credit. The meter and plumbing configuration must be approved by HCWA prior to receiving the credit.
4. HCWA must be notified of any maintenance or changes in operations that may result in changes to the metering configuration or abnormal readings. Failure to notify

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HCWA of this type of circumstance could result in suspension or termination of the sewer credit.

5. Customer is responsible for ownership and maintenance of meters.
6. HCWA reserves the right to recoup any administrative cost of operating the program.
7. HCWA can rescind this credit at any time.
8. If granted the credit, HCWA reserves the right to inspect the plumbing and meter installations at any time.
9. Credit will be given per the following formula:

Makeup water minus blowdown water = sewer credit

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APPENDIX A

Standard Water Details

- W01 Underground Utility Location Detail
- W02 Water Line Trench Detail
- W03 Pipe Depth at Edge of Pavement
- W04 Typical Fire Hydrant Assembly
- W05 Fire Hydrant in Cul-de-Sac
- W06 Fire Hydrant at Dead-End
- W07 Water Line Blow-Off
- W08 Water Line Isolation Valve
- W09 Water Line Intersection
- W10 Water Main Combination Air/Vacuum Valve
- W11 Concrete Thrust Block
- W12 Concrete Deadman
- W13 Thrust Restraint
- W14 Residential Water Meter Detail
- W15 Short Side Residential Service Detail
- W16 Long Side Residential Service Detail
- W17 4 feet, 6 inch, and 8 inch Omni F2 Fireline Meter
- W18 10 inch Omni F2 Compact Fireline Meter
- W19 Industrial Backflow Preventer (4 inch and larger)
- W20 Commercial Backflow Preventer (4 inch and larger)
- W21 Typical Jack and Bore Detail
- W22 Creek Crossing
- W23 Pavement Repair
- W24 Typical Commercial /Industrial Meter Configurations
- W25 2 Inch Meter Installation
- W26 Reduced Pressure Zone Detail
- W27 Cooling Tower Meter Configuration

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W28 Water Meter Location for Subdivision

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APPENDIX B

Standard Sewer Details

- S01 Underground Utility Location Detail
- S02 Ductile Iron Sanitary Sewage Force Main Trench Detail
- S03 C900 PVC Sanitary Sewage Force Main Trench Detail
- S04 Ductile Iron Gravity Sewer Trench Detail
- S05 SDR 35/SDR 26 Gravity Sewer Trench Detail
- S06 Pipe Depth at Edge of Pavement
- S07 Standard Sanitary Sewer Manhole
- S08 Sanitary Manhole with Outside Drop
- S09 Sanitary Sewer Doghouse Manhole
- S10 Shallow Sanitary Sewer Manhole
- S11 Sanitary Sewer Manhole Vent
- S12 Standard Manhole Invert
- S13 Standard Sanitary Sewer Manhole Lid
- S14 Watertight Sanitary Sewer Manhole Lid
- S15 Sanitary Force Main Discharge Manhole
- S16 Typical Jack and Bore Detail
- S17 Creek Crossing
- S18 Sewer Service Line Lateral
- S19 Service Lateral for Sewer Lines 16 Feet Deep and Greater
- S20 Sanitary Sewer Service Line Clean-Out Connection
- S21 Sanitary Sewage Force Main Isolation Valve
- S22 Sanitary Sewage Combination Air/Vacuum Valve (3 inch and Smaller)
- S23 Sanitary Sewage Combination Air/Vacuum Valve (4 inch and Larger)
- S24 Concrete Thrust Block
- S25 Concrete Deadman
- S26 Thrust Restraint
- S27 Typical Sanitary Sewage Lift Station Property Layout

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- S28 Access Road
- S29 Lift Station Electrical Connection
- S30 Typical Sanitary Sewage Lift Station Wet Well
- S31 Chain Link Fence
- S32 Frost Proof Yard Hydrant
- S33 Grease Interceptor
- S34 Pavement Repair
- S35 Sanitary Sewer Connection for Dumpster Pad
- S36 Sewer Easement Access Gate
- S37 Typical Jack & Bore Detail Sanitary Sewer Force Main