



## WATER AND SEWER STANDARDS AND SPECIFICATIONS

Original:	May 2011
Rev:	April 2024
Rev:	
Rev:	
Rev:	

Prepared by:



Carter & Sloope  
CONSULTING ENGINEERS



ENVIRONMENTAL PROTECTION DIVISION

**Jeffrey W. Cown, Director**

**Watershed Protection Branch**

2 Martin Luther King, Jr. Drive  
Suite 1470A, East Tower  
Atlanta, Georgia 30334  
404-463-1511

May 6, 2024

Mr. Kevin Sorrow, Public Works Director  
City of Covington  
2194 Emory Street  
Covington, Georgia 30014

RE: Standard Specifications Update  
City of Covington  
EPD # 2023-204  
Newton County, Ocmulgee River Basin

Dear Mr. Sorrow:

We have completed our review of the revised standard specifications for City of Covington (City) and have determined that our comments were appropriately addressed. We hereby approve the updated standard sewer specifications for use on future collection system projects in the City's service area.

We recommend that standard specifications be reevaluated, revised as necessary, and resubmitted for review every five years.

If you should have any questions, please contact me at (470) 524-0733, or via email at [august.lutkehus@dnr.ga.gov](mailto:august.lutkehus@dnr.ga.gov).

Sincerely,

August Lutkehus  
Municipal Permitting Unit  
Wastewater Regulatory Program

cc: Kevin Sorrow, City of Covington ([ksorrow@cityofcovington.org](mailto:ksorrow@cityofcovington.org))  
Brian Yoder, City of Covington ([byoder@cityofcovington.org](mailto:byoder@cityofcovington.org))  
Jen Lomas, Carter & Sloope, Inc. ([jlomas@cartersloope.com](mailto:jlomas@cartersloope.com))  
Chad Peden, Carter & Sloope, Inc. ([cpeden@cartersloope.com](mailto:cpeden@cartersloope.com))



**Jeffrey W. Cown, Director**

**Watershed Protection Branch**

2 Martin Luther King, Jr. Drive  
Suite 1470A, East Tower  
Atlanta, Georgia 30334  
404-463-1511

June 24, 2024

Ms. Jen Lomas  
Carter and Sloope, Inc.  
1031 Stonebridge Pkwy.  
Watkinsville, Georgia 30677

RE: STANDARD SPECIFICATIONS  
FOR CONSTRUCTION OF WATER & SEWER MAINS  
Covington Water System (WSID# 2170001)  
Newton County

Dear Ms. Lomas:

The Georgia Environmental Protection Division (EPD) Drinking Water Permitting and Engineering Unit has reviewed the Covington Water System STANDARD SPECIFICATIONS FOR CONSTRUCTION OF WATER & SEWER MAINS (the Drinking Water Part) submitted by CARTER AND SLOOPE, INC. on May 9, 2024.

After thorough review, the STANDARD SPECIFICATIONS FOR CONSTRUCTION OF WATER & SEWER MAINS (the Drinking Water Part) meets Section 1.2-Submission of Engineering Documents requirements of the Minimum Standards for Public Water Systems, March 2021, and Chapter 391-3-5 of the Georgia Rules for Safe Drinking Water and also meet Section 1.7- Additions and Extension to Public Water Systems and PART 12- Finished Water and Distribution Systems of the Minimum Standards for Public Water Systems, March 2021. The Covington Water System must provide to EPD, any updates and/or changes to the approved set of Standard Specifications.

One copy of the approved Standard Specification is retained.

If you have any questions concerning this letter, please contact this office at the number below.

Sincerely,

Asmita Patel  
Environmental Engineer  
Drinking Water Permitting & Engineering  
Phone: (470) 524 - 0552

Cc:

Manny Patel, Drinking Water Program Manager

## TABLE OF CONTENTS

SECTION 1 - INTRODUCTION.....	4
1.1.    PURPOSE .....	4
1.2.    GENERAL REQUIREMENTS.....	4
1.3.    DEVELOPMENT PLAN REVIEW AND APPROVAL PROCESS.....	5
1.4.    CONSTRUCTION.....	7
1.5.    INSPECTIONS .....	10
1.6.    AS-BUILTS .....	10
1.7.    THREE-YEAR MAINTENANCE .....	11
1.8.    BUILDING PERMITS.....	11
1.9.    APPEALS .....	11
SECTION 2 – PRECONSTRUCTION REQUIREMENTS .....	13
2.1    GENERAL REQUIREMENTS.....	13
2.2    WATER SYSTEM .....	14
2.3    SANITARY SEWER SYSTEM.....	15
SECTION 3 – DESIGN CRITERIA.....	18
3.1    GENERAL REQUIREMENTS.....	18
3.2    WATER SYSTEM .....	20
3.3    SANITARY SEWER SYSTEM.....	27
3.4    SEWER LIFT STATION .....	33
SECTION 4 – WATER SYSTEM SPECIFICATIONS .....	41
4.1    PURPOSE .....	41
4.2    MATERIALS .....	41
4.3    OTHER REQUIREMENTS.....	47
SECTION 5 – SEWER SYSTEM SPECIFICATIONS .....	48
5.1    PURPOSE .....	48
5.2    GENERAL REQUIREMENTS.....	48
5.3    MATERIALS .....	48
5.4    INSPECTIONS AND TESTS.....	74
SECTION 6 – CONSTRUCTION, EXCAVATION AND TESTING.....	76

6.1	GENERAL REQUIREMENTS.....	76
6.2	WATER SYSTEM.....	85
6.3	SANITARY SEWER SYSTEM.....	91
SECTION 7	GENERAL CONSTRUCTION NOTES.....	99
7.1	GENERAL REQUIREMENTS.....	99
7.2	WATER SYSTEM.....	99
7.3	SANITARY SEWER SYSTEM.....	100
SECTION 8	APPENDIX A – STANDARD DETAILS.....	103
SECTION 9	APPENDIX B - DRINKING WATER SUBMITTAL FORM.....	140
SECTION 10	APPENDIX C - SANITARY SEWER EXTENSION SUBMITTAL FORM.....	141
SECTION 11	APPENDIX D - SAMPLE UTILITY EASEMENT AGREEMENT.....	146
SECTION 12	APPENDIX E - DESIGN CHECKLIST.....	148
12.1	WATER SYSTEM.....	148
12.2	SANITARY SEWER SYSTEM.....	149

## **SECTION 1 - INTRODUCTION**

### 1.1. PURPOSE

These specifications describe procedures, design criteria, and products to be incorporated into the City of Covington's water distribution and sewerage system. These specifications shall be used concomitantly with the "Minimum Standards for Public Water Systems," current edition, published by the Georgia Environmental Protection Division (GaEPD). The Developer shall furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.

### 1.2. GENERAL REQUIREMENTS

1.2.1. When the standards set forth in this manual are more restrictive than those required by any statute, ordinance or regulation applicable within the City of Covington or Newton County, Georgia, the requirements of this manual shall govern. When provisions or any other statute, ordinance or regulation require more restrictive standards than required by this manual, the more restrictive standards shall apply. This document is subject to periodic revision to meet changing requirements for materials, fire and safety regulations, environmental regulations, etc. At the beginning of a project, users should verify that they have the latest edition. It is not intended as a substitute for site-specific engineering and construction techniques. Individual project conditions may require variances from the provisions in this document in which case such variances should be noted in the plans and other data submitted by the project design professional for the City's approval.

1.2.2. Definitions: Where the following words or pronouns occur herein, they shall have the following meaning:

- "As-Built Plans" shall mean plans indicating the field verified location of the applicable utility and appurtenances as installed by the contractor.
- "City" shall mean the City of Covington, Georgia, or its authorized and legal representatives.
- "Code" shall mean Covington, Georgia Code of Ordinances.
- "Commission" shall mean the Covington, Georgia Planning Commission.
- "Construction Plans" shall mean plans approved by the City for installation of the applicable utility.
- "GaEPD" shall mean Georgia Environmental Protection Division.
- "Developer" shall mean any party wishing to expand, develop, or improve the water distribution system, or the authorized and legal representative, contractor, or engineer of such party.
- "Preliminary Plans" shall mean the initial plans submitted for the review by the City and shall apply to those plans subject to the Covington Planning Commission Review Process.
- "Provide" shall mean to furnish and install.
- "Subdivision" shall mean the division of a lot of record into two (2) or more lots, building sites or other divisions for the purpose, whether immediate or future, of sale, legacy or building development, and includes all divisions of land involving a new street or a change in existing streets, and includes re-subdivision, and where

appropriate to the context, relates to the process of subdividing or to the land or area subdivided.

- 1.2.3. The Standard Details included in Section 4.0 are complementary to the Specifications written herein. If the developer or designer notes any discrepancies or desires an interpretation of a specification, they should submit their question to the City in writing for a decision by the City or the City's representative.

### 1.3. DEVELOPMENT PLAN REVIEW AND APPROVAL PROCESS

The following steps are required for private developments proposing to connect to the City of Covington's water distribution or sanitary sewer collection systems. The Developer shall submit all documents directly to the City Engineering Department throughout this process.

**Step 1 Preliminary Plan Submission** - The developer shall prepare and submit three (3) paper copies and two (2) digital copies (in DWG and PDF format) of the preliminary plan for all projects proposing to connect to the City's water distribution or sanitary sewer collection system. The preliminary plans shall include the locations of the City's water and sanitary sewer lines along with adequate information to allow the City to estimate water and sanitary sewer demands.

**Step 2 Preliminary Plan Review** - The City will review the preliminary plans and provide general, high-level comments on the proposed development. As part of the preliminary plan review, the City will observe the following test:

- a. 24-hour flow and pressure tests for projects that include connections to the water distribution system; and
- b. Open channel flow test to verify capacity of the receiving sanitary sewer line and any downstream sewer lines.

The developer is responsible for payment of the above listed test based on the Fee Schedule provided in Appendix A. Such payment shall be submitted with the package in Step 1.

The City will evaluate the flow test data to determine if the existing system has adequate capacity for the proposed development. Pending determination of available capacity, the City will issue either 1) a Reservation of Capacity letter to the developer or 2) a confirmation letter that improvements are required to support the proposed development. The reservation of capacity will become null and void if any of the following occur:

1. Construction Plans are not submitted within sixty (60) days of issuance of the Reservation for Capacity letter; or
2. Approval of the Construction Plan is not obtained within four (4) months of issuance of the Reservation for Capacity letter; or
3. Construction of the project does not begin within six (6) months of issuance of the Reservation for Capacity letter; or
4. Construction on the project is halted for more than six (6) months at any time during the project; or
5. It is in the best interest of the City to void the developer's reservation of capacity.

If the Reservation of Capacity is voided at any time and for any reason, the developer will be required to start this process over at Step 1, regardless of the status of the project, in order to secure a reservation of capacity.

**Step 3 Construction Plan Submission** - Once a Reservation of Capacity letter is issued, the developer shall prepare and submit a construction plan review package (partial submissions will not be accepted). The developer is responsible for submitting a separate copy of construction plans to GaEPD for review of all projects with sanitary sewer projects involving pump stations with capacity of 700 gallons per minute (gpm) and greater and sanitary sewer projects with gravity sewer mains exceeding thirty-six (36") inches, and any water system improvements for developments other than subdivisions, apartment complexes and shopping centers. The following documents shall be included in the construction plan review package:

- a. Three (3) 24" x 36" paper copies and two (2) digital copy (in DWG and PDF format) of the construction plans, design calculations for lift stations (see Appendix D), and hydraulic calculations of the proposed collection system;
- b. Payment for fees based on the schedule included in Appendix A;
- c. Letter from developer requesting review and approval of the construction plans. This letter shall include all pertinent contact information for the proposed project along with water and sewer demands;
- d. Three (3) hard copies and one (1) digital copy (PDF format) of the design calculations for lift stations shall be submitted with the construction plans with verification of compliance with Appendix D.
- e. Three (3) hard copies and one (1) digital copy (PDF format) of the hydraulic calculations verifying that the sewer lines within and impacted by the project have adequate capacity to carry the peak flow.
- f. Drinking Water Extension Form, only when the project requires submission of construction plans to GaEPD; and
- g. Sanitary Sewer Extension Form, only when the project requires submission of construction plans to GaEPD.

**Step 4 Construction Plan Review** - The City will conduct a full review of the construction plans for conformance with the requirements herein. The construction drawings will be designated either APPROVED or REVISE AND RESUBMIT and a checklist of deficiencies of the plans will be returned to the developer. If approved, the project will progress to Step 5; if revisions are required, the developer shall revise the construction plans and follow the instructions described in Step 3.

**Step 5 External Plan Submission** - If aspects of the development plans go beyond the jurisdiction and/or current certification of the City, the developer or his representative will send additional plans to appropriate agencies such as the Georgia Department of Transportation (GDOT), Newton County Planning Department (for plans on lots that abut the City/County boundary line) and the Georgia Environmental Protection Division (EPD) for review. It is important to note that external review must not be initiated without prior approval from the City and all fees to external agencies having been paid.

**Step 6 Preconstruction Meeting** - Following approval of the construction plans by the City and any required external agencies, the developer shall schedule a preconstruction meeting with the City. The developer will be responsible for paying all fees at the preconstruction meeting,



including connection fees, before the approved set of drawings will be released by the City. For industrial developments, where the Developer has a Service Agreement with the City of Covington, the connection fee payment schedule may be modified.

The developer, design professional, contractor and City representatives are required to meet with the City for the purpose of discussing the construction and inspection of the proposed development. The proposed start date along with a detailed construction schedule, with completion date, shall be provided to the City.

The preconstruction conference shall be held before issuance of the Land Disturbance Permit. No water or sanitary sewer construction shall be allowed until the permit is issued and displayed at the project site.

#### 1.3.1 Permit

The approval of the construction plans, and subsequent completion of the Preconstruction Meeting, will serve as a permit authorizing the contractor to proceed with the installation of the applicable utility. A copy of the approved plans shall be located at the project site at all times. **No water or sanitary sewer construction shall be allowed until the construction plans have been approved, the requirements of a Preconstruction Meeting have been satisfied, and a copy of the approved plans are available at the project site.** The permit will expire if the developer does not begin construction of the water and/or the sewer facilities within six (6) months from the date of permit issuance. If the permit expires, the plans will have to be resubmitted for review, and the developer will have to pay all associated costs of the new review.

#### 1.3.2 Capacity Reservation

The Developer may request a capacity reservation for either water or sanitary sewer. The request shall be submitted to the City in writing with the Preliminary Plan Submission. If capacity is available, as outlined herein, the City will issue a reservation of capacity letter to the Developer.

#### 1.3.3 Approval by other Government Agencies

No part of the approval process is intended to relieve the developer of the responsibility to comply with minimum standards of the Georgia Department of Natural Resources Environmental Protection Division, Georgia Department of Transportation, City of Covington, Newton County or other appropriate regulatory agency.

#### 1.3.4 General Utility Locations and Installation Requirements

All utility locations shall correspond to the typical layout shown in the Standard Detail Drawings Section 4.0. All utilities within the curbs shall be installed and the ditches backfilled and thoroughly compacted before any pavement or base is installed. All utility manholes and valve boxes shall be brought to finished grade within the roadway section.

### 1.4. CONSTRUCTION

#### 1.4.1 Preconstruction Conference

The developer, design professional, contractor and City representatives are required to meet with the City for the purpose of discussing the construction and inspection of the proposed development. The proposed start date and an approximate time for completion will be given to the City.

The preconstruction conference is required to be attended by Developer, Developer's Contractor, Owner and Design Professional before the issuance of the Land Disturbance Permit. No water or sanitary sewer construction shall be allowed until the permit is issued and is displayed at the project site.

Developer shall provide the following documents to the City at the Preconstruction Conference:

- a. Utility Contractor's License
- b. Certificate of Insurance (with City of Covington shown as Additional Insured)
- c. Copy of Land Disturbance Permit (if not within City's jurisdiction)
- d. GUPS Permits (if applicable)
- e. Newton County Transportation Department Encroachment Permit (if applicable)
- f. Recorded Easements (if applicable)
- g. List of third party testing agencies

#### 1.4.2 Approved Plans

An approved set of construction plans stamped by the City must be kept onsite at all times by the Contractor.

#### 1.4.3 Notification

The City shall be notified by the Developer or his Contractor before construction begins, and at the various stages in construction as required by the City. The City shall be given a forty-eight (48)-hour advance notice before an inspection is needed.

#### 1.4.4 Contractor Qualifications

Contractors performing utility construction must be licensed in accordance with State of Georgia law and local ordinances and approved by the City. Current licenses and Certificates of Insurance, showing the City of Covington as Additional Insureds, shall be provided at the preconstruction meeting. They should be completely familiar with the procedures and contract requirements associated with this type of project. Unsatisfactory work will cause a contractor to be removed from a project and not approved for future work.

Any and all subcontractors must be approved by the City.

#### 1.4.5 Damage to Water and/or Sewer Facilities

The Developer is responsible for replacing any and all water and/or sewer facilities which are damaged by the Developer and any of his Contractors and any Builder working at the project site. Water and sewer facilities include but are not limited to service lines, meters, meter boxes, valves, valve boxes, valve markers, fire hydrants, cleanouts and manholes.

#### 1.4.6 Protection and Restoration of Work Area

1. **General:** Return all items and all areas disturbed, directly or indirectly by work under these Specifications, to their original condition or better, as quickly as possible after work is started.
2. **Cultivated Growth:** Do not disturb cultivated trees or shrubbery unless approved by the City. Any such trees or shrubbery which must be removed shall be heeled in and replanted under the direction of an experienced nurseryman.
3. **Cutting of Trees:** Do not cut trees for the performance of the work except as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks. Remove excavated material stored over the root system of trees within 30 days to allow proper natural watering of the root system. Repair any damaged tree over 3-inches in diameter, not to be removed, under the direction of an experienced nurseryman. All trees and brush that require removal shall be promptly and completely removed from the work area and disposed of by the Developer. No stumps, wood piles, or trash piles will be permitted on the work site.
4. **Grassing:** Replace grass removed or damaged in residential areas with sod using the same variety of grass and at the first appropriate season. Outside of residential areas, plant the entire area disturbed by the work in fescue, bermuda, or other suitable ground cover, approved by the Water Resources Director, on completion of work in any area. In all areas, promptly establish successful stands of grass.
5. **Erosion Control:** Plan excavation work to prevent erosion and the washing of soil into adjacent streams. Limit the amount of open excavation at any one time. Place spoil in the proper place and keep natural water routes open. All owner/developer and contractor activities should comply with Georgia's NPDES General Permit No. GAR100000 for Storm Water Discharges Associated with Construction Activities.
6. **Disposal of Rubbish:** Dispose of all materials cleaned and grubbed during the construction of the project in accordance with the applicable codes and rules of the appropriate regulatory agencies, City, state and federal.

#### 1.4.7 Construction Acceptance

Acceptance of the construction shall be issued in three (3) distinct phases as described below:

1. **Conditional Acceptance** – Conditional Acceptance will be issued by the Water Resources Director following completion of required construction and testing and acceptance by the City's Representative.
2. **Initial Acceptance** – Initial Acceptance will follow Conditional Acceptance once the final punch-list items, closeout documents, and as-builts have been submitted by the Developer and approved by the City's Representative. The City will issue a letter for the Initial Acceptance, the date of this issuance will establish the start of the maintenance period.
3. **Final Acceptance** – Final acceptance will be issued by the Water Resources Director at the successful completion of the maintenance period and shall signify full and final

acceptance of the improvements by the City of Covington.

#### 1.5. INSPECTIONS

Any water or sanitary sewer utility installed as provided for in these Specifications will be subject to inspection during construction by the City or a representative of the City; and the fee for the inspection will be paid by the developer/contractor.

On any system to be accepted for ownership and operation by the City, a final inspection will be made to accept or reject the work when completed. Evidence must be submitted to the City in writing indicating that installation of the water and/or sanitary sewer system has been subjected to and has passed all testing requirements as set out in these specifications before acceptance.

Costs for such inspections shall be paid by the developer based upon current hourly rates.

Authorized representatives of the City, the EPD, Newton County, or other state or federal agencies shall have access to the site for inspection at all times.

#### 1.6. AS-BUILTS

One (1) 24" x 36" or 22" x 34" set of as-built drawings and two (2) digital copy (in DWG and PDF format must be submitted to the City immediately after the completion of construction. These as-built drawings shall include:

- Fire hydrants
- Line valves
- Tees
- Bends
- Service tap locations (Water and Sewer)
- Meter boxes
- Water main sizes and types of materials
- Manholes (with top and invert elevations and GPS coordinates)
- Cleanouts
- Sanitary sewer main sizes, types of materials and grades
- Road names
- Lot numbers

Fire hydrant, line valve, service tap, meter box, manhole and cleanout locations shall be recorded by survey grade GPS equipment with coordinates shown on the As-built drawings.

As-built drawing shall have "As-built" stamped in clear large print on the plans.

The City shall have the right to withhold water/sewer tap permits until the as-builts have been submitted as required.

The conditional approval letter will not be issued until as-builts have been completed and submitted to the City.

Hand-marked copies prepared by the Contractor will not be acceptable. The copies must be sharp, clear, clean and legible and must be suitable for filing for permanent records.

## 1.7. THREE-YEAR MAINTENANCE

The Developer shall sign a three-year maintenance agreement. This maintenance period shall begin on the date that written initial acceptance is issued by the City. In addition to the maintenance agreement, the Developer shall submit a maintenance bond to the City prior to initial acceptance by the City. The maintenance bond shall be equal to twenty (20%) percent of the cost of the water and sanitary sewer installation or five-thousand dollars (\$5,000), whichever is greater. The bond shall remain in effect from the date of the written final acceptance by the City for Thirty-six (36) consecutive months.

During the maintenance period, the Developer will be responsible for all maintenance and repairs to the water and sanitary sewer system. Non-emergency repairs shall be completed by the Developer within fourteen (14) calendar days of written notification by the City. Emergency repairs, such as water main breaks, sewer spills, inoperable fire hydrants, etc., shall be completed by the Developer within twenty-four (24) hours of written or verbal notification by the City. The Developer will be responsible for all costs relating to non-revenue water and sewer spills. If the Developer does not complete the repairs within the time limits established above, the City will repair or have the repairs completed and submit an invoice to the Developer for reimbursement. If reimbursement isn't received by the City within thirty (30) days, the City will utilize the maintenance bond for reimbursement.

After the three-year maintenance period the City will complete a final review and inspection of the facilities to confirm if the work is free from defects and required repairs have been completed to the satisfaction of the City. Pending approval, a letter of final acceptance will be issued to the Developer. The letter will state that the three (3) year maintenance period has expired and that the City is now the owner of the water and sewer facilities and is responsible for all future maintenance of these facilities.

After the water and / or sewer facilities are operational and throughout the three (3) year maintenance period, the Developer will be responsible for locating all water and sewer facilities when called upon by the Utilities Protection Center or the City. These utilities must be marked in accordance with the Georgia Dig Law (OCGA 25-9-13). Any water or sewer facilities cut by others will be repaired by the Developer's contractor at the Developer's expense if the lines are not located or if they are improperly located.

## 1.8. BUILDING PERMITS

Water connection and sewer tap fees must be paid to the City prior to the issuance of a building permit. Replacement of water and/or sewer facilities damaged by Builders shall be the responsibility of the Developer.

## 1.9. APPEALS

Any requirement that is outlined in these specifications may be appealed. All appeals require the approval of the Water Resources Director and the City's Engineer. If internal approval is granted by the Water Resources Director and the City's Engineer, the appeal will then require a majority vote of the full membership of the City of Covington Council for final approval. In certain situations, additional approval may be required by Georgia Environmental Protection Division.

Persons wishing to file an appeal must submit a written request to the City's Water Resources Director not less than two (2) weeks prior to the next City Council meeting stating the nature of the request to be made. If the request is not made at least two (2) weeks prior to the City's regular meeting it will be considered at the following regular meeting of the City.

## **SECTION 2 – PRECONSTRUCTION REQUIREMENTS**

### 2.1 GENERAL REQUIREMENTS

#### 2.1.1. Easements

##### 1. Easement Size

- a. Permanent water and sanitary sewer easements of twenty (20') feet in width shall be provided for all lines not located within the right-of-way. Permanent easements shall be reserved adjacent to the right-of-way for lines located within ten (10') feet inside of the right-of-way, thereby giving the City ten (10') feet of accessible property on each side of the sewer line. If sanitary sewer lines are excessively deep, wider easements may be required to maintain a 1:1 open cut slope.
- b. Easements for sanitary sewer lines and storm drainage purposes may be combined, but must be a minimum of thirty (30') feet wide.
- c. Water and / or sewer easements off the street right-of-way shall be clearly defined on the plat of the individual property owner and said property owner will be required to keep the easement free of all obstructions.
- d. All easements shall be cleared of debris, excess dirt and other materials. The ground shall be smoothed down and grassed within ten (10) days of completing construction work in the area. The use of sediment control measures will be required to protect the area until a vegetative cover is obtained.
- e. Where the developer does not contemplate installation of sewers to the most upstream property line of drainage basins running through the development, a twenty (20') feet wide permanent easement and sixty (60') feet wide construction easement will be required for future use of the City. These easements must be shown on the final development plat and recorded at the Court House in the appropriate records section.

##### 2. Easement Acquisition

- a. It shall be the responsibility of the developer to obtain any off-site easements required to connect the project to the existing water or sewer system. Easements will be conveyed to the City of Covington for all facilities which are to be conveyed to the City. This process must be started early enough to allow construction of the water and/or sewer infrastructure before any building construction is to begin. No building permits, water meter or sewer tap applications shall be issued until all off-site water mains and sewers have been constructed and accepted. A sample utility easement agreement is included in Appendix E.
- b. All easements shall allow adequate room to construct the water or sewer mains and appurtenances. Permanent easements shall be a minimum of twenty (20') feet wide, centered on the pipe or thirty (30') feet wide where storm drains are included in the same easement.
- c. Easement drawings shall be prepared for work outside the development prior to approval of the water or sewer system plans. The drawings shall be of a size suitable for legal recording and shall be prepared by a Registered Land Surveyor. The drawing will show property lines, the name of property owners with the length of

line encroaching on each property owner, size of line, width of permanent and temporary construction easement, scale of drawing, north arrow, land lot and district numbers, and a tie to the nearest land lot corner. Any streets or other existing easements shall also be shown. Easement agreements referencing these drawings shall be prepared and attached to the drawings, signed by the property owners, and recorded at the Newton County Clerk of Superior Court's office. A copy of the recorded easement agreement shall be provided to the City prior to the construction of off-site facilities.

### 2.1.2. Utility Encroachment Permits

#### 2. Permits

- a. The Designer shall furnish appropriate drawings for submittal to the owner of any state or federal highways, railroads, power lines, sewer lines, gas lines, petroleum lines, or any other utility lines on which the water or sewer construction will encroach. The drawing shall normally be 8-1/2" X 11" or 8-1/2" X 14" and shall show a plan view and profile view. The drawing will show the same information required for easement drawings. Also, the drawing will show the right-of-way of the existing street or utility, the owner's designation of the line, the name or number of the nearest intersection or mile post or tower number and the distance to that appurtenance. The clearance distance between the street surface, or the bottom of the rail, or the utility and the water and/or sewer main will be shown. The drawing will show the type of material to be used for the main and the method of construction to be used. The drawing will also contain any other special information required by the owner of the facility on which the water main is encroaching.
- b. The Developer is responsible for obtaining all permits necessary to construct water and/or sewer mains to and on the site to be developed.

Three (3) copies of the utility encroachment drawing will be furnished with the plans when they are submitted for approval. Construction permits will not be issued until the utility encroachment permit has been obtained and until any special conditions, such as insurance requirements, have been obtained.

## 2.2 WATER SYSTEM

### 2.2.1. Water Pressure Flow Test

1. A water pressure flow test must be run on any existing City water line to determine the adequacy of water supply for the project. The test shall consist of fire hydrant flow test and a twenty-four (24) hour pressure test, and the fee for the tests will be paid by the developer/contractor.

Test information shall consist of:

- a. Static Pressure and Elevation of Static Gauge
- b. Recorded Flow in GPM and Residual Pressure
- c. Maximum Elevation in Development
- d. Available Flow at Maximum Elevation with 20 PSI Residual Pressure
- e. Twenty-four (24) hour pressure chart



An adequate supply of water for the proposed project must be available prior to the approval of any plans. The results of any flow test are valid for one year.

2. At the direction of the City Engineering Department, all projects which have flow test pressure chart test results showing static pressures of less than 35 psi will require a special design study to be completed and submitted to the City for approval to ensure that no problems are to be encountered during peak demand periods. This study must be approved by the City before any construction plans will be approved.

## 2.3 SANITARY SEWER SYSTEM

### 2.3.1 Sanitary Sewer Hydraulic Analysis

A hydraulic analysis of the sewer system shall be completed and submitted with the construction plans. This analysis shall include a downstream flow schematic of the sewer system providing existing flows (peak and average), anticipated inflow and infiltration (I/I), and calculated maximum capacities (using Manning's Equation with a "n" value of 0.013) of the sewer lines from the development to the receiving water reclamation facility.

Pipe capacities shall be calculated using Manning's Equation with the following variables:

- "n" – From GaEPD Guidelines for Sewage Collection Systems
- Slope – use minimum slope for pipe diameter from GaEPD Guidelines for Sewage Collection Systems
- Flow Depth – use half full for pipes less than fifteen (15") inches in diameter, and 2/3 full for pipes fifteen (15") and greater in diameter, or as described in *Design and Construction of Sanitary and Storm Sewers* (1986), prepared by a joint committee of ASCE and WEPCF

Wastewater characteristics should include an estimate of expected BOD loading and a description of any industrial wastewater.

Existing flows shall be measured with a flow measurements study be completed by a third party. The Developer shall be responsible for all costs associated costs with the study. Flow measurement shall be of such duration to allow the designer to estimate the average and peak flows for the subject pipe segment.

### 2.3.2 Wastewater Pumping Stations

1. Conceptual Design: The construction of sewage pumping stations will be permitted only where there is not City sewer line downstream of the proposed pumping station site accessible via public right-of-way or easement. In such instances, the Developer installing such force main and associated sewerage pumping station shall furnish all products and perform all labor necessary to fulfill the requirements herein. Associated force mains shall discharge into the nearest wastewater collection system which has adequate capacity to handle the additional flows. Developer shall submit a conceptual design plan that includes the proposed pumping station site. The collection basin to which the wastewater is to be transferred shall be identified on the plan along with the projected pump station capacity and head.

2. Terms and Conditions

a. Payment shall be made to the City of Covington as described below:

i. Developer shall pay sewage pumping station phase-out charges as set forth hereinafter. The sewage pumping phase-out charge shall be calculated as follows:

$$D \times C (1 + cci)^{20} (P/F)$$

The calculation of the pumping station phase-out charge shall be defined as follows:

D = Distance from the pumping station to the nearest downgradient interceptor sewer. If no downgradient sewer exists at the time of plan approval, the distance used shall be to that of the centerline of the stream along which a future interceptor will be built. The maximum distance shall be limited to five thousand (5,000') feet.

C = The cost per linear foot of constructing new eight-inch gravity sewer as estimated by the superintendent using recent competitive bids on their projects.

Cci = Average construction cost index factor of the previous five (5) years.

P/F = The factor to calculate the present worth of future expenses in twenty (20) years at an interest rate equal to the then current average interest rate of a thirty (30) year AAA rated municipal bond issue.

Such charges may recover some of all of the costs imposed on long-range capital improvements plan caused by the public acceptance of the sewage pumping station. Such payments shall be made as a prior condition of sewer plan approval.

ii. So that existing water and sewer customers are not burdened by the cost of future operation and maintenance of Developer-installed sewage pump stations, Developers shall pay for such future operation and maintenance of sewage pumping stations contributed to the City as follows:

Pump Station Category	Charge for future O&M
0 – 99 HP	\$200,000.00
100 – 249 HP	\$229,000.00
250 – 350 HP	\$395,000.00

The charges set forth in paragraphs i and ii above are waived if there is no net increase in the number of pumping stations in the drainage basin as a result of the development.

- b. The Developer's Contractor shall install, at the pumping station, pumps as specified herein or approved by the Water Resources Department.
- c. The Developer's Contractor shall install SCADA systems as specified herein. If desired, the system may be setup to notify the Developer's personnel during the three (3) year maintenance period.
- d. The Developer's Contractor shall install an adequately sized diesel bypass pump at the pumping station to provide automatic pumping ability in the event of a power failure. The bypass pump shall automatically start-up during power failures and have a fuel tank allowing twenty-four hour operation at full loads. The fuel tank shall meet all current EPA/EPD and NFPA standards.
- e. All stipulations and agreements are contingent upon the Developer's design and installation plans being approved by the Water Resources Department and City Engineer, of course, and final acceptance of these terms and conditions by the Developer.
- f. A permanent point of ingress and egress must be granted to the City of Covington to access the pumping station.
- g. These Terms and Conditions should not be construed to replace or void any Manufacturer's or Contractor's warranties either expressed or implied.

## **SECTION 3 – DESIGN CRITERIA**

### 3.1 GENERAL REQUIREMENTS

#### 3.1.1. SUBMITTAL REQUIREMENTS AND PROCEDURES

The following submittals shall be prepared and submitted to the City in addition to those identified elsewhere herein:

1. Construction Drawings: A full set of drawings showing the new development or extension shall be prepared, stamped, and signed by a Registered Profession Engineer currently licensed to practice in the State of Georgia. The drawings shall be submitted to the City of Covington.
2. Erosion and Sedimentation Control Plan The Georgia Soil and Water Conservation Commission has taken provisions of ACT 599 and published a **MANUAL FOR EROSION AND SEDIMENT CONTROL IN GEORGIA**, 2016 Edition (or any more current edition as they are published). Water construction plans and specifications shall include appropriate segments of this manual. Developers, Engineers, Design Professionals and Contractors performing work in City of Covington are responsible for acquiring a copy of this manual and using the best practical methods contained therein to control the erosion and sedimentation of the construction site in conformance with the intent of ACT 599. Copies may be purchased from the Georgia Soil and Water Conservation Commission, 4310 Lexington Road, Athens, Georgia 30605. For additional information, call the Commission at 706-552-4470.
  - a. Plan: An erosion and sediment control plan, meeting the requirements of applicable state regulations, shall be provided as part of the overall construction drawings.
  - b. Erosion Control Details: Erosion Control Details and Symbols may be taken directly from the Manual For Erosion and Sediment Control In Georgia, 2016 referenced above.
3. Sewer Pumping Stations
  - a. Submit to the City during the Design phase the following information:
    - i. Flow capacity calculations.
    - ii. System head calculations and pump curve; tabulated and plotted on the pump curve. Include a plot of force main velocity. The duty point shall be clearly defined on the pump curve.
    - iii. Construction drawings, details, and specifications in sufficient detail to ascertain compliance with these regulations/specifications.
    - iv. Cycle time. Calculations showing determination of wet well volume and cycle time at design conditions.
    - v. Storage Volume. Provide calculations showing the volume of storage available in the event of a power outage. The storage zone shall be delineated on plan and profile drawings of the sanitary sewer system. (See subsection "Standby Pumping System" below.)
    - vi. Buoyancy calculations showing that structures are protected against flotation.

- vii. Electrical drawings including gross horsepower, full load amp motor loads, voltages, instruments and controls, and panel details including failure indicators, alerts, and warning lights.
- b. Shop Drawings. After Design plan approval but before purchasing any equipment, shop drawings shall be submitted including the following information:
  - i. Manufacturer's catalog sheets, performance curves, installation dimensional drawings, specifications, weights (operating and dry), and list of options for the specific pump that is offered for approval. Similar catalog data for controls, instruments, valves, hatches, yard hydrants, precast wet well and other manufactured items.
  - ii. Certification. After installation and before placing the system into full operation, the work must be inspected by the Owner / Developer's Engineer who must then issue a certification to the City verifying that all work has been completed in accordance with approved plans. This certification shall include all construction of the pumping station and force main. After acceptance of the work by the Engineer, a factory representative shall inspect and start up the system certifying rotation, capacity (flow and head), amperage draw, vibration, and other standard check points. This certification shall state the beginning date of the warranty and include a copy of the warranty.
  - iii. O & M Manuals. On or before the date of start-up, a digital version of the factory O & M Manuals (with two hard copies) shall be delivered to the City. These shall include the name of the purchaser, name and address of the supplier, the serial numbers of pumps, detailed wiring schematics, telephone number and address for purchase of parts.
  - iv. Control panel wiring diagrams.
- c. Spare Parts
  - i. Furnish per manufacturer's recommendations.
  - ii. Pumping stations with pumps of 5 HP or smaller shall be supplied with one (1) complete spare pump.
  - iii. Pumping stations with pumps above 5 HP shall be supplied with an extra impeller and set of bearings plus a complete set of manufacturer's recommended spare parts.

### 3.1.2. Plan Requirements

All plans for public drinking water and sanitary sewer facilities shall be prepared in accordance with the requirements outlined herein and as required in regulations promulgated by the Georgia Environmental Protection Division. The developer shall be responsible for submitting plans and other data to the City for required approvals. Design Engineer shall refer to the list provided in Appendix F prior to submission of plans for review by the City.

Construction plans for proposed water and / or sanitary sewer construction shall consist of the following:

1. Site Plan with the project name, site location map, land lots, district and north arrow, lot layout (if subdivision) or building location (multi-family, commercial, or industrial). Also show all existing and proposed streets and their names, all streams (100-year flood plain and wetland areas where applicable), water courses, storm drains, and discharge points for all drainage structures. The site plan shall show topography with contour lines at two-foot intervals as well as the water and / or sewer layout with existing and proposed lines, manhole numbers, line designation and direction of flow. Also, show the size of all lines, the location of proposed service laterals, and proposed and existing easements. The location and sizes of all water and / or sewer lines adjacent to the project including the point(s) of connection(s). Note if any other utilities are existing. Drawings shall be no smaller scale than 1" – 100'. Sheet size shall be 22" x 34" or 24" by 36".
2. The design of cross-country (undeveloped property) sanitary sewer lines and force mains shall be based on field-run surveys. The site plan for cross-country sanitary sewer lines and force mains need not show contour intervals, but the profiles shall be based on mean sea level elevation. Site plans for lift stations shall show existing and proposed contours. In the event the subdivision is developed in phases, the final construction plans for water and / or sanitary sewers may be submitted in phases or units. However, at the time the first phase is submitted, the design professional will submit one copy of the preliminary layout of the entire development showing future water and / or sewer mains. This layout will show all lines required to serve any lots to be developed and any surrounding property that may be served through the property. The site plans for each phase or unit shall contain a location drawing showing the relationship of the phase or unit to the total project and to the surrounding streets and sanitary sewer outfalls.
3. Profiles should have a horizontal scale of not more than 1" = 50' and a vertical scale of not more than 1" = 10'. The plan view should be drawn to a corresponding horizontal scale. The plan view should be shown on the same sheet as the profile. Both the plan and profile view should have line designations, station numbers, manhole numbers, elevations (including top and invert) and any other indexing necessary to easily correlate the plan and profile view.

The City of Covington Water System and / or Sewer System General Construction Notes shall be included on every plan set.

#### 3.1.3. Polyethylene Encasement

Ductile iron pipe shall be provided with polyethylene encasement, double wrapped, whenever the water main either crosses or is within ten feet (10') of a steel gas main.

### 3.2 WATER SYSTEM

#### 3.2.1 General

The criteria listed herein is not intended to cover all aspects of design, but rather to mention the basic guidelines and those particulars that are required by the City of Covington.

### 3.2.2 Water Supply (All Water Supply Systems)

Residential water supply for domestic use shall provide a normal working pressure of between 35 and 60 psi with a minimum pressure of twenty (20) psi. Pressures greater than 100 psi should not be delivered (unless requested) to the customer.

Private wells shall not be allowed for new developments, whether for domestic, irrigation, process or fire use.

### 3.2.3 Average daily demands are listed below:

Average daily residential water demands shall be estimated as follows:

Single Family Residential	400	gpd
Multi-Family Residential	120	gpd / bedroom

Average daily water demands for other developments shall be estimated using the GaEPD Minimum Standards for Public Water Systems, current version. For developments not specifically included in the Flow Schedule, the Developer shall be responsible for providing documentation defining the expected average daily water demand.

A peaking factor of 2.0 to 3.0, as determined by the City of Covington, times the average daily demand shall be used for the design of the water system. Exceptions may be made when deemed necessary by the City.

### 3.2.4 Minimum Water Main Sizes and Fire Hydrant Requirements

1. Any system, whether served from an existing City water main or otherwise, shall have a minimum size of pipe size of six (6") inches. Six (6") inch diameter water mains shall be allowed only for permanent dead ends and short cul-de-sacs where future growth is not feasible. When six (6") inch diameter mains are shown on the drawings they shall be accompanied by calculations confirming that adequate domestic and fire flow will be provided; all other water mains shall be a minimum of eight (8") inch diameter. Actual sizes may be larger depending on the size required to meet the demand of the proposed development.
2. Where a water main extension from an existing City water main is required along an existing public right-of-way or future supply route, the size of pipe to be used will be either eight (8") inch diameter, the size required to meet the demand of the development, or a size equal to the existing City main, whichever is largest. The City may require a larger pipe size to be installed than is required by this standard, and the cost of this oversizing may be funded by the City.
3. Fire hydrants will be required as set forth in these specifications where a proposed system is to be served from an existing City water main or in any case where the City is to accept a new system for ownership and operation.

### 3.2.5 Water Main Extension Requirements

1. Developers are required to extend all mains along their entire property frontage if the existing main is adjacent to the proposed development. The size of the main will be set in accordance with the requirements set in this document.
2. If an existing main must be extended to serve the property, the developer may be required to pay all of the initial costs. If the main extension will serve other developments within a one-year period, the City may negotiate with the initial developer for a pro rata share participation from future developers who wish to connect to the extension during the one year period.
3. In certain circumstances, the City may require a larger pipe size to be installed than is required by these standards, and the cost of this oversizing may be funded by the City. The developer may be required to pay all of the initial costs. If the oversized main will serve other developments within a one-year period, the City may negotiate with the initial developer for a pro rata share participation from future developers who wish to connect to the extension during the one year period. If the purpose of the oversizing is to improve service to existing customers or part of the City's master plan for a network of large mains to transfer water around the County, the City may enter into negotiations with the Developer to provide funding for the betterment.

#### 3.2.6 Fire Protection

1. Minimum flows in GPM with 20 psi residual pressure by type of development are recommended as follows where a system is to be served from an existing City Water Main.
  - a. Multi-family: 750 GPM for 30 minutes
  - b. Shopping Centers: 750 GPM for 30 minutes
  - c. Motels, Light Industry and Schools: 750 GPM for 30 minutes
  - d. Heavy Industry, Large/Tall Buildings (Warehouses, Office Buildings, Institutional): 1,000 GPM for 45 minutes
  - e. Residential: 500 GPM for 30 minutes

The City may require these recommended flow / duration quantities prior to development of property.

2. Fire protection hose lay distance is defined as being measured along the route piece of fire apparatus must travel in laying a fire line from the fire to the fire hydrant.
3. All plans for development must meet all applicable fire protection codes.
4. All requirements for design criteria and material and construction specifications must be met to secure a permit from the Department of Natural Resources for construction.
5. Spacing of fire hydrants where required shall be as follows:

Fire hydrants, within residential developments or along existing County roads, are generally located every 400 feet, starting at the beginning of the project, or as dictated by existing fire hydrant locations. Hydrants can be spaced from a minimum of 350 feet



to a maximum of 450 feet, and should be located at high points or low points and property lines, in that order of preference, where possible. For commercial developments, the fire hydrant spacing shall not exceed 300 feet.

6. Fire Main Size

- a. Multi-Family: Water mains to be no less than eight (8") inch in diameter; six (6") inch diameter mains may be used only where it completes a gridiron and then only up to 600 feet in length between interconnecting mains of approved diameter.
- b. Large Shopping Centers, Malls, etc.: Water mains to be no less than eight-inch (8") in diameter.
- c. Commercial Areas with Less than 200,000 Sq. Ft.: Water mains to be no less than eight-inch (8") in diameter.
- d. Motels, Light Industry and Schools: Water mains to be no less than eight-inch (8") in diameter.
- e. Commercial areas with 200,000 sq. ft. or more, Heavy Industry, Large/Tall Buildings: Water mains to be no less than ten-inch (10") in diameter.
- f. Single Family: Single family residential developments shall use a minimum of eight-inch (8") water mains; larger size mains dependent on demand. Six-inch (6") mains may only be used for short cul-de-sacs and permanent dead-end lines serving ten (10) or less houses and less than 500 feet in length when approved by the City.

7. Water mains and fire hydrants shall be installed by the developer and approved by the City, under water pressure and ready for firefighting before any sheathing may be installed on walls and roof.

3.2.7 Backflow Prevention

1. All water meters shall be provided with a backflow preventer that shall be installed by the Developer.
2. The type of backflow preventer required for each of the situations listed above is described in City's Cross-Connection Control Program Manual

3.2.8 Water Lines and Fixtures

1. Existing Roads

On existing roads, water mains shall be located eight feet (8') from the back of curb on the north or east side of the road; if this is not possible, the water main shall be located within five feet (5') of the right-of-way or as approved in writing by the Water Resources Department. The watermain shall be installed with a minimum cover of forty-eight inches (48") and/or with a minimum cover of forty-eight inches (48") below the level of the roadway, whichever is lower. Permission must be granted by the City to vary from this requirement. Fire hydrants on existing roads shall be located as near to the right-of-way as practical or as required by the Georgia Department of Transportation.

2. New Streets

On new streets, water mains shall be located eight feet (8') from the back of curb on the north or east side of the road. If this is not possible, the water main shall be located within five feet (5') of the right-of-way. The water main shall be installed with a minimum cover of forty-eight inches (48") and/or with a minimum cover of forty-eight inches (48") below the level of the roadway, whichever is lower. Fire hydrants on new streets shall be located as near to the right-of-way as practical or as required by the Georgia Department of Transportation. The construction of the water main shall not begin until the rough grading is completed and all curbing is installed.

### 3. Surface water crossings

Surface water crossings both over and under water, may present special concerns and should be discussed with the City before the final plans are prepared.

- a. At above water crossings, the pipe shall be adequately supported and anchored, protected from damage and freezing, and accessible for repairs or replacement.
- b. At underwater crossings, a minimum of three (3) feet of cover is required for any material other than rock between the bottom of the streambed and the top of the pipe.
- c. When the stream crossing is completed by open cut construction, the installation of ductile iron pipe with restrained push-on joints may be considered with the prior approval of the City. In such situations, the carrier pipe shall be encased in steel casing extending to the edge of the stream buffer. Otherwise, when crossing water courses, only pipes of special construction, having flexible, watertight joints shall be installed.
- d. Valves shall be provided at both ends of water crossings so that the section can be isolated for testing or repair (valves shall be easily accessible and not subject to flooding); the valve closest to the supply source shall be in a manhole.
- e. Sampling taps shall be installed at each end of the crossing, and permanent taps shall be made for testing and determining leaks.

### 4. Service Laterals

Service laterals shall be located with a minimum bury equal to that of the main line within the right-of-way and shallowing to a bury of eighteen inches (18") inches at the water meter location. Service line size shall be 3/4" for single residential service and 1" for double residential service. The Contractor is to install appropriately sized service saddle and corporation stop at the main, service laterals and 3/4" curb stops in meter boxes. For double residential services, contractor to provide tee, y-branch, bends and 3/4" curb stops in meter boxes.

Any portion of the service lateral located under pavement shall be encased in a minimum of 2" diameter P.V.C. pipe, extending a minimum of three feet (3') beyond the edge of pavement on both sides of the road. Copper tubing shall be used for all services. Compression joints shall be used. Splices of copper tubing are not allowed under any roadway pavement. A "W" shall be sawed into the curb where each service tap is made for permanent location.

## 5. Water Meter Boxes

For ¾" and 1" water meters, the City will furnish, install and set meters in meter boxes. The developer is to clearly mark the lot number inside of each meter box. No meter will be set until the meter set fee is paid and a building permit issued for the lot requesting service. Services shall be sized and located as described herein. Special consideration shall be given to the layout of the building lot to ensure that meter boxes and service taps are not placed in or under driveways.

## 6. Water Valves

Valves 16" and smaller shall be gate valves. Valves 20" and larger can be butterfly valves or gate valves.

Water valves at intersections shall be located behind the curb or edge of pavement. As a general rule, the number of valves shall equal the number of streets in the intersection minus one. The City may require valves in excess of this requirement if the water system layout warrants additional valves.

The maximum spacing of line valves shall be one thousand feet (1000'). The City may allow greater spacing in low-density rural areas, and may require closer spacing in high-density urban areas and subdivisions. Generally, the City will require a main line valve at every other fire hydrant as a minimum. The required spacing shall be at the discretion of the City based on individual development circumstances. Unless at an intersection, the line valves shall be located at fire hydrants. Concrete valve markers are required at all line valves and at the end of every dead-end line.

All valves shall be provided with valve boxes. Each valve box shall have a concrete collar. These collars must be a minimum of 3 1/2" thick. They may be round (24" diameter min.) or square (24" x 24"). Precast collars may be used, provided that they are grouted in place to the valve box. The box is to be flush with (all residential installations) or a maximum of 1" above the finished grade. The edge of the valve box is to be 1/2" above the edge of the concrete collar. If settlement occurs, the collar will be reset or repoured.

## 7. Gate Valves and Line Plug

A gate valve and a minimum of thirty-six feet (36') of ductile iron pipe shall be provided at the end of all lines for phased developments, and at locations where the water main may be extended in the future for water system improvements. The end of the line shall be provided with a M.J. plug and thrust collar. A ¾" tap for chlorination / de-chlorination purposes shall be provided. A valve marker will be placed directly above the plug.

## 8. Dead End Line

At any dead-end line, install a joint of ductile iron pipe, a fire hydrant, a M.J. plug, gate valve, and thrust blocking. Retainer glands shall be used for all fittings at dead-ends. Flushing hydrants shall be placed at any temporary or permanent dead end.

## 9. Ductile Iron Pipe

Ductile iron pipe shall be required for:

- a. Services three-inch (3") or greater
- b. Water mains twelve-inch (12") diameter or larger
- c. Crossing sanitary sewers
- d. Under all stream crossings and over or under all storm sewers
- e. Under all roads and intersections and inside casings
- f. At all locations with working pressure above 125 psi (generally below elevation 700 MSL)
- g. At all other locations specified by the City

All pipes shall be designed in accordance with AWWA C150, latest revision. Minimum thickness class for 3" and 4" diameter pipe shall be 54; minimum wall thickness for 6" - 16" diameter pipe shall be Pressure Class 350; minimum wall thickness for 18" - 20" diameter pipe shall be Pressure Class 300; minimum wall thickness for pipe larger than 20" in diameter shall be Pressure Class 250.

## 10. Air and Vacuum Relief Valve Assemblies

A&V assemblies shall be located where appropriate as determined by the design professional responsible for the water system design or directed by City. All A&V assembly locations are subject to the approval of the City. In general, within subdivisions, A&V assemblies are not necessary as long as services are located at the water main high points. Concrete valve markers are required at each A&V assembly.

## 11. Ductile Iron Retainer Glands

Retainer glands are required at all mechanical joint valves or fittings where the design includes a pipe size reduction, a change in direction, a future connection stub-out, or end of a line. This requirement holds for designs where the main adjacent to the valve or fitting is ductile iron.

## 12. Acceleration / Deceleration Lanes

Where applicable, if an acceleration lane or a deceleration lane is to be constructed and will cover or encroach over existing non-D.I.P. water mains, it is the Developer's responsibility to relocate the existing main out from under the proposed pavement and to replace the existing main with D.I.P.

### 3.2.9 Fire Line Metering Requirements

1. Persons making applications for new fire service connections with private fire hydrants, hand hose connections, or sprinkler heads will be required to have an Underwriter's Laboratory or a Factory Mutual approved meter installed as part of the fire service system. If the normal usage of the development is such that the service meter required to serve the department is larger than two-inch (2"), the City shall require that the Developer install a six-inch (6") or larger compound or ultrasonic meter and vault to serve both the normal usage and the fire line needs of the development. If the normal

usage of the development is such that a two-inch (2") meter or smaller can be used to serve the development, the Developer will be allowed to use a two-inch (2") or smaller meter for the normal usage and a separate meter assembly on the fire line.

2. All domestic and fire water supply shall be metered with a meter meeting the testing accuracy standards of AWWA.
3. Installation of meters, as required, will be the responsibility of the Developer under supervision of the City's inspectors.
4. The City shall have the right to cut off water service to buildings whose owners refuse to comply with these provisions as defined in Ordinance 13.04.180.

#### 3.2.10 Water Pump Stations

Where pump stations are required to serve a development, the Developer's design professional shall prepare and submit detailed plans, specifications, and calculations for the City's review. Design requirements shall be discussed in the preliminary stages of plan review. Each case shall be reviewed individually, and the City shall retain the right to require changes to the pump station design or materials at the City's discretion.

#### 3.2.11 Water Mains on Private Roads

The City will not accept for ownership water mains installed along roadways that are not dedicated for public use (i.e., are without public right-of-way). The City will not extend water mains along private roadways that do not have a dedicated, recorded right-of-way.

#### 3.2.12 Water Sampling Stations

For the design of water systems in subdivisions, the City requires the installation of a water sampling station as shown in the Standard Details. This sampling station will typically be installed at a cul-de-sac or other location where water movement is deemed to be at a minimum. The City may specify such location, and the cost shall be incurred by the developer.

### 3.3 SANITARY SEWER SYSTEM

#### 3.3.1. General

The criteria listed herein is not intended to cover all aspects of design, but rather to mention the basic guidelines and those particulars that are required by the City Water System Standards and Specification. For more detailed criteria, the reader should refer to standard references such as "Ten States Standards for Wastewater", Georgia EPD Regulations, Georgia EPD document "Guidelines for Gravity Sewer", Water Pollution Control Federation Manual of Practice No. FD-5, and other available literature.

#### 3.3.2. Sanitary Sewers Separate from Storm Sewers

Sanitary sewers shall be designed as separate sanitary sewers only, in which rainwater from roofs, streets, and other areas and groundwater from foundation drains are excluded. Overflows from sanitary sewers to storm sewers are not permitted.

### 3.3.3. Sizing Factors

The sanitary sewer system should be designed for the estimated ultimate tributary population. Tributary population is considered to be all areas upstream of the discharge point of the system being designed. Sewers will be designed and installed to the uppermost property line of the development being served. Consideration should be given to the maximum anticipated capacity of institutions, industrial parks, etc.

In determining the required capacities of sanitary sewers, the following factors should be considered:

1. Maximum hourly sewage flow.
2. Additional maximum sewage or waste flow from industrial plants.
3. Ground water infiltration.
4. Topography of the area.
5. Depth of excavation.

New sanitary sewer systems shall be designed on the basis of an average daily flow of sewage of not less than 150 gallons per bedroom per day for residential projects. Wastewater flows for non-residential projects shall be projected based on the flow schedule defined in the Georgia Department of Public Health *Manual for On-Site Sewage Management Systems*, Section J – Sewage Flow Schedule. Normally, all sanitary sewers shall be designed with a peaking factor determined using the “Ratio of Peak Hourly Flow to Design Average Flow” table from the *Recommended Standards for Wastewater Facilities*, 2014 edition, but not less than 2.5. Peak factors will be higher for smaller basins. Sanitary sewers shall be designed to carry the peak flow when flowing at a depth of 2/3 pipe diameter. When deviation from the foregoing are demonstrated, a description of the procedure used for design shall be included.

**No sewer main shall be less than 8"; No service lateral shall be less than 6".**

The City land use plan should be consulted and special consideration given to commercial and industrial areas. Where developers are installing major trunk lines or interceptor sewers, the City's long-range plan should be consulted as a guide and the sanitary sewer should, as a minimum, be of the size called for in the long-range plan. If proposed land use conditions have changed subsequent to the plan, these changes should be factored into the determination.

### 3.3.4. Wastewater Flow Projections (Minimum)

1. Wastewater flows for areas zoned residential shall be projected based on 350 gallons per household per day. Undeveloped residential areas upstream shall be assumed to have a density of one household per acre. An allowance shall be added for inflow and infiltration at a rate of 100 gallons per day per acre.

2. Wastewater flows for areas zoned commercial, office and industrial shall be projected based on the square footage of proposed buildings, allowing 25 gallons per day per employee and 250 square feet of building per employee. Undeveloped commercial, office and industrial areas upstream shall be projected with 2,000 gallons per day per acre.
3. Additionally, where at least twenty-five (25%) percent of a drainage area is already developed, a population density equal to that of the existing development shall be used for the entire drainage area.
4. Peak flow shall be determined by multiplying the wastewater flows determined above by the peaking factor and then adding the project inflow and infiltration flow projections.

### 3.3.5. Depth Requirements

Any sewers installed in the street shall be sufficiently deep to provide 6 feet of cover at the inlet end of all service laterals at the street right-of-way, and over any part of the main or service within the street right-of-way.

Any sewers on off-street easements shall have a minimum of four feet of cover. In extraordinary circumstances where there is no other alternative, ductile iron pipe shall be used where there is less than four feet of cover. Filling over the pipe to obtain minimum cover is not allowed, if the fill will impede the natural flow of surface water or will cause an erosion problem.

### 3.3.6. Slope

1. All sewers shall be so designed and constructed to give mean velocities, when flowing full, of not less than 2 feet per second based on Manning's Formula using an "n" value of 0.013. The following are the minimum slopes which should be provided; however, slopes greater than these are desirable:

Sewer Size	Absolute Minimum Slope in Feet Per 100 Feet	Recommended Minimum Slope in Feet Per 100 Feet
8"	0.40	0.70
10"	0.29	0.50
12"	0.22	0.40
15"	0.15	0.30
16"	0.15	0.30
18"	0.12	0.24
21"	0.10	0.20
24"	0.08	0.16
27"	0.07	0.14
30"	0.06	0.12
36"	0.05	0.10

2. Maximum slopes shall not exceed 15 feet per 100 feet without the approval of the City's Engineer.

3. Developer's design professional should provide calculations confirming the flow velocity for all pipe segments exceeding slopes of 10%.
4. When approved by the City's Engineer, DIP may be used with slopes of 15-25 feet per 100 feet with the addition of concrete anchors (dead-man) spaced at 36 feet on center. The minimum size of the concrete dead-man shall be:
  - a. Height 3x pipe diameter
  - b. Length (along pipe) 3x pipe diameter
  - c. Width (perpendicular to pipe) 2x trench width
5. Whenever possible, designs for jack and bore installations should include a drop in the upstream manhole of not less than 6 inches and should allow a slope through the bore three times as steep as the recommended minimum slope for that size pipe.

### 3.3.7. Increasing Size

When a small sewer is connected to a larger one, the connection shall be made by matching the crowns of both sewers to the same elevation.

### 3.3.8. Ductile Iron Pipe

Ductile iron pipe shall be required for sanitary sewer mains:

1. Over or under all storm sewers
2. Crossing water mains
3. Under all stream crossings
4. With less than 4 feet of cover or over 14 feet of cover
5. With 15 feet per 100 feet or greater slope
6. Where velocities exceed 10 ft/sec
7. Inside casings
8. At all other locations specified by the City

### 3.3.9. Sanitary Sewer Pipe Material Requirements

The City reserves the right to disallow any manufacturer that does not have a consistent, long-term record of quality control and successful product performance. Acceptable sanitary sewer pipe materials include Polyvinyl Chloride (PVC), Ductile Iron Pipe (D.I.P.), High Density Polyethylene (HDPE). Ductile Iron Pipe (D.I.P.) shall be used where certain conditions exist as referenced above. This should be addressed at the preliminary review stage.

### 3.3.10. Subgrade and Pipe Bedding



All D.I.P., pipe shall have a minimum of Type "4" bedding. All PVC pipe shall have a minimum of Type "5" bedding. Wherever water or wet soil is encountered, Type "5" bedding shall be provided. If specifically designated on the plans, Type "5" bedding may be required. Typically, the manufacturer's recommendations shall govern the bedding requirements of the various pipes at the varying depths; However, the City reserves the right to increase the bedding requirements for any sewer main where the City believes the manufacturer's recommendations are not sufficient. All bedding and backfill material shall be defined by the Unified Soil Classification System (USCS).

#### 3.3.11. Manholes

Manholes shall be installed at the end of each line, all changes in grade, size, or alignment, at all intersections, and at distances not greater than 400 feet. In no circumstance will a spacing of greater than 300 feet be allowed when the slope exceeds 10 percent. Cleanouts may be used only for service laterals and shall not be substituted for manholes. Manholes in cross-country areas shall be elevated so that the top is twenty-four (24") inches above ground or above the flood level, whichever is higher. A drop pipe shall be provided for a sewer entering a manhole at an elevation of more than two (2') feet above the manhole invert. Drop manholes shall be constructed in accordance with the Standard Details. The drop pipe shall be of ductile iron materials with mechanical joints. Also, at least one piece of ductile iron pipe shall be used on the incoming line to reach a solid, unexcavated foundation. All outside 90-degree elbows shall have thrust block poured below the elbow. Outside drop manholes will be noted on the construction plans. Where the difference in elevation between the incoming sanitary sewer and the manhole invert is less than two (2') feet, the invert shall be sloped from invert to invert to prevent solids deposition.

The flow channel through manholes should be made to conform in shape and slope to that of the sewers. Minimum drop through a manhole should be 0.2 feet.

#### 3.3.12. Protection of Water Supply

There shall be no physical connection between a public or private potable water supply system and a sanitary sewer which would permit the passage of any sewage or polluted water into the potable supply.

A horizontal separation of at least ten (10)' feet is required between sanitary sewer lines and existing or proposed water mains (measured edge to edge). Should conditions prevent a separation of ten (10)' feet, the lines shall be laid in separate trenches and sanitary sewers shall be ductile iron. Where sewer mains cross existing or proposed water lines, eighteen (18") inches of vertical separation is required between the two mains (measured edge to edge).

Whenever possible, the elevation of the crown of the sewer shall be at least eighteen (18") inches below the invert of the water main. The two pipes shall be installed such that a full length of pipe will be centered over the crossing so that all joints will be separated as much as possible. Ductile iron pipe shall be installed for both mains at points where the two lines cross.

Sewer lines shall not be placed within a water supply lake or reservoir, and where sewer lines are to be installed adjacent to a water reservoir, such lines shall be placed down gradient rather than up gradient of the reservoir embankment. It is recommended that sewer lines installed adjacent to water reservoirs be

constructed of ductile iron pipe.

#### 3.3.13. Installation in Public Streets

When sewers are laid within public streets, the manholes and lines shall normally be laid along the center of the street at a depth of not less than 7 feet below the road surface to the top of the pipe so that service laterals will have 6 feet of cover at the edge of the right-of-way. In curves and other areas where this is not possible, the lines and manholes are to be installed within the confines of the curb to avoid conflict with the curb and other utilities. Ductile iron pipe shall be used for sewer lines crossing storm sewers and at other locations specified by the City.

#### 3.3.14. Service Laterals

A separate sewer service shall be provided for every existing or proposed lot or building. All services shall be shown on the construction drawings. All service laterals shall be a minimum of six (6") inch in diameter. A common service shall not be allowed for two or more buildings. The service shall extend to five (5') feet inside the property line of the lot being served and normally be within ten (10') feet of the lower corner of the lot. ***The builder/contractor shall install a cleanout at the right-of-way and extend the PVC cleanout to a height of 3' above the finished grade.*** The Contractor shall also place a two (2") inch PVC pipe above the end of the service lateral to enable the builder to locate the service. All service laterals shall have six feet (6') of cover at the right-of-way. Where six (6') feet of cover cannot be achieved, services shall be ductile iron. Six (6") inch services shall be laid at a minimum grade of 1%.

The developer shall be responsible for serving all lots developed. On any lot where the service cannot be found, the developer shall be responsible for payment of the cost of and installation of another service lateral. Also, unless noted on the final plat, the service shall be low enough to serve the first-floor elevation at the building line. The builder shall be responsible for the location of the services prior to the pouring of the foundation, driveway or other appurtenance. Special consideration shall be given to the layout of the building lot to ensure that cleanouts and sewer taps are not placed in or under driveways. The City will not be responsible for any house built too low to be served nor for any service covered by construction.

No plumber or contractor will be allowed to connect to the sewerage system except to the end of the service provided for this connection when proper permit is issued. After the service is run from the end of the lateral provided by the sewer line contractor to the house plumbing, the cleanout at the right-of-way may be cut down to a level six (6") inches below the finished grade. ***The cleanout shall be provided with a cast iron ferrule with a brass***

***screw plug to enable the cleanout to be located with a metal detector. Plastic plugs are not allowed.***

#### 3.3.15. Provisions for Future Extensions

Sanitary sewer lines must end at a manhole. Stubbing out sewer lines for future extensions without placing a manhole at the end of the sewer line is not allowed.

#### 3.3.16. Sanitary Sewer Line Extension Requirements

1. If an existing trunk line or sewer main must be extended to serve the property, the developer shall be required to pay all of the costs associated with the extension. If the line extension would serve other developments within a one (1) year period, the City may negotiate with the initial developer for a pro rata share participation from future developers who wish to connect to the extension during the one (1) year period. This one (1) year period would begin upon final acceptance of the line by the City, at the end of the one (1) year developer maintenance period.
2. Sewer line extensions shall be sized in accordance with the requirements of Section 3.3.3. If the size of the trunk main extension required is larger than the minimum size required to serve the development, the Developer may be able to recapture some of the initial costs through negotiations with the City for the cost of the betterment.

#### 3.3.17. Air and Vacuum Relief Valve Assemblies

Air and Vacuum Relief (A&V) assemblies shall be located along sewer force mains where appropriate as determined by a design professional in responsible charge of the sanitary sewer system design. All A&V assembly locations are subject to the approval of the City.

#### 3.3.18. Joint Restraints Inside Casing

Inside of casings, the sewer line joints shall be slip joint restrained by using U.S. Pipe "Field-Lok" gaskets or approved equal.

### 3.4 SEWER LIFT STATION

#### 3.4.1. General

1. A site plan shall be prepared and submitted which shall depict the location of the pump station, fencing, valve vault, flow meter vault, piping, site lighting, any odor control equipment, standby pumping system, and all necessary appurtenances. An access road shall be shown from the pavement of the nearest public road to the pumping station site.
2. Determine and show on the site plan easements or fee simple designation of site access.
3. The space inside the fencing shall be large enough to facilitate service vehicle access to the pumping station wet well and other facilities. A paved turn around area shall be provided whenever the access road length exceeds 200 feet or when the road grade exceeds ten (10) percent. Where natural screening is not present to screen the site from

view of residences, special plantings shall be installed to screen the site. Show on the design site plan access and service roads and any proposed landscaping.

4. Locate the site such that pumping stations shall remain fully operational and accessible during the 25-year flood, all electrical controls shall be above the 100-year flood level, and all motors and mechanical equipment shall be protected against physical damage from the 100-year flood. Provide a note on the site plan that this requirement has been met.
5. The hydraulic and service requirements of the pumping station shall be shown on the plan or provided as supplemental information attached, including:
  - a. Duplex or triplex station and operating configuration,
  - b. Station configuration and structure types,
  - c. Design flow and total dynamic head,
  - d. Pump horsepower,
  - e. Wet well capacity,
  - f. Allowable starts per hour, (maximum of 6 starts per hour), and,
  - g. System head curve with proposed pump curve(s) superimposed.
6. Prepare and submit electrical drawings including gross horsepower, full load amp motor loads, voltages, instruments and controls, and panel details including failure indicators, alerts, and warning lights.
7. A profile for the force main shall be prepared and / or verified from a field survey.
8. An odor assessment shall be performed to determine if odor control is necessary to mitigate the low demand months / years of operation. If an odor control system is required, submit equipment details and location of such equipment on the site plan.
9. Refer to the Design Criteria & Layout section of this specification for further requirements of the design phase.

#### 3.4.2. Site

1. The site shall be provided with iron pins at each property corner. The site dimensions shall be a minimum of 40-feet by 40-feet. The perimeter of the site shall be fenced with a 7-foot high chain link fence with 3-strand barbed wire on top and be provided with a double gate, minimum 12-feet wide.
2. The entire site shall be covered with geotextile fabric below 2-inches of #57 stone and topped with 2-inches of Graded Aggregate Base (GAB) or "Crusher Run" gravel. The site shall be graded to allow for proper drainage.
3. A power pole shall be located within the fenced area with electrical meters located in such a manner that they can be easily read from outside the fenced area. All power lines within the site shall be underground. A 71 watt LED security light and fixture (Lithonia or equal) with photocell shall be mounted to the power pole 20 feet high.

4. The pumping station shall be provided with a 3/4-inch water service and yard hydrant. A water meter connection to the City water system shall be arranged. The water service line shall have a reduced pressure zone (RPZ) backflow preventer valve just downstream of the water meter. Owner/Developer shall be responsible for all fees associated with the meter installation.
5. An access road shall be provided between the pavement of the nearest public road and the pumping station site. The access road shall be minimum twelve (12') feet in width, graded with a geotextile fabric (Tensar, or equal) sub-base, and constructed of at least 6-inches of crushed stone topped with 2-inches of asphalt. A site drainage evaluation and Erosion Sedimentation and Control Plan (ES&CP) is required with the design documents. Provide proper drainage along and across the access road using culverts sized per the drainage evaluation. Erosion and sedimentation controls shall meet the latest edition of the Manual for Erosion and Sediment Control in Georgia prepared by the Georgia Soil and Water Conservation Commission.
6. The pump station site shall be deeded to the City either by fee simple quit claim or the final plat process; the access road shall be deeded to the City. In either case, the minimum width of property shall be forty (40') feet.
7. The telemetry equipment shall be provided by the Owner / Developer and shall meet all the Specifications stated herein.

#### 3.4.3. Structures and Operating Scheme

1. Wet Well: Wet well shall be constructed of precast concrete manhole sections, either round or rectangular in shape. The structure shall be pre-cast concrete with Xypex Bio-San C500 Admix and a monolithic base.
  - a. The minimum allowable inside diameter or width shall be 6-feet. Wet well size shall also meet the pump and equipment manufacturer's minimum size requirements and shall be large enough to allow space for level controls, the standby diesel pump suction lift pipe, and all other appurtenances specified to be inside the wet well.
  - b. For certain harsh applications, if approved by the City in the Design, pre-engineered fiberglass units may be considered instead of pre-cast concrete structures. Such fiberglass structures shall be molded as a single structure or in sections for field layup and be supplied by manufacturers with a minimum of five (5) years of experience in design and installation of fiberglass wet wells for municipal wastewater pump stations.
  - c. The wet well volume shall be sized to limit pump cycles to no more than 6-cycles per hour under peak flow conditions. Wet well volume should also be sufficient to provide a cycle time of no less than 5 minutes from a pump "on" to the next pump "on" time.
  - d. Provide for wet well storage volume available to meet peak flow with a 2-hour reserve.

- e. Wet wells shall also be sized to meet cycle time requirements with a drawdown (i.e., the distance between high water level and low water level) of not more than 3.0 feet.
- f. The levels in the wet well shall be set in the following manner:
  - i. Pumps off; set above pump volute based on pump,
  - ii. Lead / lag differential shall be a minimum of one foot,
  - iii. High alarm elevation shall be one foot above the highest lag setting,
  - iv. Backup high alarm float six (6) inches above High alarm float and wired directly to the telemetry panel, and
  - v. Influent pipe invert shall be a minimum of one foot above the high alarm setting.
  - vi. Triplex stations shall have the lead / 2nd pump worked into the operating levels.
- g. The wet well shall have a lockable aluminum hatch large enough for easy removal of pumps.
- h. Riser sections in precast units shall be sealed watertight using butyl rubber sealant or another approved sealant. Mastic shall not be used. Structures shall be adequately reinforced for all loading conditions normally encountered during shipping, construction, and service. All openings (for pipes, hatch, conduits) shall be either cast in place or cored. Sanitary sewer pipe connections shall utilize link-seal connectors and be watertight. Electrical conduits that penetrate the wet well shall have watertight seal-off fittings. The wet well shall be equipped with an aluminum ladder with anti-slip treads extending from the top of the wet well to the bottom of the wet well.
  - i. Top of slab shall be a minimum of two feet above the 100-year flood elevation.
  - j. All hatches shall be aluminum with stainless steel hasp and spring-assisted hinge.
  - k. All bolts, nuts and washers in the wet well shall be 316 stainless steel.
- 2. Valve and Flow Meter Vaults: Submersible pumping stations shall have a separate valve vault and a separate meter vault. The structures shall be pre-cast concrete with a monolithic base.
  - a. The valve vault shall be a minimum of 4 x 4 x 5-feet deep and sized to allow sufficient space for access and to remove and replace valves. The meter vault shall be adequately sized for the flow meter selected and for easy access to remove and replace the meter. Vaults shall be provided with an aluminum ladder having anti-slip treads, a floor drain, and a 3 x 3-foot lockable aluminum access hatch. The floor drain shall flow back to the wet-well and be equipped with a duck bill backflow valve, Tideflex Check Valve, or equal. Piping before and after the meter vault shall be configured to meet manufacturer's recommendation for straight pipe lengths.
  - b. The vaults shall be constructed of precast concrete manhole sections. Riser sections in precast units shall be sealed watertight using butyl rubber sealant or another approved sealant. Mastic shall not be used. Structures shall be adequately reinforced for all loading conditions normally encountered during shipping, construction, and service.

- c. All openings (for pipes, hatch, conduits) shall be either cast-in-place or cored. Sanitary sewer pipe connections shall utilize rubber boot connectors and be watertight.
3. Wet Well Ventilation: Provide a minimum of two four (4") inch diameter gravity vent pipes designed for natural ventilation. Vents shall be elevated to a minimum of three feet above the 100-year flood plain, have gooseneck ends with stainless steel insect screens. Where conditions are conducive to formation of hazardous conditions (in the design engineer's or Water Resources Department's opinion), then mechanical ventilation shall be provided.
4. Odor Control: Odors, depending on the severity projected by the Design, shall be controlled / eliminated using one of the following odor control processes. The City reserves the right to require odor control facilities, including but not limited to chemical odor control. If the designer proposes to eliminate chemical odor control, detailed calculations shall be provided demonstrating that odors at the pump station discharge are not anticipated and shall be subject to review and approval by the City.
  - a. Vent pipe canisters utilizing activated carbon or other media,
  - b. Bio-filter,
  - c. Drum scrubber,
  - d. Monoshell system, or
  - e. Pre-approved equivalent system.
5. Valves: Each pump discharge pipe shall be provided with a check valve and a plug valve located inside the valve vault. Valves shall be arranged such that there is sufficient space to easily access flange bolts for valve removal and replacement.
6. Instrumentation: Provide level sensors, pressure gauges, and an effluent flow meter as specified below under the Product Specifications Section.
7. Pumps: Pumps shall be submersible type and provided in a duplex or triplex configuration. In a duplex configuration, each pump shall be capable of handling the design flow, with the second pump as a redundant stand-by. In a triplex configuration, all three pumps shall be the same with two pumps operating simultaneously being capable of handling the design flow, with the third pump as a stand-by.
  - a. Pumps shall also have the following features:
    - i. Non-clog impeller.
    - ii. Be capable of passing a 3" sphere (except grinder pumps).
    - iii. Be capable of dry operation without overheating.
    - iv. Have dual mechanical seals with seal leak indicator light in the control panel.
    - v. Pump and motor casings shall be cast iron, and all fasteners shall be stainless steel.
    - vi. Motor shall be selected to be non-overloading under all operating conditions.
    - vii. Motor winding shall have a heat sensor with auto reset to prevent overheating; three-phase motors shall have two sensors.

- viii. Motor shall have upper and lower roller bearings.
  - ix. The pump shall be automatically connected to the discharge connection elbow when lowered into place and shall be easily removed for inspection or service. There shall be no need for personnel to enter the pump well. Sealing of the pumping unit to the discharge connection elbow shall be accomplished by a simple linear downward motion of the pump. Each pump shall be equipped with a stainless-steel chain for easy removal.
  - x. Motors shall be capable of fifteen (15) starts per hour.
- b. The design flow for the pump station shall represent the peak flow of the proposed development as well as future expected increase in the design flow in anticipation of further development upstream of the pump station. All possible tributary flow to the station should be included when sizing the pumping station. This total flow should include an appropriate peaking factor to account for normal diurnal flow, but not less than a 2.5 peaking factor.
  - c. Size pump stations in accordance with the design requirements herein or as directed by the City Engineer.
  - d. Pumps shall be sized to provide a velocity of at least 2.5 feet per second in the receiving force main pipe.
  - e. Pump motors shall be non-overloading over the entire pump range.
  - f. Motor rpm shall not exceed 1800 rpm.
  - g. Three phase 480-volt power shall be required on all motors, nominal 5 HP and larger.
  - h. Pump and motor shall be furnished with an adequately sized stainless steel lifting chain and hoist on a mounted, cantilevered jib-type crane that can rotate away from the access for the wet well. The chain length shall reach from the pump to the top of the station plus an additional 6 feet.
  - i. Grinder type centrifugal pumps will be used for pumps having a capacity of less than 100 gpm.
  - j. The pump station design shall allow for easy removal of any pump or equipment item without the need of shutdown of the entire station. A lifting assembly shall be provided for pump or equipment removal.
8. Screening: All sewer lift stations to be dedicated to the City shall be equipped with a mechanical screen directly upstream of the wet well. Developer to coordinate with City for acceptable screens. Screens shall be located to allow easy access to dumpster for screening disposal.
9. Electrical Building: The City reserves the right to require an Electrical building to house electrical equipment, SCADA and odor control facilities. When an Electrical Building is deemed necessary, it shall be designed as follows:
- a. Sizing: Room within the building shall be provided for future odor control chemical storage, including secondary containment. Building size requirements will be based on minimum electrical clearances around panels and a minimum of twenty-four (24") inches from all other equipment and tanks. The designer shall size the



dimensions of the building to fit the proposed control panel and chemical feed pump and tank sizes. The designer shall submit calculations for sizing the future odor control chemical tank, which will require the approval of the City. The tank shall be sized assuming that the odor control chemical to be used is hypochlorite. The chemical room shall be completely separate from the electrical control room.

- b. **Materials:** The building shall be a precast concrete or masonry building with a standing-seam roof. The designer shall consult with the developer to determine if another style of building is desired to match the aesthetics of the proposed development. The City shall be consulted and provide approval for all building materials, colors and architectural finishes.
  - c. **Doors and Security:** The chemical room will include a roll-up door sized to accommodate the installation and removal of the chemical tank. The designer shall specify the type of roll-up door. The control room will include a double door or roll-up door to provide easy access into the room, while providing means for removal of all equipment. If necessary, a removable transom may be used to provide sufficient clearance for tall and narrow equipment. The roll-up or double door shall be sized such that electrical panels can be removed without turning the panels on their side. The partition between the chemical room and control room shall be airtight. All doors shall be equipped with standard cylinder-type lock-sets.
  - d. **Heating, Ventilation and Air Conditioning (HVAC):** The building shall be provided with heating and cooling as necessary to maintain temperatures within the operating range of equipment and optimum storage temperatures for odor control chemicals. Venting of the chemical room shall be separate from the electrical control room. When the control panel has VFD's, a mechanical thermostatic switch with N.O. contacts will be installed and set to close/alarm at 90 degrees Fahrenheit. This circuit will be directly installed to the radio I/O for SCADA monitoring.
  - e. **Chemical Storage Room:** The chemical storage building shall be sized to contain the chemical tank and other accessory equipment, include a containment sump to provide 120 percent of the chemical tank capacity, and shall be approved by the City. Electricity and potable water shall be supplied. An emergency eyewash/shower system shall be installed inside the building in an area approved by the City. A wall with a window that does not open shall separate the chemical storage portion of the building from the control portion of the building. The containment sump shall have the ability to drain to the wet well or upstream manhole without creating a hazardous environment within the chemical storage room. The buried containment sump drain pipe can be PVC with a normally closed PVC ball valve located outside the chemical building. A valve riser and access box shall be provided in an accessible location.
10. **Accessories:** All materials inside the wet well and valve vault shall be corrosion resistant. Mechanical equipment requiring ferrous metals shall have a coal tar epoxy coating. Guide rails for pumps shall be stainless steel. Miscellaneous metals including fasteners shall be stainless steel; anchor bolts shall be stainless steel.

3.4.4. Force Mains: Force mains shall meet the requirements found herein and be designed based on a field-run survey with profile.

1. Design and construct force mains at a flat or positive grade.
2. Force mains shall be sized to provide a minimum velocity of 2.5 feet per second and a maximum velocity of 7 feet per second. The force main discharge shall be at the highest elevation of any part of the force main.
3. A gravity receiving sewer shall be designed and constructed on the last reach to avoid pumping “downhill” or creating a siphon situation.
4. If the discharge is at a lower elevation than the water surface at the wet-well, a back pressure sustaining valve shall be designed on the force main to prevent run on or siphonage.

Pipe, manholes, wet well, castings, fittings, accessories, and installation requirements shall meet the requirements herein.

## **SECTION 4 – WATER SYSTEM SPECIFICATIONS**

### 4.1 PURPOSE

This Section describes the methods and products to be incorporated into the water system and with requirements for their installation and use. The Owner / Developer shall furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.

### 4.2 MATERIALS

All materials used in the work shall be new and unused materials of a reputable U.S. Manufacturer conforming to the applicable requirements of the Specifications, and no materials shall be used in the work until they have been approved by the City. All materials in contact with drinking water during its distribution shall not adversely affect drinking water quality and public health and must be certified for conformance with American National Standards Institute/National Sanitation Foundation Standard 61 (ANSI/NSF Standard 61). Any reference to a AWWA, ANSI or other such specification shall mean the latest revision published. Material shop drawings shall be submitted to the City for review and approval prior to installation.

#### 4.2.1. Pipe

##### 1. Ductile Iron Pipe (DIP)

Pipe shall be manufactured in accordance with AWWA C151, latest revision. Pipe shall have an outside asphaltic coating per AWWA C151, latest revision. Pipe shall be standard cement lined and seal coated with approved bituminous seal coat in accordance with AWWA C104, latest revision. Joints shall be push-on or mechanical joints, conforming to AWWA C111, latest revision. Pipe shall be in eighteen-foot (18') to twenty-foot (20') nominal lengths with standard deflection pipe sockets. Where restrained joints are shown or specified for pipe larger than twelve (12") inch in diameter, the joints shall be "Lok-Fast" or "Lok-Ring" as manufactured by American Pipe or approved equal.

Where river crossing pipe is required, the pipe shall be "Flex-Lok Boltless Ball Joint Pipe" as manufactured by American Pipe or approved equal. Where specified, flanged pipe shall meet AWWA C151 specifications and be used with fittings meeting AWWA C110 or AWWA C153.

##### 2. Polyvinyl Chloride Pipe (PVC)

All P.V.C. pressure pipe must meet the requirements of AWWA C-900, latest revision, "Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in. for Water Distribution" and ASTM Standard D 2241, latest revision, "Standard Specification for Poly Vinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series) and shall be furnished in ductile iron pipe equivalent outside diameters with rubber gasketed joints as listed in C-900 standard. All plastic water mains must bear the National Sanitation Foundation (NSF) seal of approval for potable water use. All pipe shall have a minimum dimension ratio (DR) of 18, rated for 235 psi sustained working pressure. Certificates of conformance with the foregoing specifications shall be furnished with each lot of pipe supplied. Glued PVC fittings shall not be used.

### 3. High Density Polyethylene Pipe (HDPE)

Materials: Materials used for the manufacturer of polyethylene pipe and fittings shall be PE4710 high density polyethylene meeting cell classification 345464C per ASTM D3350; and meeting Type III, Class B or Class C, Category 5, Grade P34 per ASTM D1248; and shall be listed in the name of the pipe and fitting Manufacturer in PPI TR-4, Recommended Hydrostatic Strengths and Design Stresses for Thermoplastic Pipe and Fittings Compounds, with a standard grade rating of 1600 psi at 73°F per ASTM D-2837. The Manufacturer shall certify that the materials used to manufacture pipe and fittings meet these requirements.

Polyethylene Pipe (4 inch and larger): HDPE Pipe shall conform to AWWA C906, DR-7.3, Ductile Iron Pipe Sizes. Polyethylene pipe shall be manufactured in accordance with ASTM F714, Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter and shall be so marked. Each production lot of pipe shall be tested for (from material or pipe) melt index, density, % carbon, dimensions and either quick burst or ring tensile strength (equipment permitting).

### 4. Copper Tubing for Services

All services two (2") inch and less shall be copper service pipe, type K, soft temper, seamless copper tubing approved for potable water supply. Compression joints shall be used.

### 5. Casing Pipe

Casing pipe, where required under the street, shall be steel pipe conforming to A.S.T.M. Designation A-139, Grade B, electric fusion welded steel pipe. The pipe shall have a minimum tensile strength of 35,000 psi. The exterior and interior of the pipe shall have a coal tar varnish coating. Minimum wall thickness shall be as described in the tables below:

UNDER RAILROADS		
<u>Pipe Dia. (Inches)</u>	<u>Casing Pipe (Inches)</u>	<u>Wall Thickness Inches</u>
4	10"	0.250
6	12"	0.250
8	16"	0.281
10	18"	0.312
12	20"	0.344
16	24"	0.375
18	30"	0.469
20	30"	0.469
24	36"	0.531

UNDER HIGHWAYS		
<u>Pipe Dia. (Inches)</u>	<u>Casing Pipe (Inches)</u>	<u>Wall Thickness (Inches)</u>
4	10"	0.250
6	12"	0.250
8	16"	0.250
10	16"	0.250
12	18"	0.250
16	24"	0.312
18	30"	0.375
20	30"	0.375
24	36"	0.500

Casing for pipes less than or equal to 3-inches shall be polyvinyl chloride pipe (PVC) which has a minimum wall thickness equal to Schedule 80.

#### 6. Ductile Iron Pipe Fittings

Fittings shall be furnished in accordance with AWWA C110 or AWWA C153, latest revisions, and shall be a minimum of 250 psi pressure class rating. Joints shall be mechanical joint conforming to AWWA C111, latest revision. Cement mortar lining, conforming to AWWA C104, latest revision, shall be furnished for fittings.

#### 7. PVC Casing for Services

PVC casing pipe used for long-side services shall be schedule 40 and a minimum of 1 ½" in diameter.

#### 4.2.2. Fire Hydrants

All fire hydrants shall comply in all respects with City Standards and shall be designed and manufactured to comply with the latest revision of AWWA C502. The hydrants shall be designed for 250 pounds working pressure, of simple design, easy to operate, effectively and positively drained and protected from damage by freezing, and convenient for repairing and replacing parts.

Hydrants shall be equipped with one 4-1/2" pumper nozzle and two 2-1/2" diameter hose connections, which shall have threads meeting the latest requirements of the State Fire Insurance Commission. Hydrants shall have a safety flange on the barrel and a safety

coupling on the valve stem, to prevent damage to barrel and stem in case of traffic accident. Hydrants shall be M&H Valve and Fitting Co., Model 129, Mueller Co. Super Centurion A-421, or approved equal. Each hydrant shall be factory tested to 200 psi.

The connection at the base of the hydrant shall be mechanical joint with ductile iron retainer gland for six (6") inch ductile iron pipe. The valve opening shall meet the requirements of the AWWA Specifications for a 5-1/4" hydrant. The valve, valve seat and inner working parts shall be easily accessible. The height from the surface of the ground to the bottom of the pumper nozzle shall be no less than 18".

Leads from the main line to the fire hydrant shall use 6" ductile iron pipe and shall have a 6" gate valve between the main line and fire hydrant. The valve shall be connected to the main line by using a locked hydrant tee, equal to American Pipe model A-10180 or US Pipe U-592. A ductile iron anchor coupling must be used to insure adequate connection of fire hydrant to valve. Fire hydrant shall be connected to the valve by use of a ductile iron locked hydrant adapter.

#### 4.2.3. Valves and Accessories

##### 1. Gate Valves

Valves 16" and smaller shall be gate valves. The valves shall be of non-rising stem design, and have an iron body, bronze mounted, resilient seated, meeting all requirements of AWWA C509. Valves shall be designed for a minimum working pressure of 250 psi and shall have 2" square operating nuts, except in meter vaults where handwheels shall be installed. Valves shall open when turned counterclockwise.

Valves sized 2" through 12" shall be Mueller Co. A-2362 and 14" through 16" shall be Mueller Co. A-2361 with mechanical joints or approved equal. Mechanical joints shall be furnished with retainer glands as specified above. Where flange joints are used, flanges must meet the requirements of AWWA C115, latest revision.

##### 2. Butterfly Valves

All butterfly valves shall be bubble-tight closing at the rated pressure with flow in either direction and shall be satisfactory for applications involving throttling service and frequent operations or operations after long periods of inactivity. Valves shall meet the full requirements of AWWA C504, latest revision, for 200 psi working pressure and shall be suitable for above ground or buried service.

All interior ferrous surfaces of valves larger than 16" shall have a special epoxy coating meeting the requirements of AWWA C550. Valve bodies shall be equipped with integrally cast mechanical joint ends meeting AWWA C111, latest revision. Mechanical joints shall be furnished with retainer glands as specified above.

Butterfly valves installed underground shall come equipped with a manual operator. This manual operator shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position between fully open and fully

closed without creeping or fluttering. Operators shall be equipped with mechanical stop-limiting devices to prevent over travel of the disc in the open and closed positions.

Valves shall open when turned counterclockwise. Operators shall be fully enclosed and designed for buried operation.

### 3. Valve Boxes

Valves boxes for valves shall be approved standard cast iron adjustable shaft boxes having a minimum shaft diameter of 5-1/4". The casing shall be coated with two coats of coal tar pitch varnish. The lids of all boxes shall bear the word "Water" or the letter "W". Boxes shall be Tyler Union 6850 Screw Type or approved equal.

### 4. Air Relief Valve Assemblies

Air relief valves shall be cast iron body and covers, with bronze trim, stainless steel float, Buna-N-seal, and shall be designed for a minimum working pressure of 150 psi. The valves shall be designed to exhaust large quantities of air during the filling period, and small quantities of air which collect in the line while operating under pressure. The valves shall be GA Industries Model No. 930 combination air release and vacuum relief valves or approved equal. Valves shall be a minimum of one (1") inch.

Ball valves between water main and air release valve shall be bronze with screw connection equal to Jenkins Company Figure 201J. Meter box shall be equal to the DFW Style D-1200 or approved equal.

### 5. Tapping Sleeves

Tapping sleeves shall be Mueller, H-304 or approved equal.

### 6. Tapping Valves

Tapping valves shall be Mueller, mechanical joint, 250 psi, T2362, or approved equal.

### 7. Backflow Preventers

In accordance with the City's Cross Connection Control Program (CCCP), all water service customers are required to have a backflow prevention device selected on the basis of the customer's risk categorization as determined by the City's CCCP.

### 8. Curb Stops and Wyes

All metal parts of curb stops shall be made of bronze and NSF 61 certified. The stops shall be Ford model #B43-332WR-G-NL or approved equal. The cock shall be operated with a combined cap and tee and shall open when turned counter-clockwise. All curb stops shall have an integrated locking device.

Wyes shall be Ford model Y44-243-G-NL or approved equal.

### 9. Corporation Cocks

Corporation cocks shall have threaded inlet and compression outlet connection. All metal parts of the cock assembly shall be made of bronze, NSF 61 certified. The cock shall be operated with a tee head and shall open when turned counter-clockwise. The cock shall be a Ford F1000-xx-G-NL or approved equal.

#### 10. Electric Conductive Wire

Two (2) electric conductive wires shall be placed in the trench one (1) foot above all pipe whether metallic or non-metallic. The tracer wire shall be 12-gauge, coated copper wire with a minimum break load of 302 lbs. and 30 mil. HDPE insulation thickness. Foil tape will not be acceptable.

Flush mounted access boxes shall be provided with a maximum spacing of 1000' between boxes. Boxes shall be Copperhead Industries SnakePit Access Point or equivalent. Each access box shall be grounded with a 1.5 lbs. drive-in magnesium ground anode rod with a minimum of twenty feet (20') of lead wire.

#### 11. Meter Boxes

Meter boxes for house services shall be made of plastic having a tensile strength rating of between 4500 and 8200 psi and a compressive strength rating of 4000 to 6500 psi. The box shall be approximately 19" long, 13" wide and 12" deep. The lid shall be made of gray cast iron, free from blow holes, warp, projections, shrinkage cracks, porosity, and other defects harmful to their use. The lid shall be coated with asphaltic paint and shall be compatible with radio read AMR/AMI systems. Meter boxes shall be DFW Style D-1200 or approved equal.

#### 12. Service Saddles

Service saddles shall be equal to ROMAC Style 202NS double strap clamps suitable for use with ductile iron or PVC pipe.

#### 13. Meters

Water meters 3/4" and 1" shall be furnished and installed by the City. Meters 2" and larger shall be furnished and installed by the developer. All services shall be metered and must be capable of reading accurately at low flows. City approval shall be obtained prior to installation. All meters shall read in 1000 gallons. All meters shall be compatible with the City's meter reading equipment.

Water meters shall be Neptune or approved equal.

For meters 4" and smaller, the bypass shall be located inside the vault. For meters larger than 4", the bypass piping may be installed outside of the vault, with the valve on the bypass located inside the vault.

#### 14. Retainer Glands

Retainer glands for mechanical joints shall utilize standard gaskets and bolts conforming to AWWA C111 and shall be EBAA Mega-Lug or approved equal.



15. Polyethylene Wrap For Ductile Iron Pipe

Polyethylene wrap shall be manufactured of virgin polyethylene material conforming to ASTM Standard Specification D-1248-78, Type I, Class A or C, Grade E-1. The polyethylene film shall have a minimum thickness of 8 mm.

16. Valve Markers

One concrete valve marker shall be furnished and set at each line valve. The marker shall be made of 3,000 PSI concrete, and shall be four feet (4') long and 4" on each side, with four #4 reinforcing bars as shown on the Standard Detail.

The markers shall be set with an even number of feet between the center line of the valve and the center line of the valve marker, and the distance in feet between the valve and marker shall be stamped in the aluminum disc on the marker at the time of setting.

17. Casing Spacers

Casing spacers shall be a two-section, flanged bolted on style constructed of heat fused PVC coated steel, minimum 14-gauge band and 10-gauge risers, with 2-inch wide glass reinforced polyester insulating skids, heavy duty PVC inner liner, minimum 0.09-inch thick having a hardness of 85-90 durometer, and all stainless steel or cadmium plated hardware shall be Pipeline Seal and Insulator, Inc., or equivalent as approved by the Engineer. Spacers shall be sized and spaced as recommended by the manufacturer.

18. Concrete for Thrust Blocks and Thrust Collars

Concrete for thrust blocks and thrust collars shall have a minimum compressive strength of 3,000 PSI at 28 days.

19. Gaskets for Joint Restraint Inside Casings

Inside of casings, the D.I.P. water main joints shall be slip joint restrained by using U.S. Pipe "Field-Lok" gaskets or approved equal.

20. Subgrade Stabilizer Stone Stabilizer for subgrade shall be either approved crushed stone or gravel, uniformly graded from 1/4" to 1-1/4" in size.

#### 4.3 OTHER REQUIREMENTS

No part of these specifications is intended to relieve the developer of his responsibility to comply with requirements of the Georgia D.O.T., the Georgia EPD or other appropriate agency.

## **SECTION 5 – SEWER SYSTEM SPECIFICATIONS**

### 5.1 PURPOSE

This Section describes the products and methods to be incorporated into sewer systems and wastewater pump stations along with requirements for their installation and use. The Owner / Developer shall furnish all products and perform all labor necessary to fulfill the requirements of these Specifications.

### 5.2 GENERAL REQUIREMENTS

When the standards set forth herein are more restrictive than those required by any statute, ordinance or regulation applicable within Newton County, Georgia, the requirements of this manual shall govern. When the provisions of any other statute, ordinance or regulation requires more restrictive standards than required herein, the more restrictive standards shall apply.

### 5.3 MATERIALS

All materials used in the work, including equipment, shall be new and unused materials of a reputable U.S. Manufacturer conforming to the applicable requirements of the Specifications, and no materials shall be used in the work until they have been approved by the City. Any reference to AWWA, ANSI, ASTM or other such specification shall mean the latest revision published.

#### 5.3.1. Sanitary Sewer Pipe

Pipe and Fittings Tests: All shipments of pipe and/or fittings shall be tested and certified by an approved independent testing laboratory. Up to 0.5 percent of the number of pipe of each size furnished shall be tested, except that in no case shall less than two specimens be tested. The contractor shall be responsible for providing three (3) certified copies of the test results obtained by the testing laboratory under provisions for testing in the applicable test procedures listed below. Testing shall be done at the contractor's expense, and no pipe shall be installed until the test results are approved by the City.

##### 1. Ductile Iron Pipe (D.I.P.)

Ductile Iron Pipe shall be designed in accordance with AWWA C150. Minimum wall thickness for 4" - 12" diameter pipe shall be Pressure Class 350; Minimum wall thickness for 14" - 20" diameter pipe shall be Pressure Class 250; Minimum wall thickness for 24" diameter pipe shall be Pressure Class 200; Minimum wall thickness for pipe larger than 24" in diameter shall be Pressure Class 150. Pipe shall be manufactured in accordance with AWWA C151. Wall thicknesses greater than the minimums called for above may be required due to greater depths or varying bedding requirements.

All D.I.P. shall be subject to inspection and approval by the City after delivery. No broken, cracked, imperfectly coated or otherwise damaged or unsatisfactory pipe or fittings shall be used. The pipe interior shall be Protecto 401 ceramic epoxy lined with a minimum thickness of forty (40) mm. The exterior shall be seal coated with an approved bituminous seal coat in accordance with AWWA C151.

Pipe joints shall be push-on joints conforming to AWWA C111, unless specified otherwise on plans. Where called for, mechanical joints shall conform to AWWA C111.

## 2. Polyvinyl Chloride (PVC) Sewer Pipe

Pipe and Fittings: All PVC pipe and fittings through fifteen (15") inches shall meet the requirements as specified under ASTM D3034. PVC pipe eighteen (18") in diameter shall meet the requirements of ASTM F679. All pipe and fittings shall be suitable for use as a sanitary sewer conduit. Bell joints shall consist of an integral wall section with elastomeric gasket joint which provides a water tight seal. Standard laying lengths shall be 13.0 - 18.0 feet ( $\pm 1$  inch). The pipe shall be capable of passing all test which are detailed in this specification. Minimum wall thickness for pipe through fifteen (15") inch in diameter shall be as specified under SDR 26 in ASTM D3034. Minimum wall thickness for eighteen (18") inches diameter pipe shall be as specified under PS75 in ASTM F679. PVC sewers with more than twelve (12') feet of cover may require wall thicknesses greater than SDR 26 or PS75. PVC is not allowed for sewers greater than eighteen (18") inches in diameter or more than fourteen (14') feet of cover except as allowed by the City

Each length of pipe shall be marked with the manufacturer's name, trade name, nominal size, class, hydrostatic test pressure, manufacturer's standard symbol to signify it was tested, and date of manufacture. Each rubber ring shall be marked with the manufacturer's identification, the size, the year of manufacture, and the classes of pipe with which it can be used.

All PVC fittings and accessories shall meet the requirements specified under ASTM D3034 or F679 and shall be manufactured and furnished by the pipe supplier. They shall have bell and/or spigot configurations compatible with that of the pipe and shall have an equivalent wall thickness.

- a. Pipe Stiffness: Minimum "pipe stiffness" (F/Y) at 5 percent deflection shall be 46 psi for all sizes, when tested in accordance with ASTM Standard Method of Test D2412, to determine the "External Loading Properties of Plastic Pipe by Parallel Plate Loading". There shall be no evidence of splitting, cracking, or breaking at a deflection of up to thirty (30%) percent of the original diameter.
- b. Extrusion Quality: There shall be no evidence of flaking, swelling, of disintegration when the pipe material is tested in accordance with ASTM D2152, "Quality of Extruded Poly (Vinyl Chloride) Pipe and Molded Fittings by Acetone Immersion".
- c. Joint Tightness: Pipe and fitting joints shall comply with ASTM D3212 for "Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals". Joint assemblies shall not leak when subjected to both an internal and external hydrostatic test at equivalent pressures of 10.8 psi gauge for a period of one hour. Pipes shall be tested in straight alignment, axially deflected position, and by shear load test as otherwise defined in paragraphs 7.2, 7.3, and 7.4 of ASTM D3212.

- d. Impact Resistance: Pipe shall comply with impact resistance test conducted in accordance with ASTM D2444, "Test for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)."
  - e. Installation: PVC pipe will be installed in accordance with ASTM D2321 (Latest Revision). Type "4" bedding is the minimum bedding requirement for PVC pipe. In any area where the pipe is below existing ground water level or below the 100-year flood plain level, the contractor will embed PVC pipe in sand or graded gravel.
  - f. Deflection Limit: Vertical deflection of installed pipe shall not exceed 5 percent of the undeflected diameter as defined in Table X1.1 of ASTM D3034.
3. High Density Polyethylene (HDPE)
- a. Materials: Materials used for the manufacturer of polyethylene pipe and fittings shall be PE4710 high density polyethylene meeting cell classification 345464C per ASTM D3350; and meeting Type III, Class B or Class C, Category 5, Grade P34 per ASTM D1248; and shall be listed in the name of the pipe and fitting Manufacturer in PPI TR-4, Recommended Hydrostatic Strengths and Design Stresses for Thermoplastic Pipe and Fittings Compounds, with a standard grade rating of 1600 psi at 73°F per ASTM D-2837. The Manufacturer shall certify that the materials used to manufacture pipe and fittings meet these requirements.
  - b. Polyethylene Pipe (4 inch and larger): HDPE Pipe shall conform to AWWA C906, **DR-11** Ductile Iron Pipe sizes. Polyethylene pipe shall be manufactured in accordance with ASTM F714, Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter and shall be so marked. Each production lot of pipe shall be tested for (from material or pipe) melt index, density, % carbon, dimensions and either quick burst or ring tensile strength (equipment permitting).
  - c. Service Identification: Permanent identification of piping service shall be provided by co-extruding multiple equally spaced color stripes into the pipe outside surface or by solid colored pipe shell. The striping material shall be the same material as the pipe material except for color. The color for potable water shall be Blue.
  - d. Polyethylene Fittings and Custom Fabrication: Polyethylene fittings and custom fabrications shall be molded or fabricated by the pipe manufacturer or trained personnel. Butt fusion outlets shall be made to the same outside diameter, wall thickness, and tolerances as the mating pipe. All fittings and custom fabrications shall be fully rated for the same internal pressure as the mating pipe. Fabricated fittings must have the same working pressure as the mating pipe.
  - i. Molded Fittings: Molded fittings shall be manufactured in accordance with ASTM D3261, Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing and shall be so marked. Each production lot of molded fittings shall be subjected to the test required under ASTM D3261.

- ii. Fabricated Fittings: Fabricated fittings shall be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock, or molded fittings. Fabricated fittings shall be rated for internal pressure service equivalent to the full-service pressure rating of the mating pipe. Directional fittings 16" and larger such as elbows, tees, crosses, etc., shall have a plain end inlet for butt fusion and flanged directional outlets.
- e. Polyethylene Flange Adapters: Flange adapter shall be made with sufficient through-bore length to be clamped in a butt fusion joining machine without the use of a stub-end holder. The sealing surface of the flange adapter shall be machined with a series of small V-shaped grooves to provide gasketless sealing, or to restrain the gasket against blow-out. Below ground flange adapters may only be utilized when specified and when MJ adapters are not commercially available in the required size. Adapters for 30 inch and smaller pipe shall utilize an MJ adapter (see below).
- f. Back-up Rings and Flange Bolts: Flange adapters shall be fitted with lap joint flanges pressure rated equal to or greater than the mating pipe. Convolute style backup rings preferred over the flat stock rings. The lap joint flange bore shall be chamfered to provide clearance to the flange adapter radius. Flange bolts and nuts shall be 316 stainless steel.
- g. Manufacturer's Quality Control: The pipe and fitting manufacturer shall have an established quality control program responsible for inspecting incoming and outgoing materials. Incoming polyethylene materials shall be inspected for density, melt flow rated, and contamination. The cell classification properties of the material shall be certified by the supplier, and verified by Manufacturer's Quality Control.
- h. Polyethylene Mechanical Joint (MJ) Adapters: Mechanical connections of HDPE pipe (4" and larger) to Ductile Iron or PVC piping, mechanical joint fittings, or valves shall be through a self-restraining, fusible mechanical joint adapter with or without an integral, internal stainless steel insert. Mechanical joint adapter shall be of the same SDR rating as the pipe. A separate, loose stainless steel type insert will only be allowed for pipe sizes 4 inch through 8 inches. Provide the mechanical joint adapter, including but not limited to longer tee bolts or all thread rods with nuts at the mechanical joint bell. Note that PE flanged adapters may only be utilized for pipe sizes where MJ adapters are not commercially available.
- i. Cast Transition Couplings: HDPE to MJ cast transition coupling may only be utilized for 8 inch and smaller pipe size. A stainless steel stiffener is required sized at proper ID of HDPE pipe. The transition coupling must be epoxy lined (3 mils minimum for water use and 12 mils minimum for sewer use). Acceptable is a Power Seal model 3520 or approved equal.
- j. Electrofusion Couplings and Fittings: Electrofusion joining procedures shall not be used in any location or application.

- k. Mechanical connections of polyethylene pipe to auxiliary equipment shall be through Flanged connections which shall consist of the following:
  - i. A polyethylene “sub end” shall be thermally butt-fused to the ends of the pipe.
  - ii. Provide ASTM A240, Type 304 stainless steel backing flange, 125-pound ANSI B16.1 standard, and red rubber gaskets as required by the manufacturer.
  - iii. Stainless Steel bolts and nuts of sufficient length to show a minimum of three complete threads when the joint is made and tightened to the manufacturer’s standard. Lubricate prior to assembly. Retorque the nuts after 4 hours.

#### 5.3.2. Pipe Joints (Gravity Sewer)

1. Ductile Iron Pipe (D.I.) – Shall be flexible rubber gasket Type II, or mechanical joint Type III, conforming to ASA Specification A21.11.
2. Polyvinyl Chloride (PVC) Pipe – Shall be flexible gasket joints for PVC sewer pipe and shall be compression type conforming to ASTM D-3212. The gasket shall conform to ASTM F-477.
3. Transition Joints – The transition between sewer pipes of different materials shall be made by special adapters made for that purpose. Transition couplings used to join Ductile Iron or ASTM D-3034 PVC sewer pipe shall be Ductile Iron, deep bell, push on joint, and air tested. Ductile Iron material shall comply with ASTM A536, Grade 65-45-12 or 80-55-06. Bell depths shall meet the minimum socket depth requirements of ASTM F1336. Gasket grooves shall be machined. Gaskets shall be of SBR rubber and comply with ASTM F477. All couplings shall have pipe stops and a flow way tapered to allow a smooth transition between the pipes so as not to obstruct flow or inspection. Interior lining shall be Protecto 401 or engineer approved equal. Fittings shall be manufactured by the Harrington Corporation or Engineer approved equal.

#### 5.3.3. Force Main

1. Polyvinyl Chloride (PVC) Pipe – Shall conform to ASTM D 2241. The pipe shall have a Standard Dimensional Rating (SDR) of 26 and be of Class 160 psi. PVC pipe shall be the color green and be supplied in 20 foot nominal lengths.
  - a. Pipe shall be extruded from clean rigid, approved class 12454-A PVC compound conforming to ASTM resin Specification D-1784. Pipe shall have single rubber gasket push-on joint conforming to ASTM D3139.
2. Ductile Iron Pipe (D.I.) – Shall be in accordance with paragraph 2.1-A of this section and conform to ASTM A 377. Joints shall be flexible rubber gaskets Type II, or mechanical joint Type III, conforming to ASA Specification A21.11.
3. Fittings – All fittings shall be ductile iron, compact in weight and size, meeting the requirements of AWWA C110/ANSI A21.10, or AWWA C153/ANSI A21.4, and with a minimum rated working pressure of 250 psi. Fittings shall be mechanical joint and have a nominal wall thickness of Class 54 Ductile Iron Pipe. They shall be furnished with a

bituminous outside coating and Protecto 401 or Engineer approved equivalent interior coating. Special adapters shall be provided, as recommended by the manufacturer, to adapt the PVC pipe to mechanical jointing with cast or ductile iron pipe, fittings or valves.

4. Thrust Blocking – Concrete having compressive strength of not less than 3000 psi shall be used as a cradle or thrust blocking where shown on the plans or where directed by the Engineer. Bends exceeding 22-1/4 degrees, crosses with one opening plugged, and all tees shall be backed with concrete as a thrust block. Blocking shall be placed between solid ground and the fitting to be anchored; the area of bearing on the pipe and on ground in each instance shall be that shown on the plans. The blocking shall be so placed that the pipe fitting joints will be accessible for repair. No extra payment will be made for the thrust blocks.
5. Restrained Joints – Restrained joints for pipe, valves and fittings shall be mechanical joints with ductile iron retainer glands equivalent to “Megalug” or push-on type joints equivalent to “Lok-Ring”, “TR Flex” or “Super Lock” and shall have a minimum rated working pressure of 250 psi. The joints shall be in accordance with the applicable portions of AWWA C 111. The manufacturer of the joints shall furnish certification, witnessed by an independent laboratory, that the joints furnished have been tested at a pressure of 500 psi without signs of leakage or failure. Restrained joints shall be capable of being deflected after assembly.

#### 5.3.4. Casing Pipe

Casing Pipe, where required under the street, shall be steel pipe conforming to A.S.T.M. Designation A-139, Grade B, electric fusion welded steel pipe. The pipe shall have a minimum tensile strength of 35,000 psi. The exterior and interior of the pipe shall have a coal tar varnish coating. Minimum wall thickness shall be as described in the tables below:

UNDER RAILROADS		
<u>Pipe Dia. (Inches)</u>	<u>Casing Pipe (Inches)</u>	<u>Wall Thickness Inches</u>
4	10"	0.250
6	12"	0.250
8	16"	0.281
10	18"	0.312
12	20"	0.344
16	24"	0.375
18	30"	0.469
20	30"	0.469
24	36"	0.531

UNDER HIGHWAYS		
<u>Pipe Dia. (Inches)</u>	<u>Casing Pipe (Inches)</u>	<u>Wall Thickness (Inches)</u>
4	10"	0.250
6	12"	0.250
8	16"	0.250
10	16"	0.250
12	18"	0.250
16	24"	0.312
18	30"	0.375
20	30"	0.375
24	36"	0.500

Casing for pipes less than or equal to 3-inches shall be polyvinyl chloride pipe (PVC) which has a minimum wall thickness equal to Schedule 80.

Wherever steel casing is required, the carrier pipe shall be ductile iron pipe with push-on, field lock gasketed joints. Approved spacers shall be used to secure the pipe on grade during grouting operations. A manhole shall be placed at each end of the cased section at a distance of thirty (30') feet beyond the end of the casing; provide a permanent easement as necessary to facilitate future removal of piping from casing. Ductile iron pipe shall be continuous from manhole to manhole.

#### 5.3.5. Wyes and Bends

Wyes and bends shall be equal in quality to the materials of the pipeline being installed.

#### 5.3.6. Manholes

##### 1. Precast Manholes

Precast manholes shall be constructed of Portland Cement concrete with a compressive strength of not less than 4,000 pounds per square inch at an age of twenty-eight (28) days. The wall thickness shall not be less than five (5") inches. Manholes over twelve (12') feet deep shall be placed on a reinforced slab as shown on the Standard Details. Joints in the wall shall be tongue and groove type; Sections shall be joined using O-ring rubber gaskets, flexible plastic gaskets conforming to the applicable provisions of ASTM Standard Specification, Serial Designation C443, or an approved bitumastic joint



material. Precast concrete manholes shall consist of precast reinforced concrete sections with eccentric, (or flat slab for shallow manholes) top section and a base section conforming with the typical manhole details as shown on the Standard Details. Flat top manholes will be approved only if a need for such can be demonstrated by the design professional.

The minimum diameter of manholes shall be forty-eight (48") inches. Larger diameters are required for manholes with inside drops, and may be necessary for manholes with large diameter sewer or multiple pipes connecting at the manhole.

Each section of the precast manhole shall have not more than two holes for the purpose of handling and laying. These holes shall be sealed with cement mortar using one part Portland Cement to two parts clean sand, meeting ASTM Standard Specifications, Serial Designation C144.

All precast manholes shall have Xypex Bio-Scan C500 Admix, or approved equal, blended into the concrete at the time of batching at the rate directed by the manufacturer. The mix design shall be such to ensure waterproofing and protection of the manholes from chemical and chloride penetration.

Holes in precast bases to receive sewer pipe shall be precast at the factory at the required locations and heights. Knocking out of holes in the field will not be permitted; However, holes can be cored in the field with a coring machine. The design, the materials used in the manufacturing process and the transportation of precast manhole shall be subject to inspection at any time by the City. Materials found defective by the City will not be delivered to the job site. Material on the job site that is found defective shall be removed immediately after being notified that such materials are unacceptable. Precast manhole shall conform to ASTM C478.

Pre-molded rubber boots with stainless steel bands shall be used for connecting sewer pipe to manholes. These may be either the lock-in "Kor-N-Seal" type as manufactured by Trellborg, or the cast-in type as manufactured by Press-Seal Corporation or approved equal. In all cases, the boot shall be sized to suit the outside diameter of the type pipe being used.

The invert of manholes shall be constructed of concrete or brick in accordance with the Standard Details and shall have a cross section of the exact shape of the invert of the sewer which it connects, changes in size and grade being made gradually and evenly. Changes in the direction of the sewer and entering branch or branches shall have a true curve of as large a radius as the size of the manhole will permit. Inverts shall have a "smooth trowel" finish. The manhole bench shall be sloped 30 degrees from the manhole wall toward the invert. Manholes shall be provided with steps built into the wall as shown on the detailed drawings. Outside drop manholes will be required where the invert of any incoming line will be higher than two (2') feet from the invert of the outlet pipe. All manholes shall be water-tight when completely built.

## 2. Manhole Steps

Manhole steps shall be of #4 steel reinforcing bars covered with Polypropylene Plastic or rubber and shall be supplied with depth rings and other necessary appurtenances. The manhole steps shall conform to the applicable provisions of ASTM Specification C478, and shall be similar to and of equal quality to the "Sure Foot" by Oliver Tire and Rubber Company of Oakland, California or "PSI-PF" by M.A. Industries, Inc. of Peachtree City, Georgia. The step shall be factory built into the precast sections.

### 3. Manhole Cover and Frame

Cast iron frames and covers shall be used in all locations where manholes are installed except for non-traffic areas. Composite frames and covers shall be used in all non-traffic areas.

#### a. Cast Iron

Cast iron manhole frames and covers shall meet the requirements of ASTM A 48 for Class 30 gray iron and all applicable local standards. All castings shall be tough, close grained, smooth and free from blow holes, blisters, shrinkage, strains, cracks, cold shots and other imperfections. No casting will be accepted which weighs less than 95 percent of the design weight. Shop drawings must indicate the design weight and provide sufficient dimensions to permit checking. All castings shall be thoroughly cleaned in the shop and given two coats of approved bituminous paint before rusting begins.

Manhole frames and covers shall be as shown on the Standard Detail Drawings. All frames and covers shall have machined horizontal bearing surfaces.

#### b. Composite

Composite frames and covers shall meet the requirements of AASHTO M-306, Full H20, and either H-20 or H-25 load rating and all applicable local standards. All castings shall be tough, close grained, smooth and free from blow holes, blisters, shrinkage, strains, cracks, cold shots and other imperfections. No casting will be accepted which weighs less than 95% of the design weight. Shop drawings must indicate the design weight and provide sufficient dimensions to permit checking. All castings shall be thoroughly cleaned in the shop.

All composite covers shall have the legend "SANITARY SEWER" molded into the face, bolt down to the frame and provide a gasket between the manhole frame and cover.

Composite manhole frames and covers shall be manufactured by EJ Company, Trumbull Manufacturing, Inc. or an engineer approved equal.

### 4. Manhole Foundation

The manhole base shall be set on a compacted mat of Size #57 crushed stone graded level at the thickness shown on the Standard Details. In wet areas, the crushed stone mat shall be thickened as needed to provide a non-yielding foundation.

### 5. Brick

Brickwork required to complete the precast concrete manhole shall be constructed using 1-part Portland cement to 2 parts clean sand, meeting ASTM Specifications, Serial Designation C 144, thoroughly mixed to a workable plastic mixture. Brickwork shall be constructed in a neat and workmanlike manner. Cement mortar shall be used to grout interior exposed brick joints and faces. No more than 3 courses of brick with 9-inch maximum total depth of bricks may be used to adjust manhole covers.

All brick shall be best grade, hard-burned, common, giving a ringing sound when struck and acceptable to the City. Only bricks presenting a regular and smooth face shall be used. When submerged in water for twenty-four (24) hours, they shall not absorb more than 10% of their weight in water. Brick shall be culled when delivered on the ground, and all imperfect brick are to be immediately removed from the work. All salmon, soft or arch brick or brick made of alluvial soil will be rejected. All brick used in the work shall be of uniform size.

#### 6. Concrete and Mortar

Concrete shall consist of Portland cement, a fine aggregate, a coarse aggregate and water. Portland cement shall conform to Fed. Spec. SS-C-19 lb. Fine aggregate shall be a clean, sharp, well-graded sand conforming to Fed. Spec. SS-S-51. Coarse aggregate shall be uniformly graded broken stone or gravel which will pass a 1-1/2-inch screen and be retained on a 1/4 inch screen. Aggregate shall be free of clay, loam silt, or organic matter. Water used for concrete shall be clean and free from vegetative, sewage or organic matter and the total amount used shall not exceed six (6) gallons per sack of cement. Forms may be of wood or metal properly braced to prevent bulging. Concrete shall be thoroughly mixed and well vibrated into forms and around fittings. Exposed surfaces of concrete shall be protected from premature drying by being kept covered and moist for a period of seven days. After the forms have been removed, the voids in the interior surface, if any, shall be properly filled with cement mortar and the whole surface rubbed uniformly with neat cement.

All mortar shall be composed of one part Portland cement to three parts sand, conforming to these specifications.

All concrete shall have a compressive strength of not less than 3,000 pounds per square inch at an age of twenty-eight (28) days.

#### 7. Reinforcing Steel

Bars for concrete reinforcement shall be of the sizes, lengths and bent as shown on plans. Bars shall be ASTM Specifications A-615 Grade 60. All steel shall be free from rust, scale or any foreign coating.

##### 5.3.7. Subgrade Stabilizer Stone

Stabilizer for subgrade shall be either approved crushed stone or gravel, uniformly graded from 1/4" to 1-1/2" in size.

##### 5.3.8. Casing Spacers

Approved casing spacers shall be used to secure the sewer line on grade throughout the length of the casing. The spacers shall be sufficient to secure the pipe on grade during the grouting operation.

#### 5.3.9. Concrete for Thrust Blocks and Thrust Collars

1. Underground piping laid around curves and at all unsupported changes of direction, all tees, wyes, crosses, plugs and other like fittings shall be solidly and properly blocked with concrete against solid earth to take the reaction of the main pressure and to prevent lateral movement of the pipe or fittings when under pressure. Reaction blocking shall be installed at all locations requiring same and where tie rods and clamps are not called for in the plans. Concrete for reaction blocking shall have a minimum compressive strength of 3,000 psi at twenty-eight (28) days. The blocking, unless otherwise shown, shall be so placed that the pipe and fitting joints will be accessible for repair.
2. Reaction blocking shall be constructed in conformance with the Standard Details. Prior to blocking any joint or fitting with concrete, that joint or fitting shall be wrapped with polyethylene film in such a manner that the concrete will not stick directly to the fitting, but that the load bearing capacity of the blocking will not be affected.

#### 5.3.10. Gaskets for Joint Restraint Inside Casings

Inside of casings, the sewer line joints shall be slip-joint restrained by using U.S. Pipe "Field-Lok" gaskets or approved equal.

#### 5.3.11. Electric Conductive Wire

Two (2) electric conductive wires shall be placed in the trench one (1) foot above all pipe whether metallic or non-metallic. The tracer wire shall be 12-gauge, coated copper wire with a minimum break load of 302 lbs. and 30 mil. HDPE insulation thickness. Foil tape will not be acceptable.

Flush mounted access boxes shall be provided with a maximum spacing of 1000' between boxes. Boxes shall be Copperhead Industries SnakePit Access Box or equivalent. Each access box shall be grounded with a 1.5 lbs., drive-in magnesium ground anode rod with a minimum of twenty feet (20') of lead wire.

#### 5.3.12. Submersible Pumps:

1. Pumps shall be totally submersible, electric motor driven non-clog, sewage pumps. Pump design shall allow for continuous, unsubmerged operation without auxiliary cooling the pump. Pump design shall incorporate an automatic discharge connection, allowing each unit to be removed for inspection or service by simply lifting the pump. Reconnection shall require only lowering of the pump into position.

#### 5.3.13. Pump Construction

1. All major parts, such as the stator casing, oil casing, volute, sliding bracket, and discharge connection shall be of gray iron. All exposed bolts and nuts shall be stainless steel. All

mating surfaces of major parts shall be machined and fitted with rubber O-ring seals where watertight sealing is required. All parts shall be interchangeable and watertight sealing shall not require additional machining of replacement parts, sealing compounds, or the application of specific torques to connectors.

2. No portion of the pump unit shall bear directly on the floor of the wet well. There shall be no more than one 90-degree bend allowed between the volute discharge flange and station piping.
3. A sliding guide bracket shall be an integral part of the pump unit. The volute casing shall have a machined discharge flange to automatically and firmly connect with the cast iron discharge connection, which when bolted to the floor of the sump and discharge line, will receive the pump discharge connecting flange without the need of adjustment, fasteners, clamps or similar devices.

#### 5.3.14. Impeller:

A wear ring system shall be installed to provide efficient sealing between the volute and impeller. The impeller shall be gray cast iron, of non-clogging design, capable of handling solids, fibrous material, heavy sludge, and other matter found in normal sewage applications. The impeller shall be constructed with a long "through let" without acute turns. The impeller shall be dynamically balanced. Static and dynamic balancing operations shall not deform or weaken the impeller. The impeller shall be a slip fit to the shaft and key driven. Non-corroding fasteners shall be used. If sewage grit is of concern provide hardened impellers as approved by the City.

#### 5.3.15. Shaft Seals:

Each pump shall be provided with a mechanical rotating shaft seal system running in an oil reservoir having separate, constantly hydro-dynamically lubricated lapped seal faces. The lower seal unit between the pump and oil chamber shall contain one stationary and one positively driven rotating tungsten-carbide ring. The upper seal unit between the oil sump and motor housing shall contain one stationary tungsten-carbide ring and one positively driven rotating carbon ring. Each interface shall be held in contact by its own independent spring system supplemented by external liquid pressures. The seals shall require neither maintenance or adjustment and shall be easily inspected and replaceable. No seal damage shall result from operating the pumping unit out of its liquid environment. The seal system shall not rely upon the pumped media for lubrication. The oil reservoir shall have a drain and inspection plug with positive seal which shall be easily accessible from outside the pump.

#### 5.3.16. Pump Motor:

1. The pump motor shall be constant speed and designed in accordance with the standards of NEMA. The motor shall be housed in a watertight casing. The pump shaft shall be a one-piece solid shaft of C1034 carbon steel and shall be completely isolated from the pumped liquid. The shaft shall be supported above and below the rotor by anti-friction bearings designed to provide long life and minimize shaft deflection. At least one

bearing shall be double row type. Bearings shall have a minimum AFBMA B10 life of 20,000 hours.

2. The motor design shall incorporate a positive, circulated cooling system to cool the motor. Passages for cooling media, where used, shall be adequately dimensioned to prevent clogging.
3. Thermal sensors shall be provided to monitor stator temperature. One thermal switch shall be imbedded in the end coils of each stator winding. These thermal switches shall be used in conjunction, with and in addition to, external motor protection and shall be wired directly into the control panel.

#### 5.3.17. Cable:

Cable shall have P122 MSHA approval for submersible pump applications and this shall be indicated by a code or legend permanently embossed on the cable. Cable sizing shall conform to NEC specifications for pump motors. The cable entry sealing fitting shall relieve stress on conductors and provide a watertight and submersible seal without the use of sealing compounds and without the application of specific torques to connectors. The conductors shall connect to a terminal board which shall provide a moisture tight seal between the cable entry junction chamber and the motor. Pump cables to be supported by Kellum-grips.

#### 5.3.18. Testing:

The pump manufacturer shall perform the following inspections and tests on each pump before shipment from the factory:

1. A motor and cable test for moisture content and insulation defects.
2. Prior to submergence, the pump shall be run dry to establish correct rotation and mechanical integrity.
3. The pump shall be run for 30 minutes submerged, a minimum of 6 feet under water.
4. The motor and cable shall then be tested a second time for moisture content and insulation defects.
5. A written certification that these tests have been performed shall be provided by the pump manufacturer with each pump at the time of shipment. After testing, the pump cable end shall be suitably protected for shipment and installation.

#### 5.3.19. Manufacturer:

The pump manufacturer shall have similar units in operation for a minimum of 5 years in the United States. Pumps shall be manufactured by Flygt, Gorman Rupp, or Wilo USA.

#### 5.3.20. Access Frame and Hatch:

The wet well access frame shall be a fabricated aluminum frame designed to be cast into a concrete structure. The door shall be 1/4-inch aluminum diamond plate hinged to the frame

and equipped with a mechanism designed to assist in lifting the door. The door shall have an automatic hold-open feature, a slam latch with inside handle, outside removable key wrench and plug, and a hasp for padlocking.

#### 5.3.21. Guide Bars:

1. Guide bars shall be stainless steel pipe or structural section attached to the automatic discharge connection at their lower end and to an upper guide bar bracket at their upper end. Intermediate guide bar supports shall be provided as required to ensure a rigid installation. Guide bars shall not support any of the weight of the pump. Guide bars, supports, and attaching hardware shall all be stainless steel.

#### 5.3.22. Electrical Controls

1. Furnish and install one automatic pump control center in a NEMA 4X stainless steel enclosure for operation on a 460-volt, 3 phase, 60 Hertz, 3 wire service, three phase overload protection with manual reset and a magnet contactor. A 24-volt control circuit transformer with disconnect and overload protection shall be included, with an automatic, electrical alternator provided. Overload and disconnect functions shall be provided by a single magnetic-hydraulic, temperature-insensitive component.
2. Control centers shall be pre-calibrated to match motor and control characteristics and factory sealed to ensure trip setting it tamperproof. Control design shall allow for manual or automatic operation.
3. Control panel shall include an audible and visual high-level alarm with silence button. Control panel shall be provided with a duplex 110-volt grounded outlet on the interior of the control panel. Control panel and electrical controls shall be provided with lightning arrestors. Control panel shall include a heater with thermostat for humidity control and air conditioning to keep internal temperature below 90° F. A cooling fan shall be provided to maintain temperature below 115° F. Shelters, sun shields or aluminum "carport" awning / coverings shall be provided over electrical and control panels.
4. All telemetry system components shall be designed to connect into and communicate with the City's SCADA/telemetry system.

#### 5.3.23. Instruments:

1. **Liquid Level Sensors:** Furnish and install a liquid level sensor of the non-floating, displacement type (pressure transducer) as the primary level device. The pressure transducer shall have a 4-20 mA output signal to the pump control panel for continuous level detection and readout. Floats or restrained floats shall be provided as a backup for each level setting if the pressure transducer fails. An additional redundant high level alarm float shall be provided that is wired directly to the telemetry panel in case of a power outage. Two additional level floats and controls shall be provided for the backup pumping system (diesel-powered pump); one high-high level float shall be positioned 6 inches above the submersible pumps high level float and one low-low level

float shall be installed 3 inches below the submersible pumps low level float. Provide sensors with adequate lengths of cable for the installation of all floats and the pressure transducer without splicing. The pressure transducer shall be installed inside a perforated 6-inch diameter Sch 40 PVC stilling well secured to the wet well wall with stainless steel straps. Provide stainless steel clips and connecting hardware for attaching all level sensors and cables. Pressure transducers and float switches shall be as manufactured by Dwyer, Wika, Endress & Hauser or approved equal.

2. **Pressure Gauges:** Furnish and install two pressure gauges, one upstream and one downstream of the pump discharge check valve inside the valve pit. Each gauge shall be an oil-filled pressure gauge and visible from ground level. A diaphragm seal and ball valve shall be installed on the force main tap to allow removal of each gauge. The gauges shall have minimum 4-inch diameter dials and be sized to read the water pressure within the design head range of the pump discharge. Gauges shall be Ashcroft or approved equal.
3. **Flow Meter:** Furnish and install one flow meter and transmitter in the force main piping in its own buried pre-cast meter vault. The flow meter shall be installed to meet the manufacturers recommended straight run pipe upstream and downstream of the flow meter. There shall be no bends or fittings in the straight run pipe sections. Flow meter shall be either Coriolis or electromagnetic type and as manufactured by Emerson (Rosemount), Krohne, or approved equal. Provide all electrical wiring, cables, and conduit to power the flow meter and to transmit the flow signal to the control panel; the flow signal shall also be transmitted to the SCADA panel. Provide panel digital flow indication to read in both gallons per minute (gpm) and totalized gallons. Flow totalizer shall be non-resettable.

#### 5.3.24. Standby Pumping Station

1. Standby / Backup Pumping with Diesel-Powered Pump
  - a. Provide and install a standby backup pumping system including one (1) suction lift centrifugal sewage pump, diesel engine, support frame, drive, fuel storage tank with secondary containment, miscellaneous appurtenances, controls, and control panel all enclosed in a weather-resistant skid-mounted housing. The backup pumping unit shall be permanently mounted on an appropriately sized reinforced concrete pad near the wet well. The pump shall be able to automatically prime to twenty (28') feet of suction lift from a dry pit and be sized for the peak design flow and discharge head. The standby backup pumping system and diesel fuel tank capacity shall be rated for continuous, standby service for the station's full load demand for twenty-four (24) hours.
  - b. Provide and install independent suction piping from the pump suction to twelve (12") inches above the bottom of the wet well. Provide and install pump discharge force main piping and valves equal to that specified for the submersible pumps. Suction piping diameter shall be one pipe size larger than the pump discharge force



main piping. Standby system shall be supplied with all auxiliary systems necessary for operation (i.e. batteries, battery charger, block heater, etc.).

- c. O & M Manuals. On or before the date of start-up, a digital version of the factory O & M Manuals (with two hard copies) shall be delivered to the City for the standby pumping system. These shall include the name of the purchaser, name and address of the supplier, the serial number of the pump, detailed wiring schematics, and telephone number and address for purchase of parts. Standby system shall be tested at 100% full load on site for a period of four (4) hours. Provide installation and start-up certification letter from the manufacturer.
2. Control System: Standby control system must include a programmable control device to allow automatic start-up and test functions. Test functions can be programmed for daily, weekly, or monthly testing. Connections to the telemetry system for remote monitoring of functional and failure must be provided. Standby system shall be activated automatically when the submersible pumps are called to operate but fail to turn on. Standby suction lift pump shall be controlled by a low-level float (pump off) and a high level float (pump on).
3. Fuel storage shall be accomplished using corrosion-resistant double wall sub-base fuel tank only; no underground storage will be allowed. Fuel tank shall provide 24-hour capacity at 100% load.
4. Standby system shall be connected to the station SCADA system and provide all of the same alarms as the electric pumps but shall also include a low fuel level and low battery voltage alarm. The cumulative, previous day and current day runtimes and starts shall be provided to SCADA and displayed locally.
5. Acceptable Manufacturers: Godwin Dri-Prime HL Series or pre-approved equal.

#### 5.3.25. Fencing

1. Provide fencing as shown on the Drawings. Where the Owner / Developer finds it necessary to remove fencing to facilitate construction activities, the Owner / Developer shall completely remove all fencing including posts and wire mesh within the affected area. Fencing shall be replaced using the components that were removed, if in satisfactory condition, and new materials otherwise.
2. Overall height for new fencing shall be 7 feet with 3 strands of barbed wire on malleable iron post tops. Posts shall be set at no more than 10-foot centers, a full 3 feet deep in concrete footings, and poured the full size of the holes as excavated. Corner posts shall have the necessary strut and tie bracing.
3. Where fencing crosses ditches, steep grades, and other unusual conditions, make special provisions to ensure that the security, appearance, maintainability, and permanence of the fencing are equaled or exceeded.
4. Fencing materials shall conform to the following:

- a. Fence Mesh – 9 gage wire, woven to 2-inch squares, galvanized after weaving, 6-foot-wide roll. Continuous tension wire shall be provided at the lower edge of the mesh.
- b. Line Post – 2-1/2-inch O.D. Galvanized Pipe (3.65 lb./ft.)
- c. Corner Post – 3-inch O.D. Galvanized Pipe (5.79 lb./ft.)
- d. Gate Post – 4-inch O.D. Galvanized Pipe (9.11 lb./ft.)
- e. Top Rail – 1-5/8-inch O.D. Galvanized Pipe (2.27 lb./ft.) with extra-long pressed steel sleeves.
- f. Gates shall be supplied with heavy duty latches, keepers, and heavy duty hardened bronze padlocks with duplicate keys. Gates shall be double gates, minimum 12-foot wide.
- g. Gate Frames – 2-inch O.D. Galvanized pipe frame (2.72 lb./ft)
- h. Barbed wire shall consist of three strands of 12 gage wire, with 4-point pattern barbs, galvanized after weaving.

#### 5.3.26. Check Valves

1. Check valves shall be hinged disc type with cast iron body and bronze or bronze-fitted disc. Valves shall be designed for the operating head indicated and shall not slam shut on pump shutdown. Valves shall be equipped with a 1/2-inch stop cock at the high point of the valve for bleeding air from the line.
2. Valves shall be outside weight and lever cushioned type. The cushion chamber shall be attached to the side of the valve body externally and constructed with a piston operating in a chamber that will effectively prevent hammering action at the pump discharge heads specified. 3. The cushioning shall be by air, and the cushion chamber shall be so arranged that the closing speed will be adjustable to meet the service requirements. Valves shall be manufactured by Pratt, G-A Industries, or DeZurik.

#### 5.3.27. Plug Valves

1. Plug valves shall be 90-degree turn non-lubricated eccentric type with resilient faced plugs. Design of the valve shall allow for contact between the seat and the plug to only occur in the final degrees of plug movement. Valves shall be suitable for throttling service and service where valve operation is infrequent.
  - a. Operating Requirements: Valves shall provide drip-tight shut-off up to the full pressure rating with pressure in either direction. Pressure ratings shall be established by hydrostatic tests conducted in accordance with ANSI B 16.1. Valves shall be rated at a minimum of 150 psi. Valves twenty (20") inches and smaller shall have a port area equal to at least 80 percent of the full pipe area; port areas of larger valves shall equal or exceed 100 percent of the full pipe area.

- b. Valve Body: Bodies shall be cast-iron conforming to ASTM A 126 class B (carbon steel for 2-inch valves). All exposed nuts, bolts, springs, washers, etc. shall be zinc coated in accordance with ASTM A 153. Valves shall have flanged, or mechanical joint ends as shown on the Drawings. Flanged valves shall have ANSI 125-pound standard flanges. Mechanical joint (MJ) valves shall have bell ends conforming to applicable requirements of ANSI 21.11. Flanged valves with flange-to-MJ adapters shall not be acceptable in lieu of MJ valves.
- c. Valve Seats and Seat Rings: Valve seats shall be a raised welded-in overlay machined to mate with the resilient faced plug. Valve seat rings shall be an integral casting machined to mate with the resilient seat. Valve seats and valve seat rings shall be 90 percent pure nickel and shall be a minimum thickness of 1/8-inch.
- d. Valve Plug: The plug shall be of semi-steel conforming to ASTM A 126, Class B.
- e. Resilient Seat: The resilient seating material shall be a synthetic rubber compound of approximately 70 durometer hardness bonded to the plug or retaining element. Facing material shall be abrasion resistant and suitable for sewage and sludge service.
- f. Shaft Bearings: Valves shall be furnished with replaceable sleeve-type bearings in the upper and lower journals. Bearings shall comply with applicable requirements of AWWA C507, paragraphs 8.1, 8.3, 8.4, and 8.5. Bearing materials shall have a proven record of service of not less than five years.
- g. Shaft Seal: The valve body shall be fitted with a bolted bonnet incorporating a stuffing box and pull-down packing gland. Packing shall be the split chevron type. Design of exposed valves shall allow visible inspection of the shaft seal, adjustment of the packing, and replacement of the packing, all without disturbing the bonnet or valve operator. The shaft seal shall comply with the requirements of AWWA C504.
- h. Manual Operation: Valves eight (8") inches and smaller in diameter shall be equipped with lever operators. Provide one valve wrench for each exposed valve. Valves 10-inches and larger in diameter shall be equipped with geared operators. Geared operators shall be worm and gear type, totally enclosed, running in oil, with seals provided on all shafts to prevent entry of dirt and water into the actuator. All shaft bearings shall be permanently lubricated bronze bushings. Operator shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque. Construction of operator housing shall be semi-steel. All exposed nuts, bolts and washers shall be zinc plated in accordance with ASTM A 153. Gear operators shall comply with the requirements of AWWA C504. Valves ten (10") inches and larger shall be furnished with a hand wheel. Valves and operators shall have seals on all shafts and gaskets on valve operator covers to prevent the entry of water. Operator mounting brackets shall be totally enclosed and shall have gasket seals. All exposed nuts, bolts, springs, and washers shall be stainless steel.

- i. Acceptable Manufacturers: All plug valves shall be products of one manufacturer. Manufacturers must submit evidence of five years satisfactory service in sewage applications of valves of the same design and of the sizes required. Valves shall be manufactured by DeZurik, Pratt, Kennedy, or Homestead.

### 5.3.28. Electrical Power and Systems

#### 1. General

- a. Motor Wiring: Furnish and install power wiring to motors. Wiring into motors shall be complete with connections through associated disconnect switches, and motor starters, including the "in-line" (branch circuit power line) controlling devices.
- b. Starters to be RVSS types soft starters located inside the pump control panel and rated to match the pump size. Each RVSS started shall include an internal bypass and shall be rated for 122° degree F ambient temperature. Wiring shall be in conduit, with final connection to rotating equipment made through a section of PVC jacketed flexible conduit. Motors shall be grounded.
- c. Control Wiring: Control wiring is defined as that wiring which provides connections between control circuit elements and does not provide the power circuit into motor terminals.
- d. Provide all electrical wires, cables, switches, conduits, fittings, junction boxes, grounding system, surge protection, controls, panels, and other components of the electrical system required for a complete installation. All electrical design and products/materials shall meet and be installed in accordance with the latest edition of the National Electrical Code (NEC), the latest standard building code, and NFPA 820. All electrical, instruments, and equipment inside the wet well shall be rated for Class 1, Division 1.

#### 2. Products

- a. Disconnect Switches: Disconnect switches shall be quick-make, quick-break, UL labeled Heavy Duty safety switches. Switch ratings shall be for the applied voltage and current. Disconnects shall be non-fused type. Disconnect switch enclosures shall be NEMA 4X stainless steel. Acceptable manufacturers: General Electric, Westinghouse, ITE, and Square D. Designate with permanent labels, the maximum allowable fusing capacity and fuse type for fusible switches. Install label on inside cover. When a disconnect switch is used with motors, it shall be an approved HP rated type. Disconnects shall be provided at service and for each pump. Pump power cables shall be terminated directly to the associated disconnect switches.
- b. Circuit Breaker: Motor protection shall be circuit breaker type. No fuses shall be used for 3 phase circuit protection.
- c. Surge Protection Device: Include external surge protection device in NEMA 4X SS enclosure rated for 120 kA and connected to the main breaker load side. Surge

protection device shall be UL listed, Eaton or equal. Pump control panel shall include internal surge protection device.

- d. Conduit: Aluminum conduit shall be used for above ground installation and PVC schedule 40 for underground. Provide six (6") inch air gap under pump control panel for wetwell methane gas escape path.
- e. Equipment Frame: Rigid aluminum to be used for vertical supports and stainless steel for channel and fasteners. Structural engineer to design frame.
- f. Junction Boxes: Junction boxes to be NEMA 4X SS with quarter turn latches.
- g. Conductors: All conductors shall be copper, single conductor, 75-degree C. Type THWN.

#### 5.3.29. SCADA/Telemetry

1. Description: SCADA to be provided by a cellular-based communication system for alarm monitoring and remotely controlling wastewater collection systems equipment with data collection and reporting services. The system shall include the following:
  - a. Remote terminal units to collect and transmit data from Project site to central server location.
  - b. Cellular communications via carrier between remote terminal units and central server location. Carrier to be specified by SCADA manufacturer.
  - c. Central server location to receive, record, and analyze telemetry data reported by remote terminal units.
  - d. Alarm notification system to alert operating personnel about system alarms and malfunction conditions.
  - e. Secure web-based user interface to access recorded data, generate system reports and control local equipment through remote terminal unit.
2. Quality Assurance:
  - a. Manufacturer of cellular-based remote terminal units (RTUs) to be engaged in manufacture and operation of managed SCADA service for a minimum of ten (10) years.
  - b. Manufacturer or manufacturer's authorized firm, or combination of both, shall provide the following:
    - i. Required monitoring-related services with field equipment.
    - ii. Maintain ongoing cellular service agreements through relationships with cellular carrier provider(s).
    - iii. Specified server center and server infrastructure.
    - iv. Continuous technical support, at all times.

- v. Design and furnish a complete, integrated and functionally operating system, warranted to perform the intended functions as herein specified.
- vi. Provide or supply all hardware and software specified herein or required and provide all required and specified collateral services in connection with the system such as testing, calibration, start-up, operation and maintenance manuals, record prints, and operator training.
- vii. Physical mounting / setting of RTU panels.
- viii. Final terminations of AC power, signal wiring and coaxial cable to field instruments, PLC panels and RTU panels. In accordance with the requirements of the Georgia Construction Industry Licensing Board, Division of Electrical Contractors and Division of Low Voltage Contractors, the manufacturer must be properly licensed to perform the electrical portions of the work specified herein.

3. Remote Terminal Units (RTU):

- a. RTU: Factory assembled and programmed data collection and reporting device, contained within electrical enclosure designed for 25-year life expectancy.
- b. Data Cellular Radio: Communicate with central server location via cellular radio transmitting data through Transmission Control Protocol (TCP) socket connection.
  - i. Provide encrypted and end-to-end acknowledged transmissions. Short Message Service (SMS), User Datagram Protocol (UDP), and satellite-based data transmission methods are not permitted.
  - ii. Accommodate radios from various cellular carriers; field-interchangeable within 10 minutes.
  - iii. Support LTE, 3GPP and 3GPP/2 technology for CDMA and HSPA+ networks.
  - iv. Subscriber Identification (SIMs) shall be provisioned to provide a Cellular Wireless Private Network.
- c. Enclosure: For indoor or outdoor locations, panels shall be NEMA 4X #304 stainless steel.
- d. Power Requirements: 120VAC to RTU. Include 24VDC battery backup and charger capable of a minimum runtime of sixteen (16) hours. Include alarming for low battery or loss of AC power.
- e. Digital Inputs: Minimum of twenty (20) relay-isolated inputs.
- f. Analog Inputs: Minimum of four (4) inputs. Inputs to measure 4-20 mA at 10 bit resolution. Inputs to transmit values every two minutes or more rapidly when value deviates from previous transmission by 5% or more of full scale.
- g. Pulse Inputs: Transmit data every two minutes when change in pulse data occurs.
- h. Digital Outputs: Twelve (12) dry contact closure, 10 amp minimum.
- i. Analog Outputs: Two (2) 4-20 mA outputs.

- j. On-Board Telemetry Data: Standard alarms to be monitored: AC Power Failure, Low Battery Voltage, RTU Door Intrusion, Loss of Communication.
4. Communication:
- a. RTU Communication: Transmit data through cellular radios that communicate through third and fourth generation GSM and, or CDMA cellular networks.
    - i. Provide cellular radios with private IP addresses.
    - ii. Provide private gateways through respective cellular networks.
    - iii. Data Encryption: Transmit data after application layer encryption and with carrier level encryption.
    - iv. End-to-End Data Acknowledgement: Confirm every data packet from RTU to central service with central server acknowledgement back to RTU in real-time.
    - v. Communication Failure Alarms: Dispatch communication failure alarm.
    - vi. Monitor and report secure socket connections for end-to-end uptime.
    - vii. Report interruption durations fifteen (15) seconds and greater, and every disconnect/reconnect event.
  - b. Cellular Service: Obtain approval from cellular provider, accepting cellular radios for use on respective cellular network in accordance with FCC requirements.
  - c. Data Transmission Rates:
    - i. Off-normal conditions: Transmit data on occurrence to initiate alarm notifications. Ability to delay alarm notifications via the web portal user interface.
    - ii. The data transmission rates shall be configurable over-the-air by Manufacturer.
    - iii. Pump state transmitted in real-time.
5. Server Center and Server Infrastructure:
- a. Provide and maintain central server center that will house redundant and linked servers, interconnects, databases, power supplies, inbound cellular connections, and outbound internet hubs and providers.
  - b. Data:
    - i. Ownership: Data is Covington's property and will not be disclosed, unless authorized by Covington in writing.
      - a Provide historical RTU data storage forever.
      - b Manufacturer shall backup and archive databases daily.
    - ii. Data Export and Data Links: Provide the following capabilities:
      - a Interfacing to an Object Linking and Embedding for Process Control (OPC) compliant Human Machine Interface (HMI) for client/server SCADA systems.
      - b Connection will be based OPC-UA 1.03 (October 2015) or greater.
  - c. Security:

- i. User must be authenticated before a connection can be established.
  - ii. Authentication must support X.509 certificates before connection is allowed.
  - iii. All messages encrypted with 128 bit or better encryptions.
  - iv. All messages must be signed to ensure that they are received exactly as they are sent.
  - v. Covington's firewalls will not be required to accept incoming socket connections.
  - vi. Allow for multiple concurrent OPC connections to provide redundant HMI database operation at Covington's locations.
  - vii. Auditing and logging must be available for all user activities.
  - viii. Provide access to web portals via TLS cryptographic security protocol. SSL methods must be disabled. Web portal must receive an A rating from <https://www.ssllabs.com/ssltest/>
  - ix. Provide capabilities for Two-Factor authentication methods for accessing the web portal.
6. Visualization:
- a. Provide capabilities to display stations on a map overview to specify location.
  - b. Provide a system-wide alarm display that supports severity and filter capabilities.
7. Database:
- a. Tag structures shall be descriptive and provide sufficient information and consistency not to require a comment field to identify.
  - b. User Defined Templates (UDTs) shall be provided for associated equipment to maintain consistency and standards.
8. Alarm and Alert Notification System
- a. Alarms
    - i. Provide alarm notifications for off-normal conditions and upon return-to normal conditions.
    - ii. Provide capability to transmit return to normal alarms to different notification group.
  - b. In addition to off-normal conditions and City specified alarms, the following conditions shall trigger an alarm notification:
    - i. AC Power Loss
    - ii. Phase Loss
    - iii. Wet well High-High Level
    - iv. Wet well Low Level
    - v. Pump 1 Motor Over-Temperature
    - vi. Pump 2 Motor Over-Temperature
    - vii. Pump 3 Motor Over-Temperature



- viii. Pump 1 Seal Failure
  - ix. Pump 2 Seal Failure
  - x. Pump 3 Seal Failure
  - xi. Bypass Pump Running
  - xii. Bypass Pump Fault
- c. Alarm Notification: Via telephone (voice call), text message, email or any combination, simultaneously.
- i. Provide capability to allow alarm notification cycles with configurable delay between each cycle and with each cycle containing multiple notification destinations.
  - ii. Provide capability to acknowledge alarms at time of initial alarm delivery or by a toll-free phone call, text message, email or via City's web portal.
  - iii. Provide system capability to cease alarm notification when user acknowledges alarm event, with capability to re-initiate alarm notification when alarm input remains off-normal after user settable time.
  - iv. Provide capability for specific users to be notified of individual alarm events.
  - v. Provide capability for alarm notifications to be configured based on time of alarm. Permit alarm notification groups to switch between groups at different hours of the day and different days of the week.
  - vi. Provide alarm notification groups that accommodate multiple teams within each group to easily facilitate rotation of teams of on-call personnel.
- d. Alarm Message Formats
- i. Alarm Notifications: Describe alarm condition, time, location at time of off normal condition and pump status.
  - ii. Provide capability for alarms to be delivered individually or grouped into one message so multiple, simultaneous alarms can be delivered and acknowledged in one phone call.
  - iii. Deliver alarm with added introductory message asking for specific person when calling a phone where the person answering is not known.
- e. Voice Alarm Delivery Capacity:
- i. Provide capacity to deliver minimum twenty (20) outbound simultaneous voice phone lines.
- f. Alarm Dispatch Logs: Document each alarm event with the following:
- i. Event Information
  - ii. Date
  - iii. Time
  - iv. Station Name
  - v. Alarm Condition
- g. Notification Information

- i. Date
- ii. Time
- iii. Name of person notified
- iv. Notification method
- v. Status of Notification: "Success", "Failure", or "Event Acknowledge"
  - a For notification failure, log failure reason.
- vi. Provide recording of each voice notification attempt to document notification.

#### h. Alert Notification System

- i. Provide email alerts for less critical items, such as low battery voltage and communication failure reminder.
- ii. Provide analyses for daily pump runtimes over 30 days, with an alert triggered if pump runtime falls outside 30-day high or low average runtime pattern.
- iii. Provide analyses of hourly pump runtimes and automatically compare runtimes to two user-set thresholds. Dispatch an alert next day when alert threshold is exceeded. Dispatch alarm immediately when alarm threshold is exceeded.
- iv. Provide analysis if hourly pump starts and automatically compare starts to two-set thresholds. Dispatch an alert next day when alert threshold is exceeded. Dispatch alarm immediately when alarm threshold is exceeded.

### 9. Remote Data Access

#### a. Remote Data Access Format

- i. Provide remote access to system collected data via web browser, through internet-enabled smart phone, tablet, laptop, or desktop computer.
  - a UI must be optimized for viewing both on small screens and large monitors.
- ii. Provide secure access through specified phone that does not require web access (Voice SCADA). This will require user login credentials, with minimum of numeric five-digit login and associated phone number for that site to maintain site security.
- iii. Provide access to web portals via TLS cryptographic security protocol. SSL methods must be disabled. Web portal must receive an A rating from <https://www.ssllabs.com/ssltest/>
- iv. Provide web portal display of graphs, reports, alarms, and RTU setup.
  - a Optimize data to minimize page loading times.
  - b Windows (reports, graphs) must update automatically when new data is available.
  - c Utilize Responsive Design patterns where the Graphical User Interface (GUI) automatically adapts to the screen size.
- v. System Access: Require username and password credentials for access to web portal.
  - a Provide three levels of access:
    - 1) Read only: Can view pages but cannot make changes.

- 2) Administrator: Can view pages, can make system changes, and alter control functions.
- 3) Super Admin: Can view pages, make system changes, alter control functions and add, modify or remove user credentials.

b. Data Presentation

- i. Map to display location of each unit and color-coded status indication.
- ii. Battery voltage, AC voltage, temperature, and radio status condition.
- iii. Report end-to-end uptime history and daily connection percentage of each RTU.
- iv. RTU electronic key reads with usernames, time of read, and site name.
- v. Pump runtimes by hour and day with historical graphs and tables and individual pump flow estimates.
- vi. Automatic daily analysis of pump runtimes for abnormalities with automatic notification of abnormalities.
- vii. Pump starts with hourly analysis of excess pump starts with automatic notifications of excess pump starts.
- viii. Perform and display volumetric inflow/outflow calculations from RTU-supplied data for each pump cycle using real-time pump start/stop data with simultaneously gather level transducer or float data to perform inflow/outflow and pump GPM calculations.
- ix. Pump flow capacity estimations for station capacity analysis based on station design capacity and RTU-supplied data for each pump cycle.
- x. Show pump run status from map view.

c. Security Data:

- i. Passwords and Access
  - a. Log accesses to User web portal. Include date, time, and duration of access; User Name and Password to access site, and IP address of accessing computer.
  - b. Provide accessibility to log through User web portal.
  - c. Store passwords in encrypted/blind format. There are no default passwords.

10. Installation and Startup

- a. System provider to provide installation and startup services to include operator training.

11. Warranty

- a. The system shall be covered by a FIVE-YEAR WARRANTY that includes parts and labor.

12. Service Agreement

- a. Beginning at Substantial Completion, provide continuous, renewable annual service agreement including:

13. Data Services: Cellular data connections, servers and infrastructure that acts on and stores Covington's data, and administration of same. No separate overage charges or early termination fees shall apply.
14. Notifications: Provide real-time alarm notifications and alarm notification recording.
  - a. Provide record of success or failure of each event including audio recording of voice alarm callouts.
15. Web Portal: Web portals optimized for personal computers and mobile devices.
16. Technical support: Provide live telephone technical support from 8 AM to 6 PM eastern time. Provide emergency technical support at all times at no additional charge.
17. Owner / Developer to be responsible for all fees during the warranty period.
18. SCADA systems to be provided by Mission Communications LLC, MR Systems, Inc. or City approved alternate.

#### 5.3.30. Execution

1. Power: The Owner / Developer will arrange new electrical service for the station with the local power provider. The service will be transferred to Covington upon acceptance of the station as part of the Final Plat process.
2. Electrical Metering: Metering equipment shall be provided for the electrical service. Metering shall be arranged with the local power utility and shall be installed in accordance with the utility company's requirements and the NEC.
3. Excavation, Backfilling, and Concrete Encasement: Comply with all requirements specified herein. Electrical conduit and control signal wiring shall meet requirements of the NEC.

### 5.4 INSPECTIONS AND TESTS

#### 5.4.1. General

1. All lines designed to operate as gravity sanitary sewers and all force mains shall be successfully tested. Tests of installed piping shall be completed as described below.
2. All piping to be tested must satisfactorily comply with these tests before being eligible for acceptance.
3. These tests must be performed in the presence of the City's inspector in order for the test to be accepted as valid.
4. All lines shall be cleaned and flushed prior to testing.

#### 5.4.2. Concealed Work

The City inspector may direct that the contractor notify the City and receive inspection approval prior to concealing certain work such as manhole foundations, pipe bedding, wyes, bends, service laterals, or other appurtenances.

#### 5.4.3. Timing of Service Connections

In no circumstances shall any homes, buildings or plumbing fixtures be connected to the sanitary sewers until the sewers have been inspected and approved by the City.

#### 5.4.4. Pre-Treatment Requirements for Industrial Wastewater

Some industrial and other developments may be required to pre-treat sewage prior to discharge into the City's collection system. Requirements for pre-treatment will be as described in the Sewer Use Ordinance.

#### 5.4.5. Other Requirements

No part of these specifications is intended to relieve the developer of his responsibility to comply with requirements of the Georgia D.O.T., the Georgia EPD or other appropriate agency.

## **SECTION 6 – CONSTRUCTION, EXCAVATION AND TESTING**

### 6.1 GENERAL REQUIREMENTS

It shall be expressly understood that these specifications are for installation of all underground water and sewer mains and associated appurtenances.

All work shall conform to the applicable provisions of specifications prepared by the AWWA, ANSI, and ASTM of latest revision except as otherwise specified herein.

Compliance with applicable safety regulations is the responsibility of each company engaged in the work. The City assumes no responsibility for the actions of others on the job site. It is the responsibility of those installing water and sewer mains and associated appurtenances to conform to OSHA regulations. The Developer shall pay particular attention to Safety & Health Regulations Part 1926, subpart P “Excavations, Trenching & Shoring” as described in OSHA publication 2226.

#### 6.1.1. Trench Excavation

Water and sewer lines shall normally be installed by open-cut trench excavation. Pipe trenches shall be excavated straight and true to grade and line and in the location shown on the plans. Trenches shall be dug so that the pipe can be laid to the alignment and depth required, and the trench shall be of such width and shall be braced and drained so that the workmen may work therein safely and efficiently. No chocking under the pipe will be permitted. All joints shall be as specified herein. Excavation must be made under the bell of each pipe so that the entire length of the pipe will lie uniformly on the bottom of the trench and the pipe weight shall not rest on the bells. Trenches shall be free of water during the work.

1. Trenches shall have a minimum width of twelve (12") inches plus the diameter of the outside of the bell of the pipe. The maximum trench width at the top of the pipe shall not be more than the outside diameter of the bell plus two (2') feet. In unpaved areas, the trenches may have a greater width than this, beginning at one (1) foot above the top of the pipe and extending to the ground surface if such width is necessary or desirable. However, in paved areas, the width of the trench from top to bottom shall not exceed the nominal diameter of the pipe plus two (2) feet.
2. Pipe trenches shall be straight and true to grade and, in the locations shown on the plans. Trenches shall be dug so that the pipe can be laid to the alignment and depth required, and the trench shall be of such width and shall be braced and drained so that the workmen may work therein safely and efficiently. No chocking under the pipe will be permitted. All joints shall be as specified herein. Excavation must be made under the bell of each pipe so that the entire length of the pipe will lie uniformly on the bottom of the trench and the pipe weight shall not rest on the bells. Trenches shall be free of water during the work.
3. All changes in grade shall be made gradually and limit pipe deflection to not exceed one-half of the Manufacturer's maximum allowable deflection. At points of interference with storm sewers and cross drains on D.O.T. right-of-way, the pipe will be run under the conflicting utility. Where the water main crosses beneath a storm sewer, there shall

be a minimum of eighteen (18") inches of clearance between the main and the storm sewer.

4. In laying pipe across water courses, railroad crossings, or depressions of any kind, the minimum depth here specified shall be maintained at the bottom of the depression. Railroad crossings shall be installed according to American Railway Engineering Association requirements and specific requirements of the Railroad with jurisdiction.
5. Where necessary, the line shall be lowered at valves so that the top of the valve stem is approximately one foot (1') below the finished grade. The trench shall be deepened to provide a gradual approach to all low points of the line. In no instances shall the operating nut be greater than eighteen inches (18") below finished grade.
6. No excavation shall be made under highways, streets, alleys or private property until satisfactory arrangements have been made with the State, City, County or owners of the property to be crossed. All excavated material shall be placed so as to not interfere with public travel on the streets and highways along which the lines are laid. Not more than 100 feet of trench shall be opened on any line in advance of pipe laying.
7. When deemed necessary, crossings of paved highways and driveways, may be made by boring or jacking the pipe under the pavement and shall be done in such manner as not to damage the pavement or subgrade, unless the casing or pipe is in solid rock, in which case the crossing shall be made by the open cut method or by tunneling. ***All pipe installed under a roadway crossing shall be ductile iron pipe in steel casing.***
8. Wherever streets, roads, or driveways are cut, they shall be immediately backfilled and compacted after the pipe is laid and shall be maintained in first-class condition as passable at all times until repaved.
9. Backfilling, compaction, dressing and clean-up shall be kept as close to the line laying crew as is practical, and negligence in this feature of the work will not be tolerated.
10. In excavation and backfilling and laying pipe, care must be taken not to remove or injure any water, sewer, gas or other pipes, conduits or other structures without an order from the Designer. When an obstruction is encountered, the Contractor shall notify the Designer who will adjust same or make necessary changes in grade and/or alignment to avoid such obstruction. Any house connection, drains or other structures damaged by the Contractor shall be repaired or replaced immediately.
11. All excavation shall be placed on one side of the trench, unless permission is given by the City to place it on both sides. Excavation materials shall be so placed as not to endanger the work and so that free access may be had at all times to all parts of the trench and to all fire hydrants or water valve boxes, etc. All shade trees, shrubs, etc., shall be protected.
12. The Contractor shall furnish, install and maintain such sheathing, bracing, etc., as may be required to support the sides of the excavation and to prevent any movement that

might injure the pipe, or cause sloughing of the street or trench, or otherwise injure or delay the work or interfere with adjoining structures.

13. All materials shall be considered as rock which cannot be excavated except by drilling, blasting or wedging. It shall consist of undecomposed stone in solid layers or of boulders of not less than one-half cubic yard. Wherever rock is encountered in the excavation, it shall be removed by suitable means. If blasting is used for removal of rock, the contractor shall take all proper safety precautions. Contractor shall comply with all rules and regulations for the protection of life and property that may be imposed by any public body having jurisdiction relative to the handling, storing and use of explosives. Contractor is fully responsible for filing for and acquiring any blasting permits which may be required by those agencies with such jurisdiction. Before blasting, the Contractor shall cover the excavation with heavy timbers and mats in such a manner as to prevent damage to persons or the adjacent property. Rock excavation near existing pipelines or other structures shall be conducted with the utmost care to avoid damage. The Contractor shall be wholly responsible for any damage resulting from blasting, and any injury or damage to structures or property shall be promptly repaired by the Contractor to the satisfaction of the City and property owner. Seismic monitoring will be required for all blasting.
14. Rock in trenches shall be excavated over the horizontal limits of excavation and to depths as follows:

Size of Pipeline Inches	Depth of Excavation Below Bottom of Pipe, Inches
6	6
8 to 18	8
18 to 30	10
Over 30	12

The undercut space shall then be brought up to grade by backfilling with subgrade stabilizer stone.

15. In rock excavation, the backfill from the bottom of the trench to one foot above the top of the pipe shall be finely pulverized soil, free from rocks and stones. The rest of the backfill shall not contain over 75% broken stone, and the maximum sized stone placed in the trench shall not weigh over fifty (50) pounds. Excess rock and fragments of rock weighing more than fifty (50) pounds shall be loaded and hauled to disposal. If it is necessary, in order to comply with these specifications, selected backfill shall be borrowed and hauled to the trenches in rock excavation. Sides of the trench shall be trimmed of projecting rock that will interfere with backfilling operations. Rock excavation by blasting shall be at least seventy-five (75) feet in advance of pipe laying.

#### 6.1.2. Bracing, Sheeting and/or Shoring

When required by regulations or to prevent damage to adjoining structures, roadways, pavements, utilities, trees, or private property which are specifically required to remain, provide bracing and sheeting; all costs associated with Bracing, Sheeting and/or Shoring



shall be the responsibility of the Contractor. All construction shall comply with the Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1926, Subpart P, latest revision.

1. **Timber:** Timber for shoring, sheeting, or bracing shall be sound and free of large or loose knots and in good condition. Size and spacing shall be in accordance with OSHA regulations. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the pipe and adjacent property. Leave sheeting in place when in the opinion of the City it cannot be safely removed. Cut off sheeting left in place at least two (2) feet below the surface.
2. **Steel Sheet Piling:** Continuous lock joint steel sheet piling may be substituted for timber sheeting when approved by the City. Steel piling may be removed, without cutting, provided the rate of removal keeps pace with the tamping and backfilling operations to assure complete filling of the void created by the withdrawal of the piling. Complete withdrawal of the piling in advance of the tamping and backfilling will not be permitted. Piling, where ordered to be left in place by the City for reasons of safety, will be cut off where directed.

**Trench Shield:** A trench shield or box may be used to support the trench walls. The use of a trench shield does not necessarily preclude the additional use of bracing and sheeting. When trench shields are used, care must be taken to avoid disturbing the alignment and grade of the pipe or disrupting the bedding of the pipe as the shield is moved. When the bottom of the trench shield extends below the top of the pipe, the trench shield will be raised in six (6") inch increments with specified backfilling occurring simultaneously. At no time shall the trench shield be "dragged" with the bottom of the shield extending below the top of the pipe.

#### 6.1.3. Backfilling and Bedding

1. All D.I.P. and Steel pipe shall have a minimum of Type "2" bedding. All PVC pipe shall have a minimum of Type "5" bedding. Wherever water or wet soil is encountered, Type "5" bedding shall be provided regardless of pipe material. If specifically designated on the plans, Type "4" or "5" bedding may be required. Typically, the manufacturer's recommendations shall govern the bedding requirements of the various pipes at the varying depths; However, the City reserves the right to increase the bedding requirements for any main where the City believes the manufacturer's recommendations are not sufficient.
2. After the pipe has been laid, backfilling shall be done in two (2) distinct operations. In general, all backfill beneath, around and to a depth of twelve (12") inches above the top of the pipe shall be placed by hand in four (4") inch layers for the full width of the trench and thoroughly compacted by hand with vibratory equipment. The remainder of the backfill shall be placed in six (6") inch layers and compacted to the top of the trench, either by pneumatic hand tamps, hydro-tamps, or other approved methods. Care shall be taken so that the pipe is not laterally displaced during backfilling operations. The backfill lifts shall be placed by an approved method in accordance with that hereinafter

specified. Backfill materials shall be the excavated materials without bricks, stone, foreign matter or corrosive materials, where not otherwise specified or indicated on the plans.

3. Backfill under permanent concrete or bituminous pavement and as elsewhere specified or indicated on the plans shall be approved bank-run sand or gravel or crushed stone free from large stones and containing not more than ten percent (10%) by weight of loam or clay. This backfill shall be compacted to one hundred percent (98%) as determined by the Modified Proctor test (ASTM D 1557) for the top two (2) feet of trench and ninety-five percent (95%) by the Modified Proctor test from pipe bedding to two (2) feet below trench top. Mechanical vibrating equipment shall be used to achieve the required compaction. Pavement shall be replaced immediately after the backfilling is completed.
4. Backfill under gravel or crushed stone surfaced roadways shall be the approved suitable excavated material placed in six (6) inch layers thoroughly compacted for the full depth and width of the trench, conforming to the compaction, density compaction method and materials as specified in "3" above.
5. Backfill in unpaved areas shall be compacted with mechanical vibrating equipment to ninety percent (90%) as determined by the Modified Proctor Test. Backfill material from pipe bedding to ground surface shall be excavated earth free from large stones and other debris.
6. Contractor shall fully restore and replace all pavement, surface structures, etc., removed or disturbed as part of the work to a condition equal to that before the work began to the satisfaction of the City.
7. Where sheeting is used in connection with the work, it is in no case to be withdrawn before the trench is sufficiently filled to prevent damage to banks, road surfaces, adjacent pipes, adjacent structures or adjacent property, public or private.
8. All costs of compaction testing shall be the responsibility of the Developer. Developer shall obtain third party testing services for all compaction testing. All third-party testers shall be approved by the City prior to beginning their work.

#### 6.1.4. Location and Protection of Existing Underground Utilities

It is the responsibility of the Contractor to locate the underground utilities and to protect same. Utility lines or services damaged by the Contractor shall be repaired by the Contractor at their own expense.

#### 6.1.5. Required Separation of Sewer and Lines

In cases where water lines cross above sanitary sewers, there shall be a minimum of eighteen inches (18") vertical separation between the water and sewer mains. In cases where a sanitary sewer crosses above a water main, there shall be a minimum of eighteen inches (18") vertical separation, plus the sanitary sewer shall be encased in concrete. Both mains shall be D.I.P. At crossings, one full length of water pipe must be located so that both

joints are as far from the sanitary sewer as possible. In cases where water mains parallel sewer mains there shall be a minimum of ten (10) feet horizontal separation maintained between the mains. These distances are measured edge to edge.

#### 6.1.6. Standard Detailed Drawings

Installation of water and sewer mains and appurtenances shall be made in accordance with the Standard Details in Appendix A.

#### 6.1.7. Dewatering Trenches

The Contractor shall do all necessary pumping or bailing, build all drains and do all other work necessary at his own expense to keep the trenches clear of water during the progress of the work. No structure shall be built, or pipe shall be laid in water, and water shall not be allowed to flow over or rise upon any concrete, masonry or pipe until the same has been inspected and the concrete or joint material has thoroughly set. All water pumped, bailed or otherwise removed from the trench or other excavation shall be conveyed in a proper manner to a suitable place of discharge where it will not cause injury to the public health or to public or private property or to work completed or in progress, or to the surface of the streets or cause any interference with the use of same by the public. One backup pump, for every ten (10) dewatering pumps used, shall be kept on site.

#### 6.1.8. Street Cuts

1. When deemed necessary paved roads will be bored and cased. A bore must be attempted before consideration will be given to cutting the street.
2. Existing roadways shall not be open cut unless permission is granted by the Georgia D.O.T.; Newton County Publics Works Department; and/or the City of Covington Public Works Department. Submittal of an authorization letter from the appropriate entity is required.
3. One lane of traffic shall be maintained open at all times. Construction work shall be limited to between 9 A.M. and 4 P.M.
4. The Contractor shall furnish traffic control devices and certified personnel to direct traffic, if required.
5. The above requirements may be altered with the written approval of the City in extenuating circumstances. Advanced notice is mandatory for alteration of these requirements.
6. Assuming that a road bore has been attempted and failed, and that the Developer has received permission to open cut a road, pavement replacement shall adhere to the following guidelines:
  - a. Removing and replacing pavement shall consist of removing the type of pavement and base encountered, and replacing same to its original shape, appearance and riding quality, in accordance with the detailed plans. Where possible, all pipe under existing paved driveways will be either free bored or installed in casing. Free bores

under driveways will be made with D.I.P. Casing will be required where the installation is under any roadway. Carrier pipe shall be D.I.P.

- b. Concrete pavement shall be replaced with pavement of a thickness equal to that removed, or 6" for driveways and 8" for roads, whichever is thicker. The concrete shall meet the specifications of the D.O.T. for concrete paving.
  - c. Where bituminous paving is replaced, a base course of 3000 psi concrete shall be placed over the ditch line. The concrete shall be six (6") inches thick for driveways and parking lots and eight (8") inches thick for public roads. The top of this base course shall be left with a rough float finish 1-1/2" below the surface of the existing paving. After the concrete has attained its strength, a tack coat of AC-15 or equal shall be applied at the rate of 0.25 gallons per square yard, and a plant mix surface course applied over this, and finished off level with existing pavement.
7. Unless otherwise directed in writing, all pavement will be removed to a width of the trench plus twelve (12") inches on each side as shown on the detailed drawings. Under normal circumstances, the maximum allowable trench width shall be the nominal diameter of the pipe plus twenty-four (24") inches.

#### 6.1.9. Barricades

The Contractor shall provide, erect and maintain all necessary barricades, suitable and sufficient red lights, danger signals and necessary precautions for the protection of the work and the safety of the public. Streets closed to traffic shall be protected by effective barricades on which shall be placed acceptable warning signs. Barricades shall extend completely across the street which is to be closed, and shall be illuminated at night by lights not farther than five (5) feet apart, and lights shall be kept burning from sunset to sunrise.

#### 6.1.10. Placing of Steel Casing Pipe

##### 1. General

- a. Where pipe is required to be installed under railroads, highways, streets, streams, or other facilities by jacking or boring methods, construction shall be done in a manner that will not interfere with the operation of the utility and shall not weaken the roadbed or structure.
- b. Casing pipe shall be installed at the locations shown on the plans. Unless directed otherwise, the installation procedure shall be the dry bore method. The hole is to be mechanically bored and cased through the soil by a cutting head on a continuous auger mounted inside the casing pipe. The installation of the casing and boring of the hole shall be done simultaneously by jacking.
- c. The diameter of the bore shall conform to the outside diameter and circumference of the casing pipe as closely as practicable. Any voids which develop during the installation operation shall be pressure grouted.

- d. Lengths of pipe are to be full circumference butt-welded to the preceding section installed.
- e. Excavation material will be removed and placed at the top of the working pit. Backfill material and methods of backfilling and tamping shall be as required in these Regulations.
- f. Carrier pipe shall be D.I.P. and inserted within the casing by use of stainless-steel casing spacers. intervals shall be as recommended by the manufacturer. Inside of casings, the water main joints shall be slip joint restrained by using U.S. Pipe "Field-Lok" gaskets or approved equal.
- g. At each end of the casing pipe, the void between the carrier pipe and casing shall be sealed with brick and mortar or EDPM end seals with stainless steel band straps.
- h. Where possible, all pipe under existing paved driveways will be either free bored or installed in casing. Free bores under driveways will be made with D.I.P.

2. Sewer System

- a. The completed casing shall have no sags or crowns which cause the grade for any segment to be less than the minimum slope for the size pipe being installed.

6.1.11. Connection to City's Existing System

1. General

- a. The Developer's private contractor shall make all required connections to the City's water and/or sewer system. The City's Inspector will supervise the connection and all associated work. The contractor shall give the City a minimum of forty-eight (48) hours' notice prior to any water and sewer system work.
- b. No connections shall be made without the presence of the City's employee.
- c. The Contractor shall provide proper traffic control devices and certified personnel to direct traffic if required.
- d. The timing of the Developer's connection to the City's system shall be pre-arranged with the City.

2. Water System

- a. All taps shall be wet taps (on pressurized water mains in service). All taps to be made with saddles or full-circle stainless steel tapping sleeves.

3. Sewer System

- a. All connections to existing manholes shall be properly cored with a coring machine; "Knocking-out" of a hole in the manhole for a connection is not permitted.

6.1.12. Clean-Up

1. The Contractor shall remove all unused material, excess rock and earth, and all other debris from the construction site as closely behind the work as practical or at the direction of the City. If the Contractor fails to maintain clean-up responsibilities as directed by the City's representative, the City may choose to use their own forces to do so, followed by an invoice to the Developer for the City's work.
2. All trenches shall be backfilled and tamped before the end of each day's work.
3. Prior to requesting the final inspection, the Contractor shall do the following:
  - a. Remove and dispose of, in an acceptable manner, all shipping timbers, shipping bands, spacers, excess materials, broken material, crates, boxes and any other material brought to the job site.
  - b. Repair or replace any work damaged by the construction.
  - c. Pour concrete collars around all valve boxes outside paved areas.
  - d. All manhole covers shall be brought to grade.
  - e. Ensure that all fire hydrants are set to grade and that all valves have been located, are accessible for operation and are fully open.
  - f. All easement areas shall be cleared of trees, stumps and other debris and left in a condition such that the easement can be maintained by bush-hog equipment.
  - g. All shoulders, ditches, culverts, and other areas impacted by the construction shall be at the proper grades and smooth in appearance.
  - h. A uniform stand of grass or mulch for erosion protection, as defined in the Manual for Erosion and Sediment Control In Georgia, is required over all road shoulders and water or sewer easements prior to the City's acceptance of the water or sewer main.
  - i. If work is performed on a Georgia D.O.T., Newton County Transportation Department or City of Covington R/W, a letter from the governing agency is required to be submitted after construction is complete stating that grassing, clean-up, drainage, etc. is acceptable.

#### 6.1.13. Grassing

All areas outside structures and along pipelines where the earth is disturbed shall be grassed. After the soil has been properly prepared, the seed shall be planted. After the seeds have been planted, the moisture content of the soil shall be maintained at the optimum amount to insure germination of the seed and growth of the grass.

The Contractor shall complete temporary and final stabilization of disturbed areas in conformance with the requirements of the *Field Manual for Erosion and Sediment Control in Georgia*, current edition.

The Contractor shall do all maintenance work necessary to keep all planted areas in satisfactory condition until the work is finally accepted. This shall include mowing, repairing

washes that occur, reseeding, and water as required to produce a healthy and growing stand of grass. Mowing will be required to remove tall and obnoxious weeds before they go to seed.

It is the intent of these specifications to produce a stand of grass that is alive and growing, without any bare spots as defined in the *Field Manual for Erosion and Sediment Control in Georgia*, current edition. The Contractor shall repeat all work, including plowing, fertilizing, watering, and seeding as necessary to produce a satisfactory stand.

#### 6.1.14. Booster Pump and Sewer Pumping Stations

1. **Construction:** The pump and instrumentation manufacturers shall provide the services of a competent factory representative for as many days as necessary for the purpose of supervising and / or inspecting the installation, placing the equipment into service, and calibrating and adjusting each item of equipment or instrument and training of City staff. After the functionality test is completed, the manufacturers shall certify to the City, in writing, that the equipment is fully operational and capable of meeting the operational requirements. This certification must be provided before the City will accept responsibility for the operation of the pumping station.
2. **Post Construction:** The Owner/Developer shall demonstrate to the satisfaction of the City that all equipment is operational and meets the design flow and head requirements specified herein. The City shall also be provided two (2) hard copies and electronic copies (PDF) of operation, maintenance, and instruction manuals for each piece of equipment. City staff will review and provide any final comments on the operation and maintenance (O&M) documents before finalization.

## 6.2 WATER SYSTEM

### 6.2.1. Laying Pipe

1. All pipe shall be laid straight, true to line and grade. Bell and coupling holes shall be dug in the trench and the pipe shall have a continuous bearing with the trench bottom between bell or coupling holes. No shimming or blocking up of the pipe shall be allowed. When the work is not going on, all pipe openings shall be securely closed by the insertion of the proper size plug and caulking so that dirt and debris will not be washed into the pipe in case of rain.
2. In making the joints with ductile iron pipe, the spigot end of the pipe and the inside of the bell shall be thoroughly cleaned and the gasket inspected to see that it is properly placed; Lubricant shall be applied to the spigot end of the pipe and it shall be inserted into the bell of the adjoining pipe to the stop mark on the pipe.
3. Locator wire shall be placed in the trench above all mains.

### 6.2.2. Thrust Restraint for Pressure Lines

1. Reaction Blocking

- a. Underground piping laid around curves and at all unsupported changes of direction, all tees, wyes, crosses, plugs and other like fittings shall be solidly and properly blocked with concrete against solid earth to take the reaction of the main pressure and to prevent lateral movement of the pipe or fittings when under pressure. Reaction blocking shall be installed at all locations requiring same and where tie rods and clamps are not called for in the plans. Concrete for reaction blocking shall have a minimum compressive strength of 3,000 psi at twenty-eight (28) days. The blocking, unless otherwise shown, shall be so placed that the pipe and fitting joints will be accessible for repair.
- b. Reaction blocking shall be constructed in conformance with the Standard Details. Prior to blocking any joint or fitting with concrete, that joint or fitting shall be wrapped with polyethylene film in such a manner that the concrete will not stick directly to the fitting, but that the load bearing capacity of the blocking will not be affected.

## 2. Retainer Glands

Mechanical joint fittings and valves shall be installed with retainer glands where specified herein.

### 6.2.3. Setting Fire Hydrants

Fire hydrants shall be placed at the locations shown on the plans. Gate valves for fire hydrants shall be connected directly to the main by means of a "Locked Hydrant Tee". All other connections between the main and the fire hydrant shall be mechanical joint with ductile iron retainer glands. Fittings shall be restrained by a "Locked Hydrant Adapter" whenever the fire hydrant is located close enough to the main to allow its use. Care shall be exercised that set screws and retainer glands are tightened sufficiently to secure the hydrants before pressure is put on the main. Not less than four cubic feet of No.5 or No.57 stone shall be placed around the base of the hydrants, as shown in the Standard Details. Before placing the hydrants, care shall be taken to see that all foreign material is removed from within the body. The stuffing boxes shall be tightened and the hydrant valve opened and closed to see that all parts are in first class working condition. All hydrant openings shall be kept capped, except when hydrant is being worked on.

When a fire hydrant has been constructed but is not yet in service, the Contractor shall provide and attach to the fire hydrant, flags or collars indicating that the fire hydrant is not in service. Said flags or collars shall remain on the fire hydrant until it is put into service. Whenever an existing fire hydrant is taken out of service, whether temporarily or permanently, it shall be equipped with a flag or collar indicating that it is not in service. The Contractor shall provide and install flags or collars as required and shall notify the Fire Department whenever the operating status of any fire hydrant changes.

FIRE HYDRANTS SHALL NOT BE OPERATED WITH ANY TOOL EXCEPT A SPECIFICALLY DESIGNED FIRE HYDRANT WRENCH. If the Contractor observes any other contractor or person operating a fire hydrant with an unapproved fire hydrant wrench, he shall report



that fact to the City immediately. It is the Contractors responsibility to ensure that all new facilities are maintained in new condition until final completion of the project and acceptance by the City. Fire hydrants with damaged operating nuts shall not be accepted.

#### 6.2.4. Setting Valves and Fittings

Valves and fittings shall be placed where shown on the plans. Valves shall be set plumb and shall have cast iron valve boxes with the word "WATER" cast into the lid. The valve boxes shall be placed directly over the valve and set plumb, the top of the box being brought to the surface of the ground. After the boxes are in place, earth shall be filled in the trench and thoroughly tamped around the box. After all settlement has taken place, a concrete collar shall be constructed for each valve box.

Fittings shall be properly braced to ensure that they will not be blown off or broken loose under the greatest possible working pressure. All fittings shall be mechanical joint unless specified otherwise. In situations where there is insufficient undisturbed earth to act as a bearing surface or where otherwise directed by the City, fittings shall be restrained by the use of stainless steel threaded rods or other method acceptable to the City.

Prior to blocking any joint or fitting with concrete, that joint or fitting shall be wrapped with polyethylene film in such a manner that the concrete will not stick directly to the pipe but that the load bearing capacity of the blocking will not be affected.

#### 6.2.5. Marking Location of Valves

1. Each main line water valve shall be marked by cutting a letter "V" in the curb. The "V" shall be turned to point toward the valve. The letter height shall be 6".
2. Concrete valve markers shall be set for main line water valves with an even number of feet between the center line of the valve and the center line of the aluminum disc in the top of the marker, and the distance in feet between the valve and marker shall be stamped in the marker at the time of setting.

#### 6.2.6. Interruption of Water Supply During Construction

A minimum of two (2) hours advance notice shall be given to any occupied building served by a water line which is required to be shut off. Occupants shall be informed of the date, time of cutoff and the duration of stoppage. Failure to do so will make the Contractor liable for any damages reported to the City's Office. For outages affecting several customers, a 24-hour notice shall be prepared and given to the affected customers and must be coordinated with the City. For Commercial and Industrial areas, contractor shall coordinate cut off with all affected businesses.

#### 6.2.7. Testing And Inspection

1. General
  - a. All lines designed to operate under pressure shall be successfully tested. Tests of installed piping shall consist of a pressure and leakage test and a disinfection test.

- b. All piping to be tested must satisfactorily comply with these tests before being eligible for acceptance. In general, tests shall be conducted in accordance with AWWA C600 and C651 except as otherwise herein specified in the presence of a City employee.

2. Pressure and Leakage Testing

Pressure and leakage tests shall be performed in accordance with the latest edition of AWWA Standard C600.

- a. Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants, blow-offs or air release valves are not available at the high places, the Contractor shall make the necessary taps at points of highest elevation before the test is made and insert plugs before the test has been completed.
- b. Prior to the pressure test, pipe laid in trenches shall be backfilled adequately to secure the pipe during the test. Any observed leakage shall require corrective measures to pipelines and/or joints to the satisfaction of the Inspector.
- c. After all piping has been placed, each section between line valves shall be tested by the developer's contractor in the presence of the City's inspector and tests shall be continued until all leaks have been made tight to the satisfaction of the Inspector. The Contractor shall furnish all necessary meters, pumps, gauges, bulkheads, and other materials and appliances necessary to conduct the test as herein required. Every precaution must be taken to valve-off or otherwise protect control equipment in or attached to the pipeline to prevent damage thereto.
- d. The test pressure of the installed pipe shall not be less than 1.25 times the working pressure at the highest point along the test section.
- e. Allowable leakage shall be no greater than as calculated below:

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

Where:

L = allowable leakage in gallons/hour

S = the length of pipe tested in feet

D = pipe diameter, in inches

P = average test pressure during the leakage test in pounds per square inch (psi).

For PVC: 
$$L = \frac{ND\sqrt{P}}{7,400}$$

Where:

L = allowable leakage in gallons/hour

N = number of joints in the length of pipeline tested

D = pipe diameter, in inches

P = average test pressure during the leakage test in pounds per square inch (psi).

Any section of the line not meeting the above test shall have the leaks found and corrected at once and re-tested until the leakage falls within the limits specified above. Leakage testing and repair shall be witnessed and approved by the City.

f. Tapping Sleeve and Valves

All tapping sleeve and valves shall be hydrostatically tested at a pressure of 200 psi for a period of ten (10) minutes with no loss of pressure. Leakage testing and repair shall be witnessed and approved by the City prior to completing the tap of the existing water main.

3. Disinfection of Water Mains

All new water mains, as well as those taken out of service for inspection, repair or other activities that might lead to contamination of water shall be disinfected before they are placed in or returned to service.

- a. Disinfection of the new mains and the disposal of the heavily chlorinated water following the disinfection, shall be accomplished in accordance with the latest edition of AWWA Standard C651.
- b. The “tablet method” of disinfection which consists of placing calcium hypochlorite granules or tablets in the water main as it is being installed and then filling the main with potable water when installation is complete is **not allowed**.
- c. Before the main is chlorinated, it shall be filled to eliminate air pockets and shall be flushed to remove particulates. A flushing velocity of not less than 2.5 feet/second shall be provided in pipe sizes less than 24 inches in diameter. For larger diameter mains, an alternative to flushing, such as broom-sweeping of the main, is acceptable prior to chlorinating the main.
- d. During disinfection of the water mains, an appropriate cross-connection control device, consistent with the degree of hazard, shall be provided for backflow protection of the active distribution system.
- e. The quality of the water used during the disinfection procedures shall meet the required drinking water standards.
- f. The chlorine solution used for disinfection of water mains shall have a free chlorine residual concentration not less than 25 mg/L. This heavily chlorinated water shall be retained in the main for at least 24 hours, during which time all valves and hydrants shall be operated to ensure disinfection of the appurtenances. At the end of the 24-hour period, the treated water in all portions of the main shall have a residual of not less than 10 mg/L free chlorine. Re-chlorinate if required results are not obtained on all samples.
- g. After the applicable retention period, the heavily chlorinated water must not be disposed in a manner that will harm the environment. Neutralizing chemicals, such

as Sulfur Dioxide, Sodium Bisulfite, Sodium Sulfite or Sodium Thiosulfate can be used to neutralize the chlorine residual remaining in the water to be wasted.

- h. Flush all lines until residual is equal to existing system. After final flushing and before the water main is placed into service, water samples shall be collected from the main and tested for microbiological quality in accordance with the Georgia Rules for Safe Drinking Water, Chapter 391-3-5. The laboratory results must show the absence of coliform organisms in the water. Re-flush and re-disinfect the lines, as necessary, until satisfactory bacteriological results are obtained. Sampling and testing shall be completed by a certified third party with Developer responsible for all associated costs.

4. When Cutting into or Repairing Existing Mains

- a. Shall be performed when mains are wholly or partially dewatered;
- b. Shall follow the current AWWA C651 Standards, including trench treatment, swabbing with hypochlorite solution, flushing and/or slug chlorination as appropriate;
- c. Bacteriological testing shall be performed after the repairs are complete. However, depending upon the circumstances, the water main may be returned to service prior to completion of testing to minimize the time the customers are out of service.
- d. Leaks or breaks that are repaired with clamping devices while the mains remain full of water under pressure may require no disinfection.

5. Amount of Chlorine Necessary for Disinfection

- a. Chlorine required to produce 25 mg/L concentration in one-hundred (100') feet of pipe by diameter is listed below:

Pipe Diameter (inches)	100% Chlorine		1% Chlorine Solution	
	(lbs.)	(g)	(gal)	(L)
4	0.013	5.9	0.16	0.6
6	0.030	13.6	0.36	1.4
8	0.054	24.5	0.65	2.5
10	0.085	38.6	1.02	3.9
12	0.120	54.4	1.44	5.4
16	0.217	98.4	2.60	9.8

Note: 1% chlorine solution may be prepared with sodium hypochlorite (contains 5% to 15% available chlorine) or calcium hypochlorite (contains approximately 65% available chlorine by weight). To prepare 1% chlorine solution using calcium hypochlorite, add one (1) pound (454 grams) of calcium hypochlorite in approximately eight (8) gallons of water.

- b. Amounts and types of chemicals advised to be used for neutralizing various residual chlorine concentration in 100,000 gallons of water are listed below:

Residual Chlorine	Sulfur Dioxide (SO <sub>2</sub> )		Sodium Bisulfate (NaHSO <sub>3</sub> )		Sodium Sulfite (Na <sub>2</sub> SO <sub>3</sub> )		Sodium Thiosulfate (Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> ·5H <sub>2</sub> O)	
	Mg/L	Lbs.	Kg	Lbs.	Kg	Lbs.	Kg	lbs.
1	0.8	0.36	1.2	0.54	1.4	0.64	1.2	0.54
2	1.7	0.77	2.5	1.13	2.9	1.32	2.4	1.09
10	8.3	3.76	12.5	5.67	14.6	6.62	12.0	5.44
50	41.7	18.91	62.6	28.39	73.0	33.11	60.0	27.22

### 6.3 SANITARY SEWER SYSTEM

#### 6.3.1. Installation of Sanitary Sewer

Construction occurring around active sanitary sewerage systems shall be done in such a way so as to prevent the spillage of sewage; bypassing of raw wastewater onto the ground or into a receiving stream is prohibited.

Construction stake-out will be required prior to construction of sanitary sewer lines. At a minimum, the horizontal alignment will be staked at one-hundred (100') foot intervals and each manhole will be located with a centerline stake and two (2) offset hubs. "Cuts" to invert elevations will be shown for each manhole entry and exit pipe. A copy of the stake-out notes will be provided to the City prior to commencement of pipe installation.

Pipe and accessories shall at all times be handled with care to avoid damage. Whether moved by hand, skidways or hoists, material shall not be dropped or bumped. The interior of all pipe shall be kept free from dirt and foreign matter at all times. Each joint of pipe shall be unloaded opposite or near the place where it is to be laid in the trench. All such material that is defective in manufacture or has been damaged in transit or after delivery shall be removed from the job site.

All pipe, manholes and appurtenances shall be of the dimensions and laid to the line and grade as shown on the plans and as established by the design professional and as approved by the City. Wyes and/or service connections and stubs from manholes shall be placed where shown on plans and as approved by the City.

The preferred order of construction is to connect to existing sanitary sewers after all other construction is complete and conditionally accepted by the City. Connections to existing sanitary sewers can be done at the beginning of construction, however, the new main shall be plugged where it enters either the existing manhole or the new doghouse manhole over an existing sanitary sewer, and the plug shall remain in place until the project is conditionally accepted.

Sanitary sewer pipes shall be joined by "push-on" joints using elastomeric gaskets to affect the pressure seal. The ends of pipe to be joined and the gaskets shall be cleaned immediately before assembly and the assembly shall be made as recommended by the pipe manufacturer. Lubricant used must be non-toxic and supplied or approved for use by the

pipe manufacturer. Sanitary sewer pipes shall be laid in the uphill direction with the bells pointing upgrade. Any variation from this procedure shall require approval from the City.

Bell holes shall be provided of sufficient size to allow ample room for making the pipe joints without putting any load on the bell of the pipe. The bottom of the trench between bell holes shall be carefully graded so that the pipe barrel will rest on a solid foundation for its entire length as shown on the plans. Pipe shall be laid with joints close and even, butting all around, so that it will form a close concentric joint with adjoining pipe with no sagging at the hub and so that a true surface is given to the invert throughout the entire length of the sewers. After the pipe is laid, backfilling shall be completed as directed herein.

The contractor will be required to provide and operate any equipment necessary to keep the trenches free from water while pipe is being laid and the joints made. The installed pipe shall not be used for draining water from the ditch.

Pipe grades shall be obtained by use of a laser and double checked with a surveying level and rod.

All openings along the line of the sewers shall be securely closed at night, during suspension of work, and at the end of each work period, with a water-tight stopper.

No length of pipe shall be laid until one preceding it shall have a sufficient quantity of fine earth tamped around it to hold it firmly in place.

#### 6.3.2. Wastewater Pumping Stations

The construction of wastewater pumping stations will be permitted only as allowed in the City of Covington Code of Ordinances Section 13.16.225. Force mains shall discharge into the nearest wastewater collection system which has adequate capacity to handle the additional flows. Wastewater pumping stations shall generally include the following:

- Submersible type pumps
- Precast structures for pumps, flow meter, and valves
- Piping and fittings
- Fenced site
- Access road
- Odor control equipment, as required
- Pre-screening, as required
- Redundant, emergency stand-by pumping system
- Electrical components and control panel
- All controls and instruments specified herein
- SCADA / Telemetry for remote monitoring

#### 6.3.3. Manhole Excavation

1. The excavation for manholes shall extend to a firm, acceptable foundation and leave not less than twenty-four (24") inches in the clear between their exterior surface and the embankment or timber that may be used to protect it.

#### 6.3.4. Making of Joints

When joining gravity sewer pipe, both the spigot end and the bell end of the pipe shall be perfectly clean and free from dirt, oil, grease, or other foreign matter. The spigot end shall be lightly coated with the lubricant recommended and furnished by the manufacturer, and the pipe then shall be securely and firmly seated in the bell end of the adjoining pipe. In making the joint, the spigot end of the pipe, after being cleaned and coated with lubricant, shall not be allowed to touch the sides or bottom of the trench before being inserted in the bell end of the adjoining pipe. In addition to the above, joints shall be made in strict accordance with the specifications and recommendations of the manufacturer.

#### 6.3.5. Subgrade and Pipe Bedding

All D.I.P. and PVC pipe shall have a minimum of Type "4" bedding as shown in the Standard Details. Wherever water or wet soil is encountered, Type "5" bedding shall be provided for D.I.P. If specifically designated on the plans, Type "5" or "6" bedding may be required.

A description of the types of bedding are provided in the Standard Details.

#### 6.3.6. Stream Crossings

The preferred method of crossing a river, stream, creek, impoundments, or wet weather ditch is with a minimum of three (3) feet of cover, for material other than rock, between the bottom of the streambed and the top of outside diameter of the carrier pipe/casing pipe. Steel casing is required for all stream crossings and shall extend a minimum of ten feet (10') beyond the top of bank on each side with Ductile Iron Pipe used as the carrier pipe. Concrete collars or encasement must be provided at all joints for ductile iron pipe with less than three feet (3') of cover.

The stream bed and banks at the crossing site shall be protected from erosion with the use of rip-rap, as defined and sized in the [Manual For Erosion and Sediment Control In Georgia](#), most current edition.

Aerial crossings will require detailed plans and will be allowed only when, in the City's opinion, there is no reasonable alternative.

Erosion control measures shall be installed prior to installing pipe across any stream. All work should be performed when stream flows are at their lowest, and all work should be performed as quickly and safely as possible. As soon as conditions permit, the stream bed shall be cleared of all falsework, debris, and other obstructions placed therein or caused by the construction operations.

Erosion control measures can include, but is not limited to, the following items:

1. Silt fencing
2. Erosion control checkdams
3. Channel diversion through temporary storm drain pipe.
4. Rock filter dams

The construction and installation of these various structures are detailed in the **Manual For Erosion And Sedimentation Control In Georgia** or the Georgia Department of Transportation Standards and Construction Details.

#### 6.3.7. Sewer Service Laterals

Sewer service shall be provided for every existing or proposed lot or building. All services shall be shown on the construction drawings. All service laterals shall be a minimum of six inch (6") in diameter. A common service shall not be allowed for two (2) or more lots. The service shall extend to five feet (5') inside the property line of the lot being served and normally be within 10 feet of the lower corner of the lot. The Contractor shall also place a two-inch (2") PVC pipe above the end of the service lateral to enable the builder to locate the service. The builder shall install a cleanout at the right-of-way and extend the PVC cleanout to a height of three feet (3') above the finished grade. All service laterals shall have six feet (6') of cover at the right-of-way. Where six feet (6)' of cover cannot be achieved, services shall be ductile iron.

Six inches (6") services shall be laid at a minimum grade of one percent (1). Service laterals tied directly to manholes shall enter the manholes through cored holes and shall be provided with a pre-molded rubber boot as described herein. The crown of laterals shall match the crown of the effluent pipe and shall be provided with a concrete flume to slope the flow into the manhole invert. The location of all sewer services shall be marked with an "X" sawcut into the gutter.

#### 6.3.8. Setting Fittings on Force Mains

Fittings shall be placed where shown on the plans. Fittings shall be properly braced to ensure that they will not be blown off or broken loose under the greatest possible force of the sewage flow. All fittings shall be mechanical joint with retainer glands unless specified otherwise. In situations where there is insufficient undisturbed earth to act as a bearing surface or where otherwise directed by the City, fittings shall be restrained by the use of stainless steel threaded rods or other method acceptable to the City.

Prior to blocking any joint or fitting with concrete, that joint or fitting shall be wrapped with polyethylene film in such a manner that the concrete will not stick directly to the pipe or fitting but that the load bearing capacity of the blocking will not be affected.

#### 6.3.9. Minimum Tests

All new gravity sewer lines constructed will be tested for exfiltration and deflection. All sewer lines will be televised and may be subjected to the Mandrel Test before final acceptance. Sewer lines installed under asphalt and flexible pipe sewers (PVC) shall be subjected to the Mandrel Test. Force mains will be subjected to a pressure / leakage test. Slopes of sewer mains that are close to minimum grade will be checked to ensure cleansing velocity. The City will require manholes to be subjected to a vacuum test to check for potential infiltration. The backfill in the trench above the pipeline will be subjected to compaction tests as detailed below. Any defects located during testing must be corrected



before construction of the project may proceed. All costs associated with testing will be paid by the Developer. Tests will be performed as follows:

1. Exfiltration Test (Low Air Pressure Test)

After completing backfill of a gravity sewer line section, conduct a low-pressure air test of all pipe constructed, using methods and devices acceptable to the City. Perform such test using the following general procedures:

- a. Prior to air testing, the section of sewer between manholes shall be thoroughly cleaned and wetted. Immediately after cleaning or while the pipe is water soaked, the sewer shall be tested with low-pressure air.
- b. At the Contractor's option, sewers may be tested in lengths between manholes or in short sections (25 feet or less) using inflatable balls pulled through the line from manhole to manhole.
- c. Air shall be slowly supplied to the plugged sewer section until internal air pressure reaches approximately 4.0 psig above ground water pressure, if any.
- d. After this pressure is reached and the pressure allowed to stabilize (approximately two to five minutes), the pressure may be reduced to 3.5 psig above ground water pressure before starting the test.
- e. If a 1.0 psi drop does not occur within the test time, then the line has passed the test.
- f. If the pressure drops more than 1.0 psi during the test time, the line is presumed to have failed the test, and the Contractor will be required to locate the failure, make necessary repairs, and retest the line. Minimum test time for various pipe sizes, in accordance with ASTM F 1417 is as follows:

Pipe Diameter (in)	Minimum Time (min: sec)	Length for Minimum Time (ft)	Time for Longer Length (sec)
4	3:46	597	.380L
6	5:40	398	.854L
8	7:34	298	1.520L
10	9:26	239	2.374L
12	11:20	199	3.418L
15	14:10	159	5.342L
16	15:06	149	6.078L
18	17:00	133	7.692L
21	19:50	114	10.470L
24	22:40	99	13.674L

- g. Required test equipment, including inflatable balls, braces, air hose, air source, timer, rotameter as applicable, cut-off valves, pressure reducing valve, 0-15 psi pressure gauge, 0-5 psi pressure gauge with gradations in 0.1 psi and accuracy of  $\pm$  two percent, shall be provided by the Contractor. Testing equipment shall be equal to Cherne Air Loc Testing Systems.
- h. The Contractor shall keep records of all tests made. Copy of such records will be given to the City. Such records shall show date, line number and stations, operator, and such other pertinent information as required by the City.
- i. The Contractor is cautioned to observe proper safety precautions in performance of the air testing. It is imperative that plugs be properly secured and that care be exercised in their removal. Every precaution shall be taken to avoid the possibility of over-pressurizing the sewer line.

NOTE: Upon request, the City may allow substitution of a water exfiltration test in lieu of the low air pressure test. If used, the exfiltration test will be conducted with a minimum water head of two (2') feet above the groundwater table and the allowable exfiltration will be limited to twenty-five (25 GPD) gallons per day per inch diameter per mile of pipe.

## 2. Deflection Test

Every section of sewer line will be visually checked for deflection. A passing section shall show at least 95% of a full circle when observed from one end. This may be done using mirrors to reflect sun light or by using lamps. Any section which fails this visual test shall be further checked as follows:

The section shall have water run through it sufficient to fill any sags that may exist. Then it shall have a television camera pulled through it to check for sags. Any sag holding more than one inch of water will require that the pipe be removed and replaced to proper grade after which the section shall be televised again to verify correction.

### 3. Mandrel Test for Flexible Pipe (PVC)

All gravity sewer mains installed under asphalt and constructed of PVC shall be subjected to the Mandrel Test thirty (30) days after backfilling. The procedure for testing flexible pipe for maximum allowable deflection shall be generally as follows. See ASTM specifications for mandrel dimensions and more details.

- a. Completely flush the line making sure the pipe is clean of any mud or trash that would hinder the passage of the mandrel.
- b. During the final flushing of the line, attach a floating block or ball to the end of the mandrel pull rope and float the rope through the line. (A nylon ski rope is recommended).
- c. After the rope is threaded through the line, connect the pull rope to the mandrel and place the mandrel in the entrance of the pipe.
- d. Connect a second rope to the back of the mandrel. This will enable the mandrel to be retrieved if excessive deflection is encountered.
- e. Draw the mandrel through the sanitary sewer line.
- f. An increasing resistance to pull is an indication of excessive deflection. If this occurs mark the rope to note the location. Televiser the sanitary sewer section to identify the extent of the problem and develop a plan, subject to City approval, for correcting the problem.
- g. Retest after correcting the problem.

### 4. T. V. Inspection

Video inspection shall be required for all segments of gravity sanitary sewer. A video tape of the inspection will be made. Any discrepancies noted such as sagged pipes, broken pipes, bad joints, etc., will be dug up and will be corrected. Internal grouting to repair new lines will not be allowed. After correction of the discrepancies, the line will be reinspected.

### 5. Force Main Pressure Testing

Before applying the specified test pressure, all air shall be expelled from the pipe. Pipe laid in trenches shall be backfilled adequately to secure the pipe during the test. Any observed leakage shall require corrective measures to pipe lines and/or joints as otherwise provided for in these Specifications and to the satisfaction of the City.

The Developer will furnish the necessary water for testing the force main. The force main must be flushed and tested to 1.5 times the design working pressure of the pipe

for two (2) hours. If a leak is discovered, it should be repaired and retested. This should continue until there are no pressure drops.

6. Cleansing Velocity / Slope Test

In areas where the design calls for minimum grade, or the Inspector suspects a line has been installed close to minimum grade, the Inspector shall work with the Contractor to survey the inverts to check the grade of the sewer mains. If the minimum grade required to provide cleansing velocity is not met, the line shall be dug up and re-laid at the proper grade.

7. Manhole Construction

Every manhole will be visually inspected to check for plugging of lift holes, use of connecting boots, use of joint material, leakage, proper invert construction, proper setting of frame and cover. Vacuum testing of the manhole structure will be required for all manholes.

8. Compaction Testing

Compaction testing will be required for sanitary sewers constructed in paved areas or where pavement is planned. A minimum of five (5) tests per 1,000 feet of sanitary sewer will be conducted at varying depths. Additional tests may be required as determined by the City.

The City may require additional compaction tests be conducted in any other areas where the City's inspector suspects the backfill has not been compacted in accordance with these specifications. If any of these tests show failing results, then the failing backfill will be removed, re-compacted and re-tested, and one additional area will be tested as well.

Compaction tests shall be conducted by an independent laboratory at the Developer's expense. All results shall be submitted to the City within seven (7) days of completion of the test.

## **SECTION 7 – GENERAL CONSTRUCTION NOTES**

### 7.1 GENERAL REQUIREMENTS

The following General Construction Notes shall be included on all design drawings.

### 7.2 WATER SYSTEM

1. All water system construction must follow the current City of Covington Water and Sewer System Standards and Specifications.
2. All 6" - 10" diameter water mains shall be Ductile Iron Pipe or meet the requirements of AWWA C-900 for PVC, latest revision for 150 psi working pressure (DR 18). All water mains 12" in diameter or larger shall be ductile iron pipe.
3. Ductile Iron Pipe (D.I.P.) is required for water mains:
  - a. 12" in diameter or larger
  - b. Crossing sanitary sewers
  - c. Under all stream crossings and over or under all storm sewers
  - d. Under all roads and intersections and inside casings
  - e. At all locations with working pressure above 125 psi (generally below elevation 700 MSL)
  - f. At all other locations specified by the City
4. All line valves shall be marked by concrete valve markers.
5. A concrete valve marker is to be placed directly above the plug on all dead-end water mains.
6. Information regarding underground utilities on these plans is not guaranteed as to accuracy or completeness. Prior to beginning work, the Contractor shall request a field location through the Utilities Protection Center and any utility owners thought to have facilities in the area. The Contractor shall promptly compare these field-marked locations with the project plans and then notify the Designer of any anticipated problems or need for contract changes. It is the Contractor's responsibility to excavate for the purpose of determining exact elevations or locations at utility crossings and other critical locations well in advance of the work under this contract. Damage to existing utilities resulting from the Contractor's negligence shall be repaired at the Contractor's expense.
7. All service lines under pavement shall be encased in PVC casing with a minimum diameter of 1 1/2", extending a minimum of 3 feet beyond the pavement on each side of the road.
8. Thrust restraint by retainer glands and concrete blocking shall be placed at all bends and tees.
9. The developer shall obtain a Land Disturbing Permit from the City Engineering Department and notify the water system inspector 48 hours before beginning construction.
10. The developer shall install water services up to and including meter boxes and curb stops. 3/4" and 1" will be set by the City after the building permit is issued.
11. Water mains shall be installed with a minimum of 48" cover

12. Locator wire and marking tape shall be placed in the trench above ALL water main before backfilling trench.

13. Flow Test Information:

Static Pressure: \_\_\_\_\_ psi at \_\_\_\_\_ ft.

Recorded Flow: \_\_\_\_\_ GPM with \_\_\_\_\_ psi residual pressure.

Maximum Elevation in Development \_\_\_\_\_ m.s.l. (to be determined by developer.)

Flow Available at Max. Elevation: \_\_\_\_\_ GPM with 20 psi residual pressure.

Size of water main at point of connection to project: \_\_\_\_\_ inches

Date of flow test: \_\_\_\_\_

14. The approved water plan shall not be changed except by written approval of the City.

15. As-Built Drawings shall be submitted in accordance with Section 1.6.

### 7.3 SANITARY SEWER SYSTEM

1. All sanitary sewer system construction must follow the current City of Covington Water & Sewer Standards and Specifications.
2. For D.I.P. sewer lines, the minimum wall thickness for 4" - 12" diameter pipe shall be Pressure Class 350; minimum wall thickness for 14" - 20" diameter pipe shall be Pressure Class 250; minimum wall thickness for 24" diameter pipe shall be Pressure Class 200; minimum wall thickness for pipe larger than 24" in diameter shall be Pressure Class 150. Wall thicknesses greater than the minimums called for above may be required due to greater depths or varying bedding requirements. Class C bedding is the minimum allowed. Protecto 401 lined.
3. All Polyvinyl Chloride (PVC) sewers 6" to 15" in diameter shall meet the requirements for minimum wall thickness as specified under SDR 35 in ASTM D3034, latest revision. PVC sewers that are 18" in diameter shall have a minimum wall thickness as specified under T-1 in ASTM F679, latest revision. PVC sewers with more than 12 feet of cover may require wall thicknesses greater than SDR 35 or T-1. PVC is not allowed for sewers greater than 18" in diameter or more than 14 feet of cover.
4. Ductile Iron Pipe is required for sanitary sewer lines:
  - a. Over or under all storm sewers
  - b. Crossing water mains
  - c. Under all stream crossings
  - d. With less than 4 feet of cover or over 14 feet of cover
  - e. With 15% or greater slope
  - f. Where velocities exceed 10 ft/sec
  - g. Inside casings
  - h. At all other locations specified by the City
5. Information regarding underground utilities on these plans is not guaranteed as to accuracy or completeness. Prior to beginning work, the Contractor shall request a field location through the Utilities Protection Center and any utility owners thought to have facilities in the area. The Contractor shall promptly compare these field-marked locations with the project

plans and then notify the designer of any anticipated problems or need for design changes. It is the Contractor's responsibility to excavate for the purpose of determining exact elevations or locations at utility crossings and other critical locations well in advance of the work under this contract. Damage to existing utilities resulting from the Contractor's negligence shall be repaired at the Contractor's expense.

6. All sewer service laterals shall have a minimum diameter of 6".
7. All manholes shall be constructed using Xypex Bio-San C500 Admix or approved equal.
8. The Developer shall obtain a permit from the City and notify the sewer system inspector 48 hours before beginning construction.
9. This project is located in land lots \_\_\_\_\_, \_\_\_\_\_ district of Newton County, Georgia.
10. The existing land use is (describe current land use, such as agricultural, commercial, etc.).
11. The Developer is: (name, address, and telephone number).
12. 24-Hour local contact for erosion and sediment control is (name and 24-hour telephone numbers).
13. This project construction area is acres.
14. This project consists of: (describe sanitary sewer work to be done, including length of pipe and sizes and number of manholes).
15. Adjacent areas include (describe development style of area surrounding project.).
16. The escape of sediment from the site shall be prevented by the installation of erosion control measures and practices prior to, or concurrent with, land disturbing activities and erosion control measures will be maintained at all times. If full implementation of the approved plan does not provide for effective erosion control, additional erosion and sediment control measures shall be implemented to control or treat the sediment source.
17. All erosion and sediment control measures will be checked daily and any deficiencies noted will be corrected by the end of the day.
18. This property (is / is not) located within a 100 year flood plain as shown on F.I.R.M. Community Panel Number, dated \_\_\_\_\_.
19. All fill slopes will have silt fence at the toe of the slopes.
20. A 25 to 35 foot undisturbed vegetative buffer adjacent to all running streams and creeks will be left and maintained.
21. Clearing will be kept to an absolute minimum. Vegetation and mulch will be applied to applicable areas immediately after grading is complete. Land disturbing will be scheduled to limit exposure of bare soils to erosive elements.
22. Construction activities will be performed in compliance with all applicable laws and regulations.

23. All marketable timber will be salvaged. Top soil will be salvaged, stock piled and spread on areas to be vegetated. Trees outside of the clearing line will be protected from damage by appropriate markings. Supplemental vegetation will be established.
24. Cleanout of sediment control structures will be accomplished in accordance with the sediment disposal accomplished by spreading on site. Sediment barriers will remain in place until sediment contributing areas are stabilized.
25. Contractor is responsible for staking the alignment of the proposed pipeline prior to pipe installation. If a conflict should arise the contractor shall notify the designer at that time.
26. All excavated dirt shall be placed on the high side of the trench away from any creeks.
27. Any fill dirt over the pipe shall be graded to prevent ponding.
28. The construction easement represents the limits of clearing for the complete job. The contractor shall not clear beyond this limit.
29. There shall be no change in preconstruction contours (excess material must be removed to an upland disposal area).
30. Bank stabilization (rip-rap) shall only be placed where necessary for erosion prevention. No rip-rap shall be placed in excess of the minimum needed for erosion protection.
31. No rip-rap shall be placed in any wetland area or in any location or manner so as to impair surface water flow into or out of any wetland area.
32. Discharges of dredged or fill materials into the creek shall be avoided or minimized through use of other practical alternatives.
33. Discharges of fill in spawning areas during spawning seasons shall be avoided.
34. Discharges of fill shall not restrict or impede the movement of aquatic species indigenous to the waters or the passage of normal or expected high flows or cause the relocation of the water (unless the primary purpose of the fill is to impound water).
35. Discharges of fill in wetland areas shall be avoided.
36. Heavy equipment in wetland areas shall be avoided.
37. Discharging fill into breeding areas for migratory waterflow shall be avoided.
38. All temporary fills shall be removed in their entirety.
39. No person shall commence, perform, or engage in blasting or in excavating with mechanized excavating equipment on any tract or parcel of land in this county until the person planning the blasting or excavating has given 48 hours' notice by submitting a locate request to the Utilities Protection Center, beginning the next business day after such notice is provided, excluding hours during days other than business days. Any locate request received by the utilities protection center after business hours shall be deemed to have been received by the Utilities Protection Center the next business day.



# SECTION 8 APPENDIX A – STANDARD DETAILS

FRAME AND COVER SET IN MORTAR BRICK COURSES FOR ADJUSTING TO GRADE

MANHOLE FRAME AND COVER (SEE DETAIL S3)

SEE NOTE 3

STEPS TO MEET ASTM C-478, A615, AND D4101

PREFORMED PLASTIC GASKET WITH PRIMER, TO MEET FED. SPEC. SS-5-00210, "RAM-NEK" OR APPROVED EQUAL-ASSEMBLE ACCORDING TO MANUFACTURER'S RECOMMENDATIONS

PRECAST MANHOLE TO MEET ALL REQUIREMENTS OF ASTM C-478 (LATEST)

REINFORCING TO MEET ASTM A-105, 0.12in./ft.

PIPE OPENING AS REQUIRED, USE DUKOR KOR-N-SEAL FLEXIBLE NEOPRENE BOOT OR APPROVED EQUAL

3:1 SLOPE

1" MORTAR

CONCRETE INVERT PLACED IN FIELD

REGULAR MONOLITHIC BASE

UP TO 24" DIA.

D.I.P.

BRICK

4" MIN.

48" x 5" WALL-ONE PEICE BASE UNIT- 2'-0" AND 3'-0" HEIGHTS

**NOTE:**

- 1) ALL MANHOLES SHALL BE ECCENTRIC CONE TYPE. VERTICAL SIDE WITH STEPS TO BE POSITIONED OVER INVERT SHELF AND AWAY FROM DROP CONNECTIONS.
- 2) 8" FOOTING REQUIRED ON DEPTHS OVER 12' WITH No. 4 BARS AT 12" O.C.E.W. ON A 12" GRANULAR FOUNDATION.
- 3) 12" IN ROAD SHOULDERS/MAINTAINED RIGHT-OF-WAY; 24" MIN. IN CROSS COUNTRY EASEMENTS.
- 4) OUTSIDE DROP CONNECTION REQUIRED FOR DROPS OVER 2'-0".
- 5) WATER-TIGHT MANHOLE FRAME SHALL BE DESIGNATED ON PLAN AND PROFILE, AND SHALL BE REQUIRED IN FLOOD PLAINS ON AREAS SUBJECT TO FLOODING (SUBMERGED DURING RAINFALL). VENT REQUIRED FOR WATERTIGHT MANHOLES. SEE STANDARD S9.
- 6) FOR MANHOLES IN PAVEMENT, USE A 2" ADJUSTABLE RING, NEENAH R-1979 SERIES OR ENGINEER APPROVED EQUAL.

**STANDARD MANHOLE SCHEDULE OF GOVERNING DIMENSIONS**

PIPE SIZE	ANGLE "A"	MH. DIA.
8" TO 15"	0° TO 90°	4'-0"
18" TO 24"	0° TO 60°	4'-0"
18" TO 24"	60° TO 90°	5'-0"
27" TO 30"	0° TO 30°	5'-0"
27" TO 30"	30° TO 60°	5'-0"
27" TO 30"	60° TO 90°	6'-0"
36"	0° TO 90°	6'-0"
42"	0° TO 60°	7'-0"
42"	60° TO 90°	8'-0"
48"	0° TO 45°	8'-0"

**NOTE:**  
MINIMUM  $\phi$  RADIUS OF M.H. INVERT = 1.5 x PIPE DIAMETER

**EFFLUENT**

**INFLUENT**

**M.H. DIA.**

**ANGLE "A"**

**DROP CONNECTION**

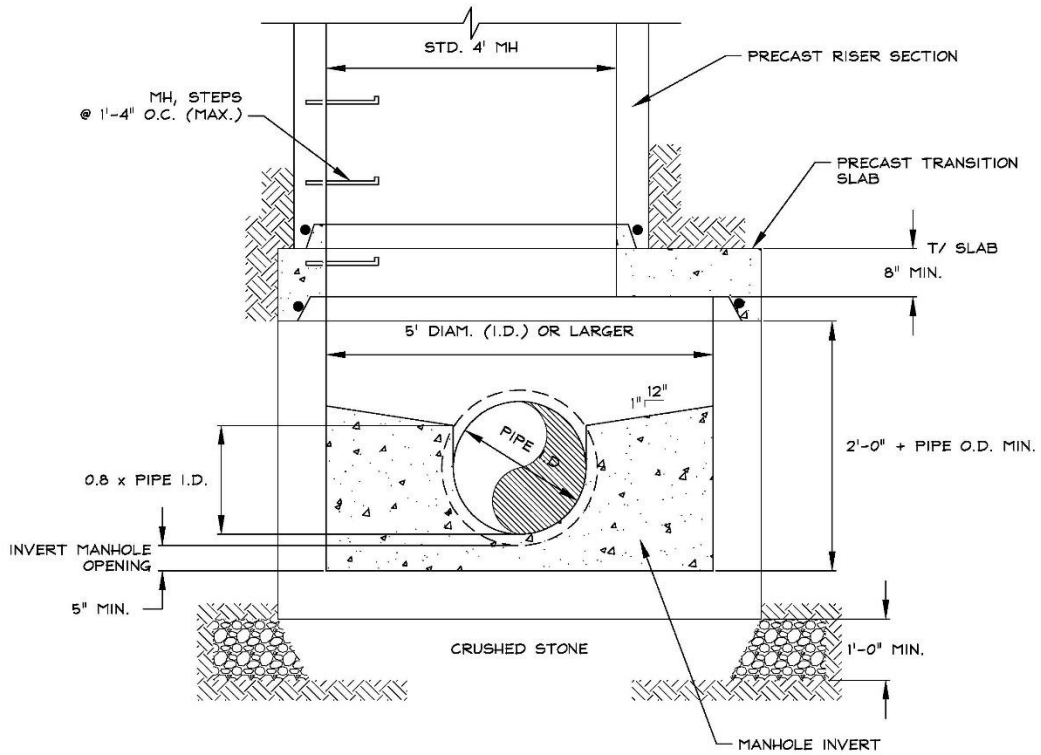


PRECAST DROP MANHOLE DETAIL

STANDARD DETAILS  
SEWERAGE SYSTEM CONSTRUCTION

DATE: FEBRUARY 2023  
SCALE: N.T.S.

STANDARD S1



**NOTES:**

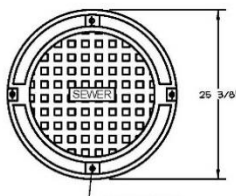
1. SEE DETAIL S1 FOR MANHOLE SPECIFICATIONS AND DIMENSIONS.



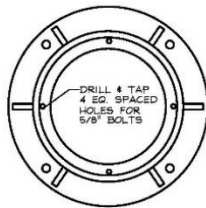
**LARGE DIAMETER MANHOLE  
DETAIL**  
**STANDARD DETAILS  
SEWERAGE SYSTEM CONSTRUCTION**

DATE: FEBRUARY 2023  
SCALE: N.T.S.

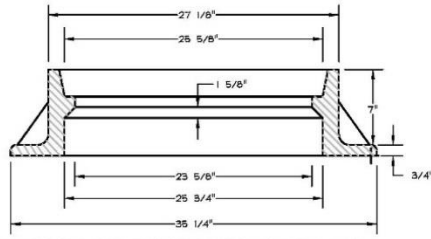
**STANDARD S2**



**COVER FACE**  
N.T.S.

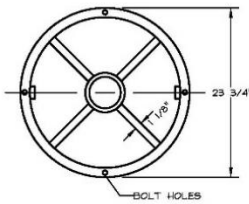


**FRAME PLAN**  
N.T.S.

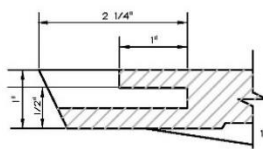


NOTE: PICKHOLES SHALL BE NON-PENETRATING AND WATER TIGHT. CORRUGATION AND TWO PICKHOLES IN COVER, NO PERFORATION. SEATING SURFACE OF FRAMES AND COVERS TO BE MACHINED TO FIT. FRAME AND COVER SHALL WEIGH 300 POUNDS MINIMUM.

**FRAME SECTION**  
N.T.S.

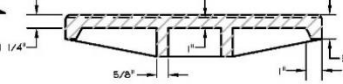


**COVER BACK**  
N.T.S.

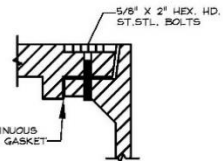


**PICKHOLE DETAIL**  
N.T.S.

APPROX. WEIGHTS  
FRAME 195 LBS.  
COVER 295 LBS.  
TOTAL 490 LBS.



**COVER SECTION**  
N.T.S.



**WATERTIGHT DETAIL**  
N.T.S.

- NOTE:
- 1) ONLY BOLT DOWN MANHOLE REQUIRES 1" O" RING GASKET & BOLTS.
  - 2) BOLT-DOWN MANHOLE COVERS REQUIRED IN FLOOD PLAINS, AREAS SUBJECT TO FLOODING, OR AS SPECIFIED.

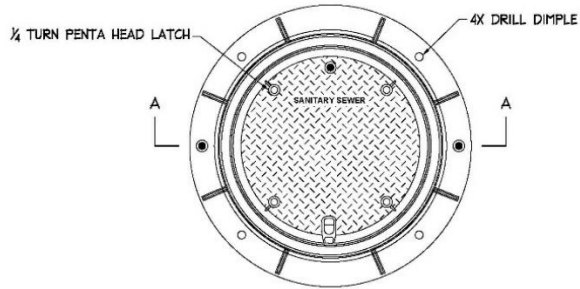


**STANDARD FRAME AND COVER  
DETAIL**

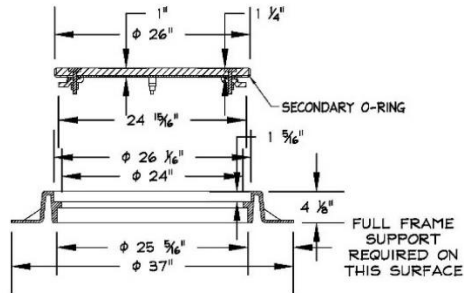
**STANDARD DETAILS  
SEWERAGE SYSTEM CONSTRUCTION**

DATE: FEBRUARY 2023  
SCALE: N.T.S.

STANDARD 53



**FRAME & COVER PLAN**  
N.T.S.



**SECTION A**  
N.T.S.

**COMPOSITE MANHOLE COVER & FRAME DETAIL**

**NOTES:**

1. COMPOSITE FRAMES AND COVERS SHALL MEET THE REQUIREMENTS OF AASHTO M-306, FULL H20, AND EITHER H-20 OR H-25 LOAD RATING AND ALL APPLICABLE LOCAL STANDARDS. SHOP DRAWINGS MUST INDICATE THE DESIGN WEIGHT AND PROVIDE SUFFICIENT DIMENSIONS TO PERMIT CHECKING.
2. FRAMES SHALL BE CAST INTO THE MANHOLE EXCEPT WHERE FINE ADJUSTING IS NEEDED, I.E. UNDER ROADS
3. ALL COMPOSITE COVERS SHALL HAVE THE LEGEND 'SANITARY SEWER' MOLDED INTO THE FACE.
4. COMPOSITE MANHOLE FRAMES AND COVERS SHALL BE EJ 2600 OR AN ENGINEER APPROVED EQUAL.

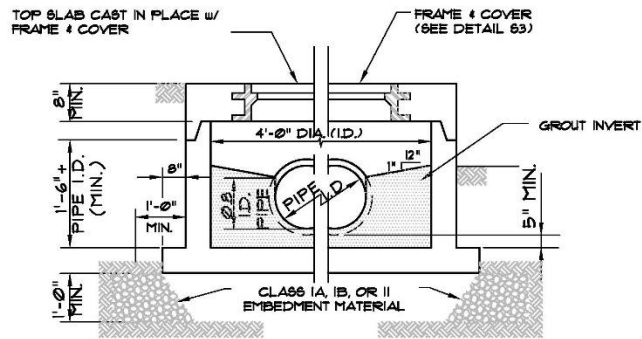


**COMPOSITE FRAME AND COVER  
DETAIL**

**STANDARD DETAILS  
SEWERAGE SYSTEM CONSTRUCTION**


DATE: FEBRUARY 2023  
SCALE: N.T.S.

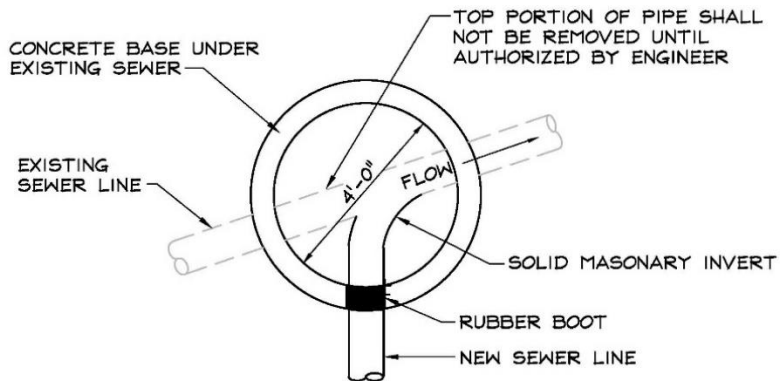
STANDARD S4



TOP AT GRADE      TOP ABOVE GRADE

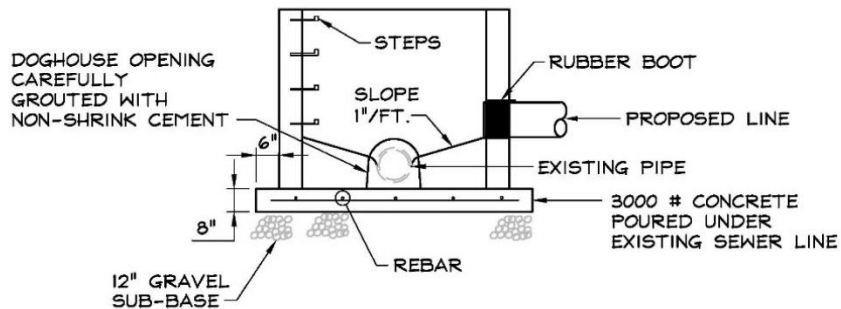
NOTE: MANHOLE SHALL BE LINED & COATED


	<p>PRECAST CONCRETE SHALLOW MANHOLE</p>	<p>DATE: FEBRUARY 2023 SCALE: N.T.S.</p>
	<p>STANDARD DETAILS SEWERAGE SYSTEM CONSTRUCTION</p>	<p>STANDARD 55</p>

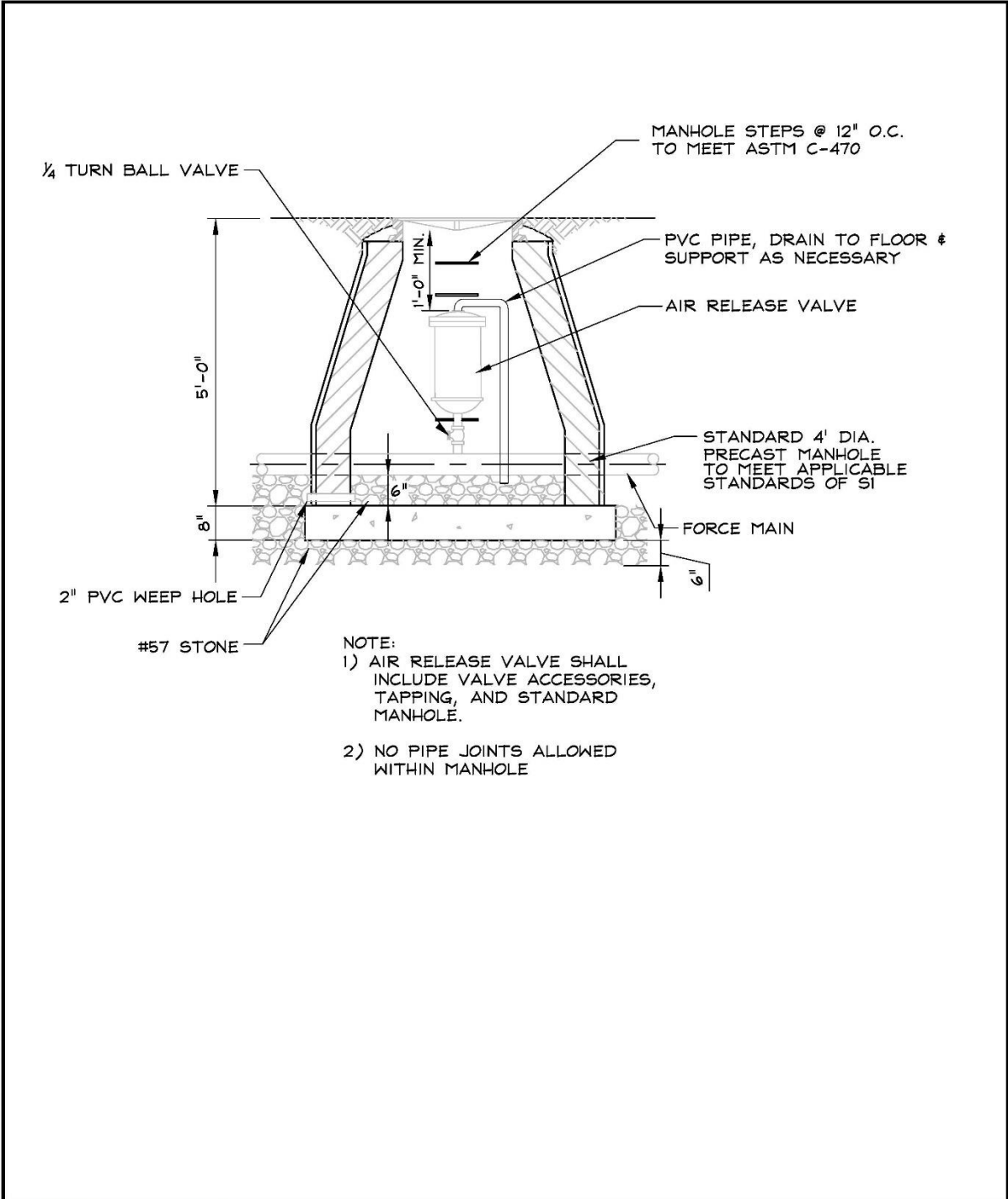



**NOTES**

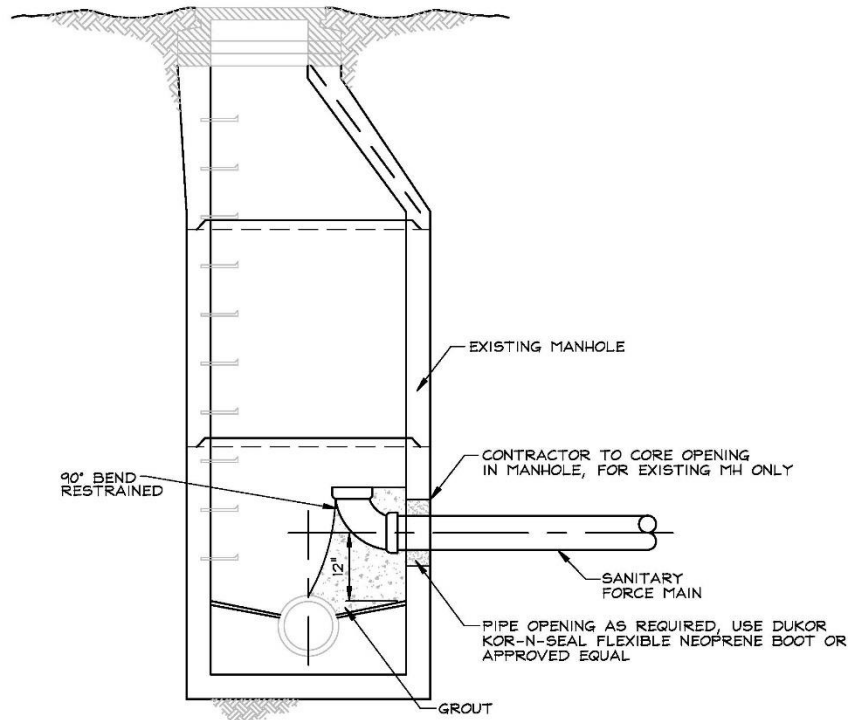
1. PROVIDE PRECAST MANHOLE RISER COMPLETE WITH UP-SIDE DOWN U-SHAPED OPENING TO SUIT EXISTING LINES.
2. CORED AND BOOTED OPENINGS TO SUIT PROPOSED PIPELINES.
3. TABLES ARE TO BE GENTLY SLOPED AND TROWELED SMOOTH FROM MANHOLE WALL TO INVERT WALL HEIGHT AND CONSTRUCTED OF SOLID MASONRY.



	<b>DOGHOUSE MANHOLE</b>	DATE: FEBRUARY 2023 SCALE: N.T.S.
	<b>STANDARD DETAILS SEWERAGE SYSTEM CONSTRUCTION</b>	
	<b>STANDARD S6</b>	



	<b>AIR RELEASE VALVE DETAIL</b>	DATE: FEBRUARY 2023 SCALE: N.T.S.
	<b>STANDARD DETAILS SEWERAGE SYSTEM CONSTRUCTION</b>	<b>STANDARD 57</b>



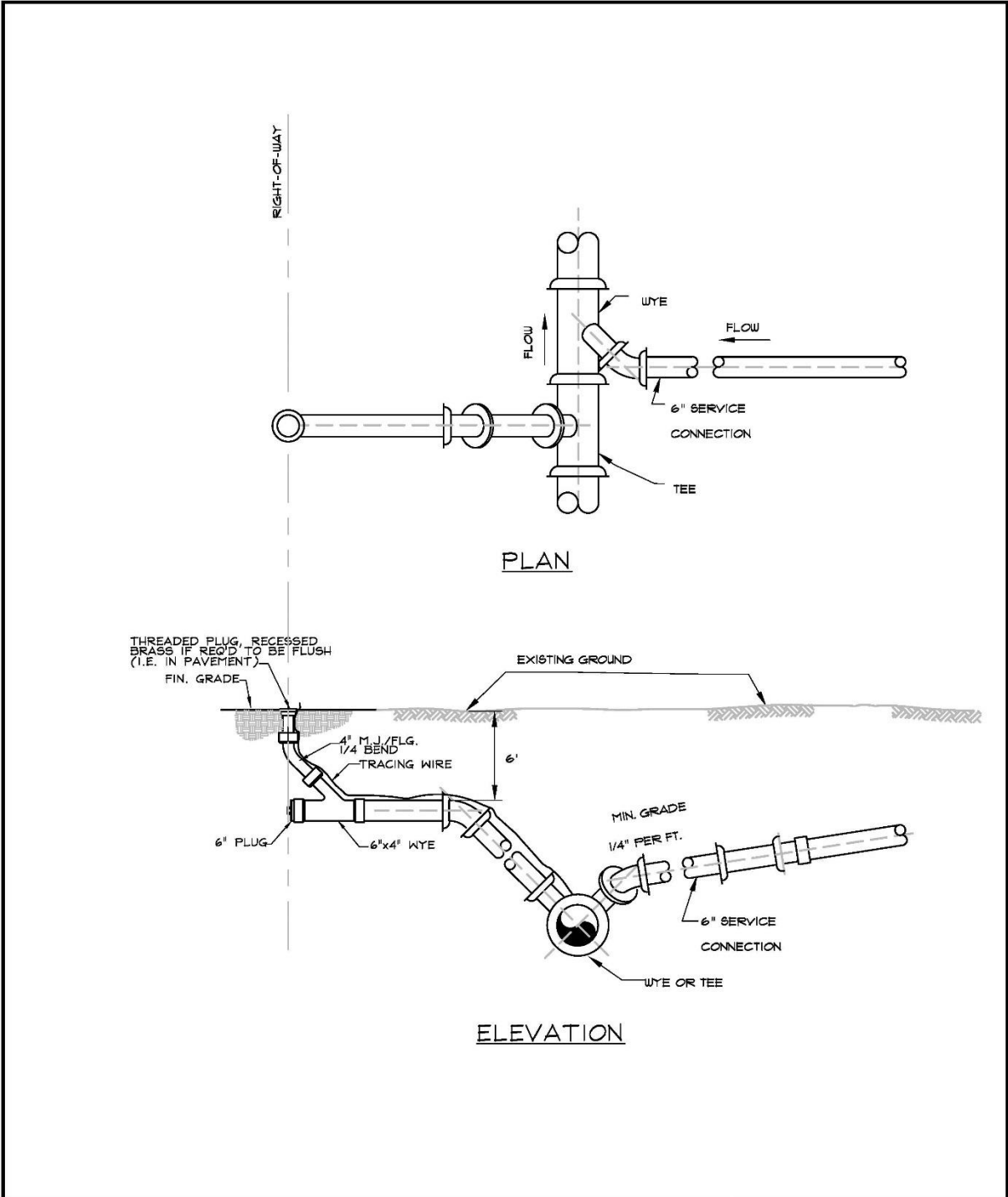
**FORCE MAIN CONNECTION**


**STANDARD DETAILS**  
**SEWERAGE SYSTEM CONSTRUCTION**

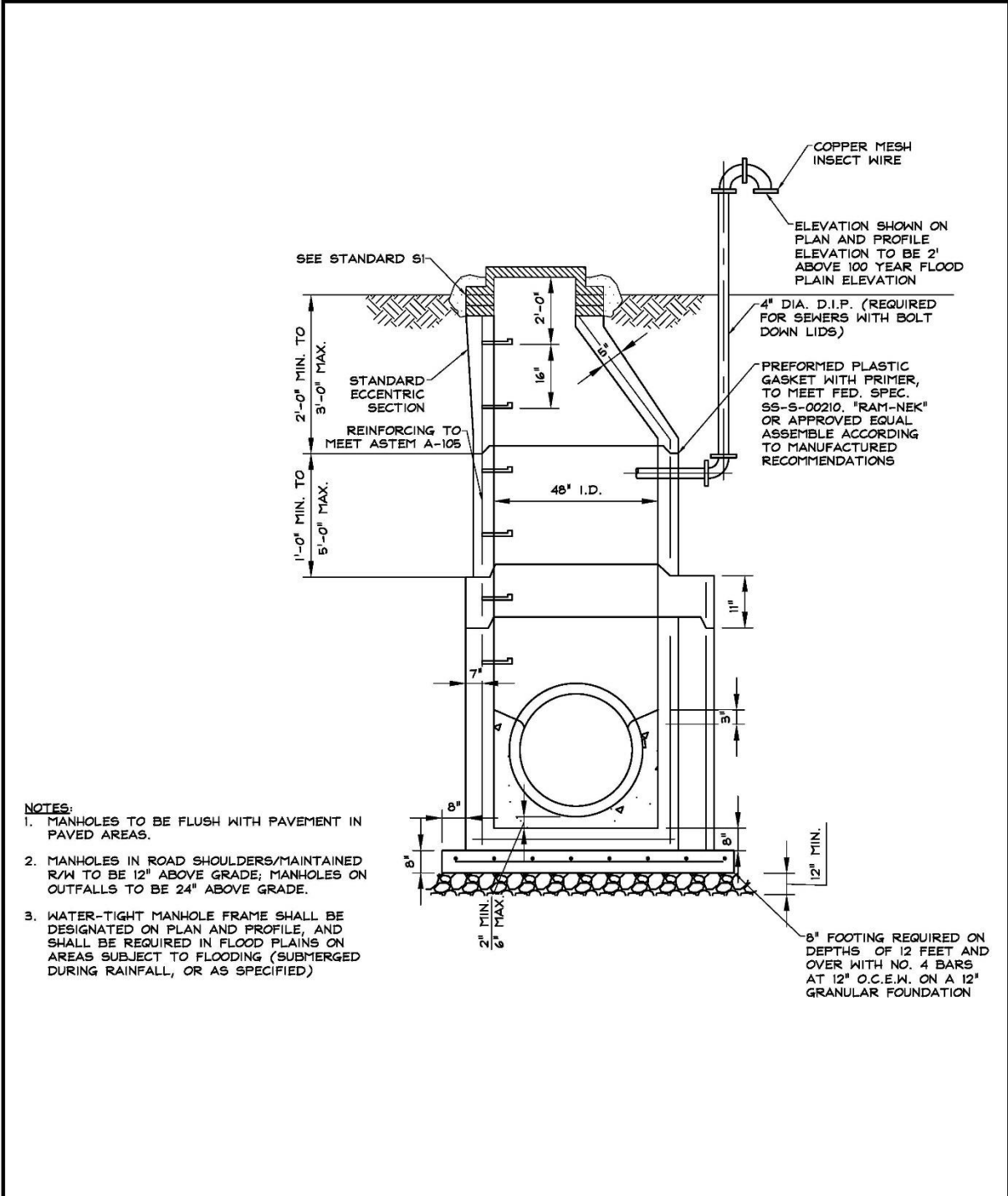
DATE: FEBRUARY 2023  
SCALE: N.T.S.

STANDARD 58





	<b>SERVICE CONNECTIONS</b>	DATE: FEBRUARY 2023
	<b>STANDARD DETAILS SEWERAGE SYSTEM CONSTRUCTION</b>	SCALE: N.T.S.
		<b>STANDARD 59</b>



- NOTES:**
1. MANHOLES TO BE FLUSH WITH PAVEMENT IN PAVED AREAS.
  2. MANHOLES IN ROAD SHOULDERS/MAINTAINED R/W TO BE 12" ABOVE GRADE; MANHOLES ON OUTFALLS TO BE 24" ABOVE GRADE.
  3. WATER-TIGHT MANHOLE FRAME SHALL BE DESIGNATED ON PLAN AND PROFILE, AND SHALL BE REQUIRED IN FLOOD PLAINS ON AREAS SUBJECT TO FLOODING (SUBMERGED DURING RAINFALL, OR AS SPECIFIED)

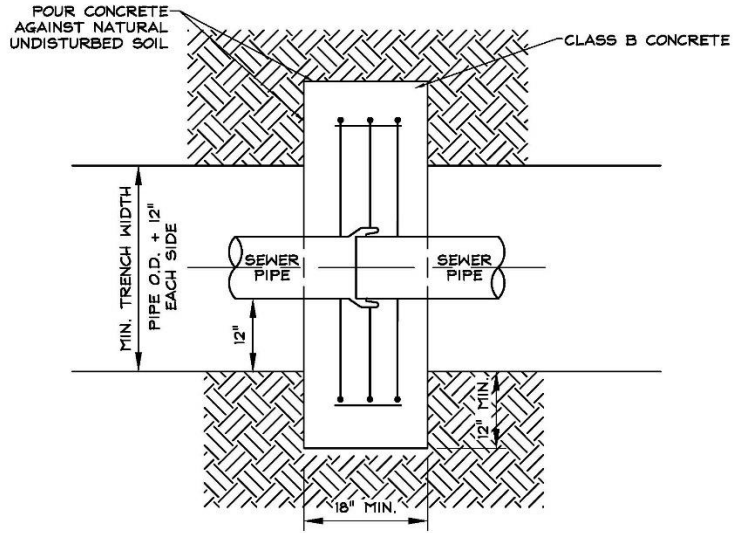


STANDARD VENTED MANHOLE  
(FOR PIPE LARGER THAN 18")

STANDARD DETAILS  
SEWERAGE SYSTEM CONSTRUCTION

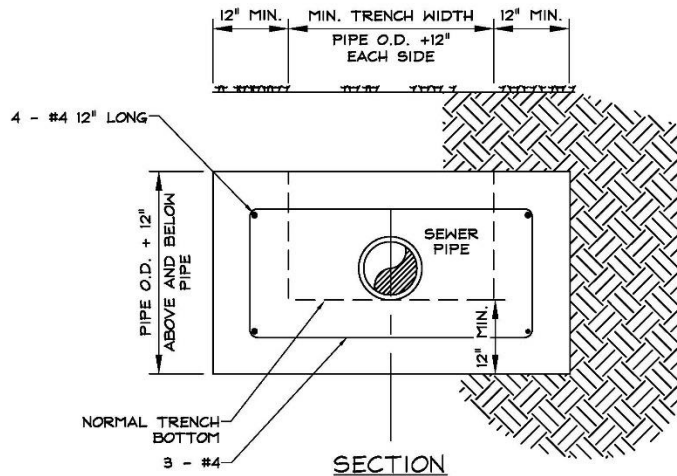
DATE: FEBRUARY 2023  
SCALE: N.T.S.

STANDARD S10



PLAN

NOTE:  
COLLAR REQUIRED AT  
EVERY PIPE JOINT



SECTION

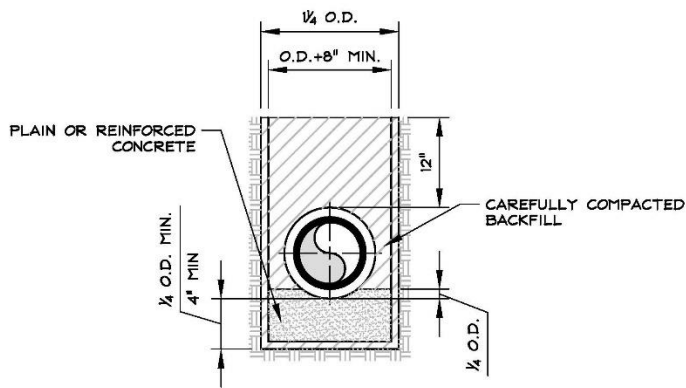


SEWER PIPE COLLAR

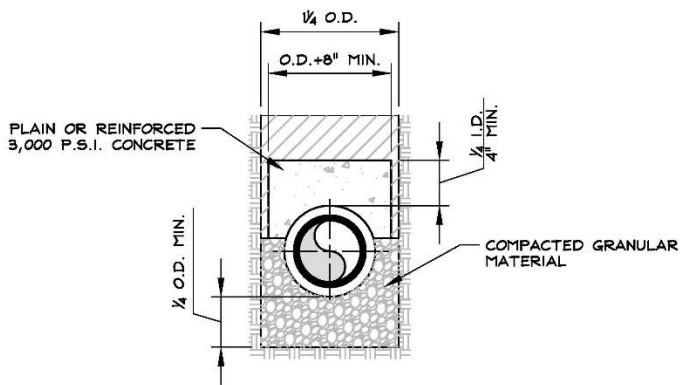
STANDARD DETAILS  
SEWERAGE SYSTEM CONSTRUCTION

DATE: FEBRUARY 2023  
SCALE: N.T.S.

STANDARD S11



**CONCRETE CRADLE**



**CONCRETE ARCH**

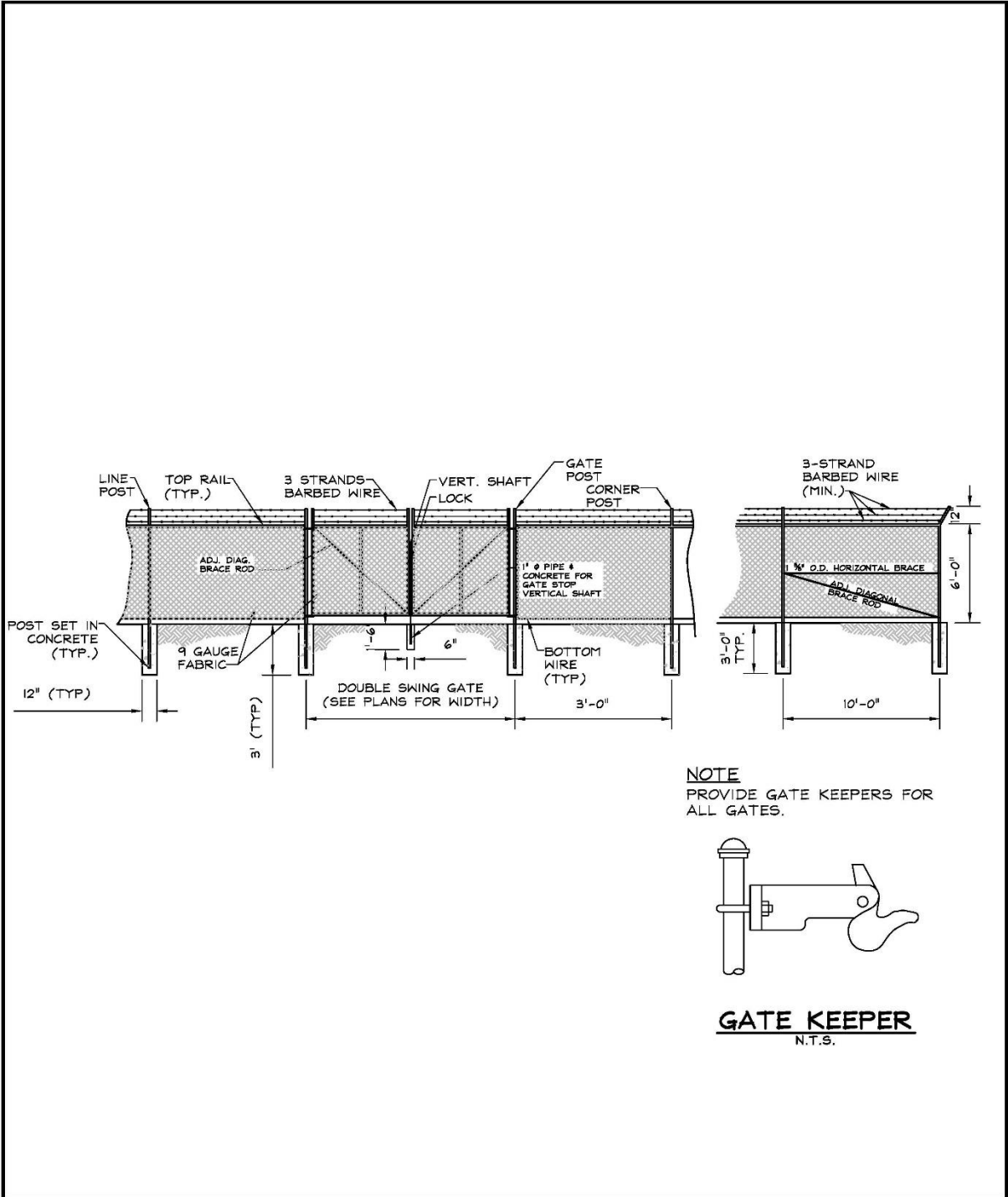


PIPE CLASS  
"A" BEDDING

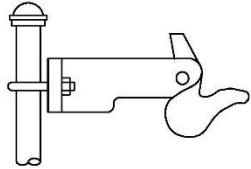
STANDARD DETAILS  
SEWERAGE SYSTEM CONSTRUCTION

DATE: FEBRUARY 2023  
SCALE: N.T.S.


STANDARD S12

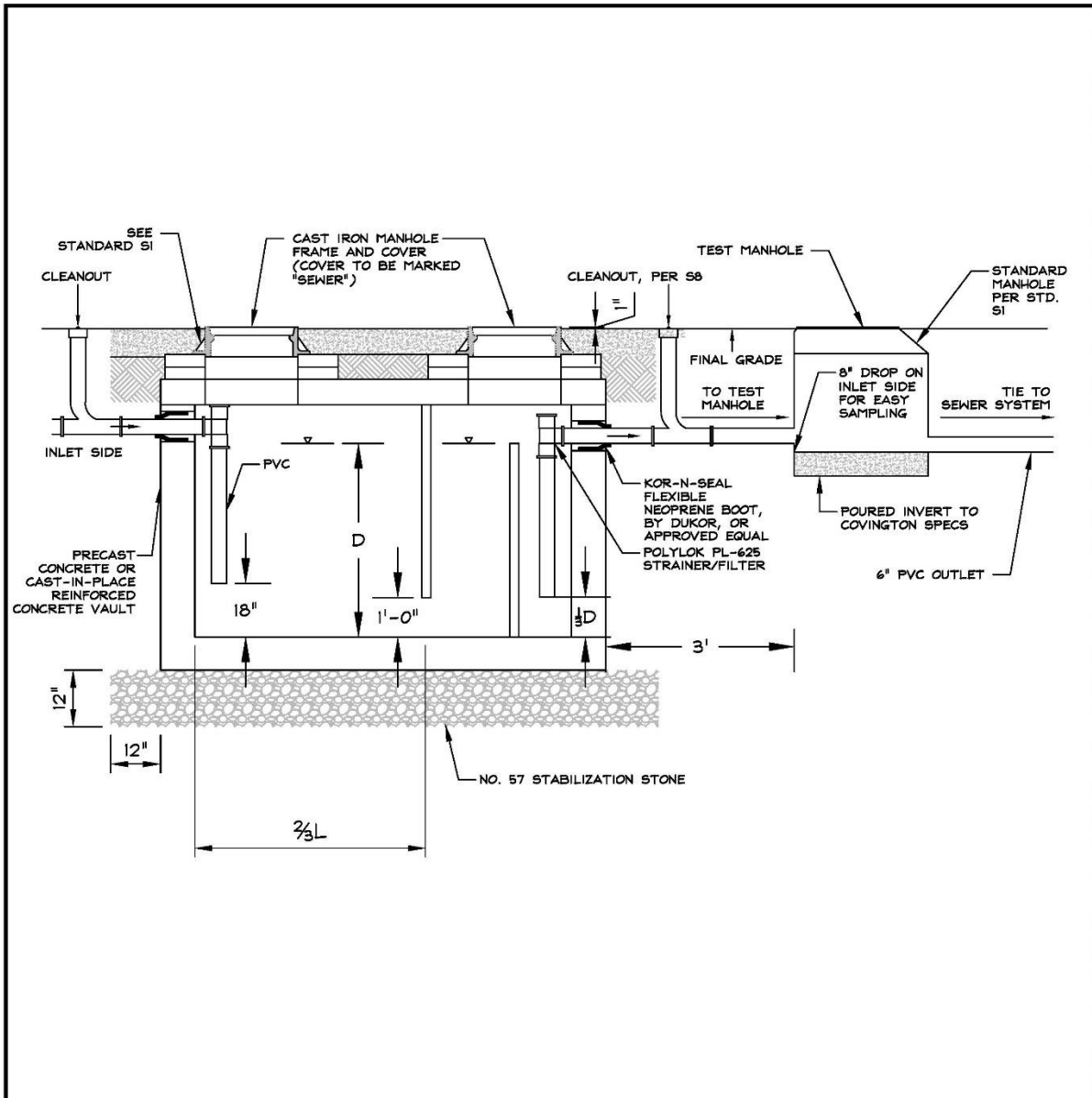


**NOTE**  
 PROVIDE GATE KEEPERS FOR ALL GATES.




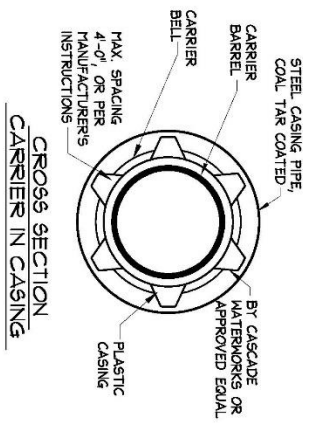
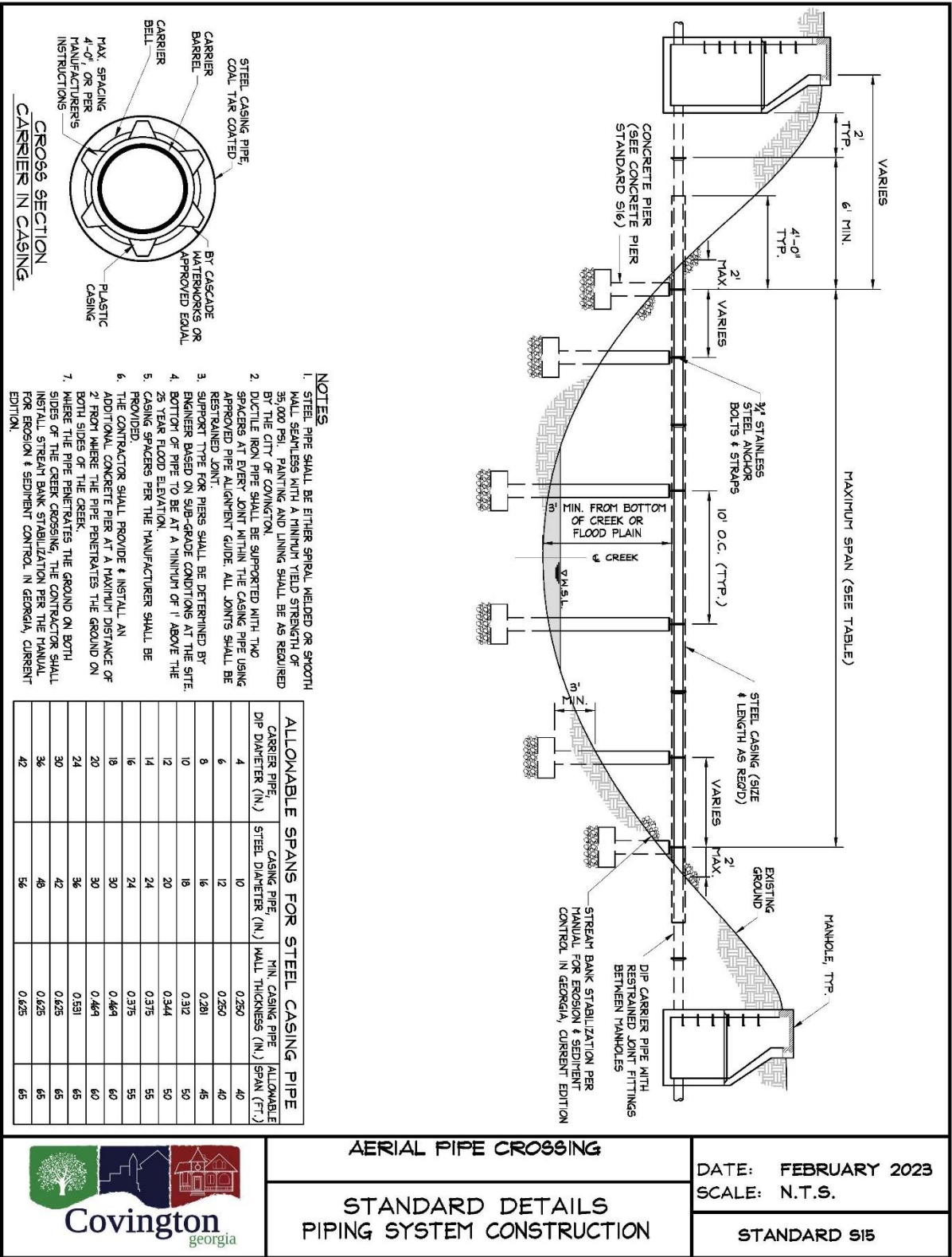
**GATE KEEPER**  
 N.T.S.

	<b>FENCE &amp; GATE DETAIL</b>	DATE: FEBRUARY 2023 SCALE: N.T.S.
	<b>STANDARD DETAILS          SEWERAGE SYSTEM CONSTRUCTION</b>	<b>STANDARD S13</b>



- NOTES:**
- GREASE INTERCEPTOR SHALL HAVE A MINIMUM CAPACITY OF 1,500 GALLONS AND A MAXIMUM CAPACITY OF 3,000 GALLONS. IF REQUIRED CAPACITY IS GREATER THAN 3,000 GALLONS, MULTIPLE GREASE INTERCEPTORS SHALL BE USED.
  - CONCRETE DESIGN STRENGTH SHALL BE 4,000 PSI @ 28 DAYS.
  - GREASE INTERCEPTOR SHALL BE HS-20 LOAD RATED.
  - FRAME & COVER SHALL MEET REQUIREMENTS OF SI # S2.
  - NO RESTROOM SEWAGE IS ALLOWED TO FLOW THROUGH THE GREASE TRAP.

	<b>GREASE INTERCEPTOR DETAIL</b>	DATE: FEBRUARY 2023 SCALE: N.T.S.
	<b>STANDARD DETAILS SEWERAGE SYSTEM CONSTRUCTION</b>	<b>STANDARD S14</b>



- NOTES**
1. STEEL PIPE SHALL BE EITHER SPIRAL, WELDED OR SMOOTH WALL SEAMLESS WITH A MINIMUM YIELD STRENGTH OF 35,000 PSI. PAINTING AND LINING SHALL BE AS REQUIRED BY THE CITY OF COVINGTON.
  2. DUCTILE IRON PIPE SHALL BE SUPPORTED WITH TWO SPACERS AT EVERY JOINT WITHIN THE CASING PIPE USING APPROVED PIPE ALIGNMENT GUIDE. ALL JOINTS SHALL BE RESTRAINED JOINTS.
  3. SUPPORT THE FOR PIERS SHALL BE DETERMINED BY ENGINEER BASED ON SUB-GRADE CONDITIONS AT THE SITE.
  4. BOTTOM OF PIPE TO BE AT A MINIMUM OF 1' ABOVE THE 25 YEAR FLOOD ELEVATION.
  5. CASING SPACERS PER THE MANUFACTURER SHALL BE PROVIDED.
  6. THE CONTRACTOR SHALL PROVIDE & INSTALL AN ADDITIONAL CONCRETE PIER AT A MAXIMUM DISTANCE OF 2' FROM WHERE THE PIPE PENETRATES THE GROUND ON BOTH SIDES OF THE CREEK.
  7. WHERE THE PIPE PENETRATES THE GROUND ON BOTH SIDES OF THE CREEK CROSSING, THE CONTRACTOR SHALL INSTALL STREAM BANK STABILIZATION PER THE MANUAL FOR EROSION & SEDIMENT CONTROL, IN GEORGIA, CURRENT EDITION.

CARRIER PIPE DIP DIAMETER (IN.)	CASING PIPE STEEL DIAMETER (IN.)	MIN. CASING PIPE WALL THICKNESS (IN.)	ALLOWABLE SPAN (FT.)
4	10	0.250	40
6	12	0.250	40
8	16	0.281	45
10	18	0.312	50
12	20	0.344	50
14	24	0.375	55
16	24	0.375	55
18	30	0.441	60
20	30	0.441	60
24	36	0.531	65
30	42	0.625	65
36	48	0.625	65
42	56	0.625	65

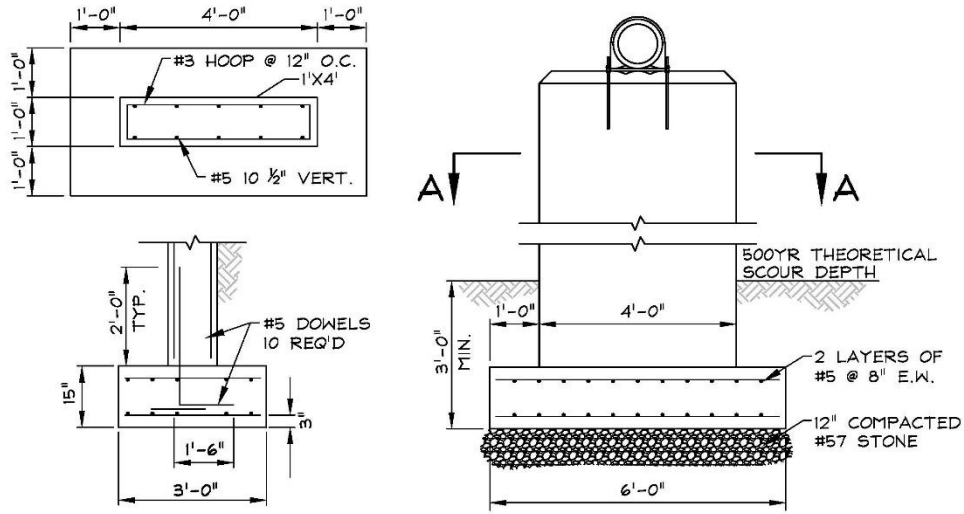


**AERIAL PIPE CROSSING**

**STANDARD DETAILS**  
**PIPING SYSTEM CONSTRUCTION**

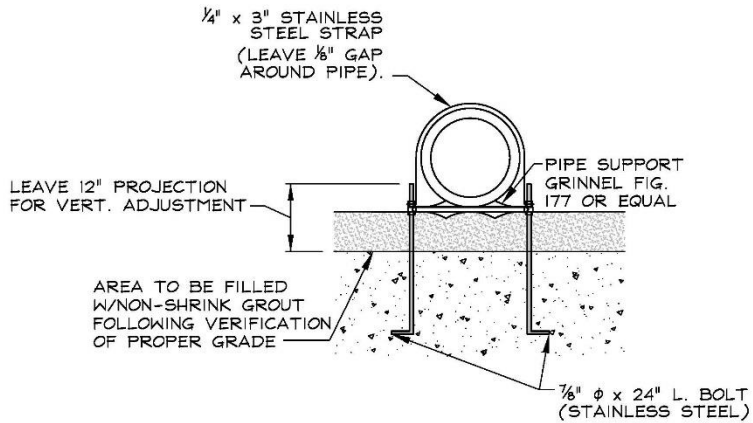
DATE: FEBRUARY 2023  
SCALE: N.T.S.

**STANDARD S15**



- NOTES: 1. SOIL BEARING CAPACITY BELOW FOOTING OF PIERS SHALL BE 2000 P.S.F.. THE CONTRACTOR SHALL VERIFY SOIL BEARING CAPACITY BEFORE PLACING CONCRETE FOR FOOTING.
2. STEEL REINFORCING BARS SHALL BE ASTM A 615 GRADE 60.

### CONCRETE PIER DETAIL



### PIPE SUPPORT DETAIL FOR CONCRETE PIER DETAIL



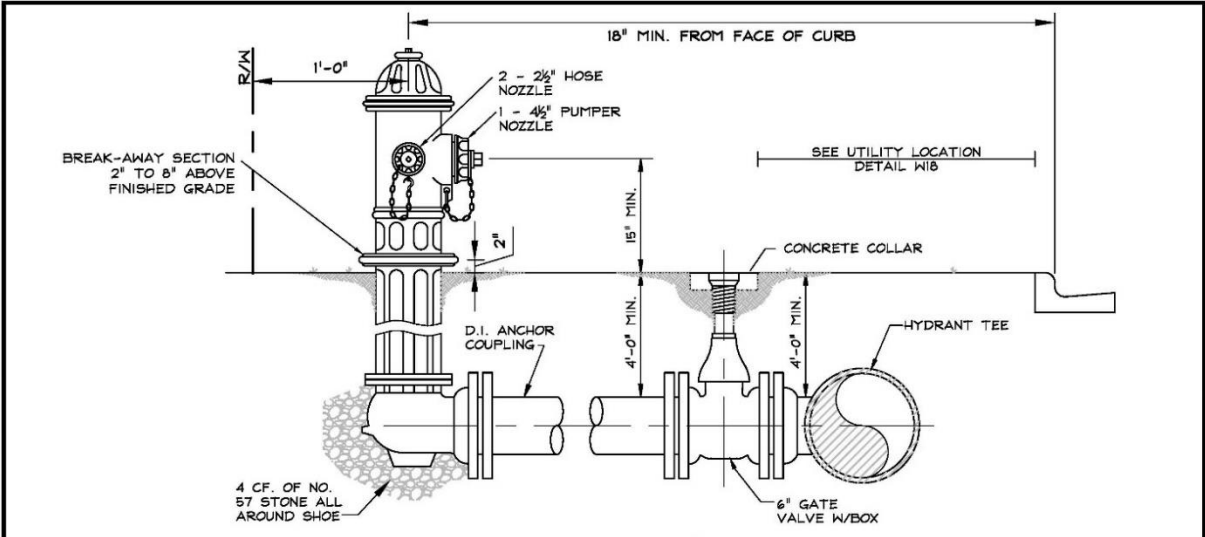
CONCRETE PIER DETAILS

STANDARD DETAILS  
PIPING SYSTEM CONSTRUCTION

DATE: FEBRUARY 2023  
SCALE: N.T.S.

STANDARD S16

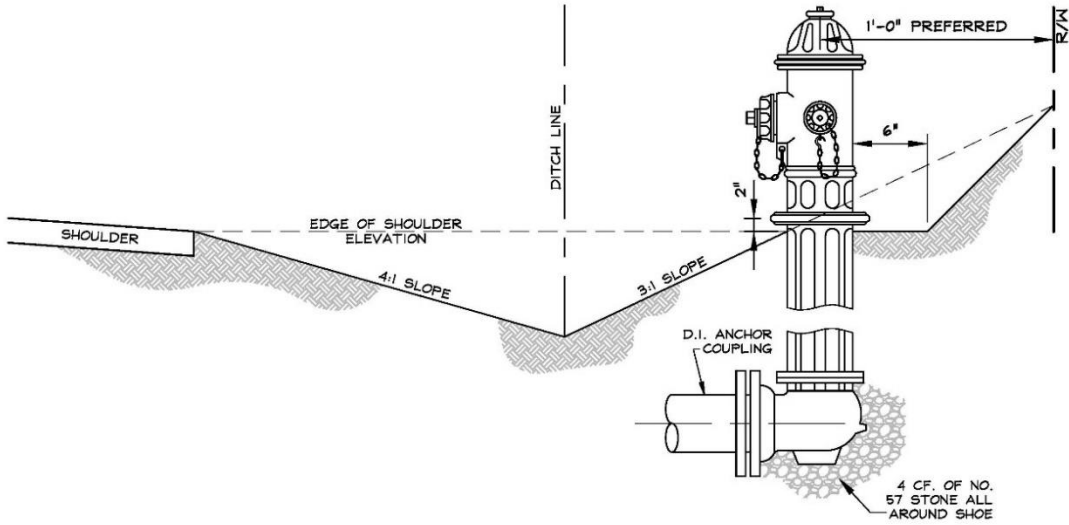




**TYPICAL SECTION W/  
CURB & GUTTER**

**NOTES:**

1. PUMPER NOZZLE TO FACE STREET.
2. HYDRANT SHALL NOT BE SET ON THE ROAD SIDE OF WATER MAIN.
3. ADJUST VALVE BOX TO FINISHED GRADE.
4. CONCRETE COLLAR REQ'D AROUND HYDRANT BOX EXCEPT IN PAVED AREAS.
5. GRAVEL TO BE PLACED AROUND HYDRANT DRAIN, MINIMUM 2 FT. x 1 FT. x 2 FT.
6. NO HYDRANT SHALL BE INSTALLED SO THAT ANY PART OF THE HYDRANT IS IN CONFLICT WITH A SIDEWALK.



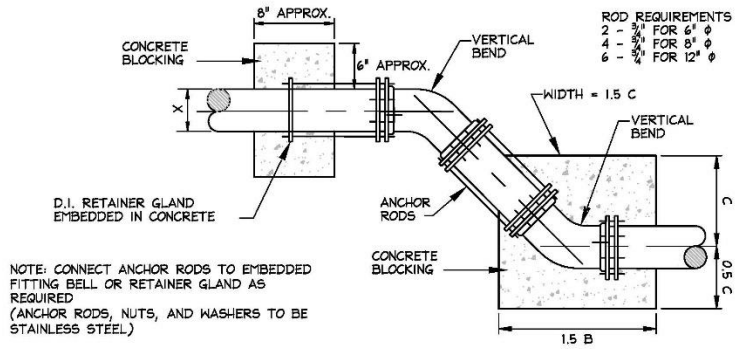
**TYPICAL SECTION WITHOUT  
CURB & GUTTER**



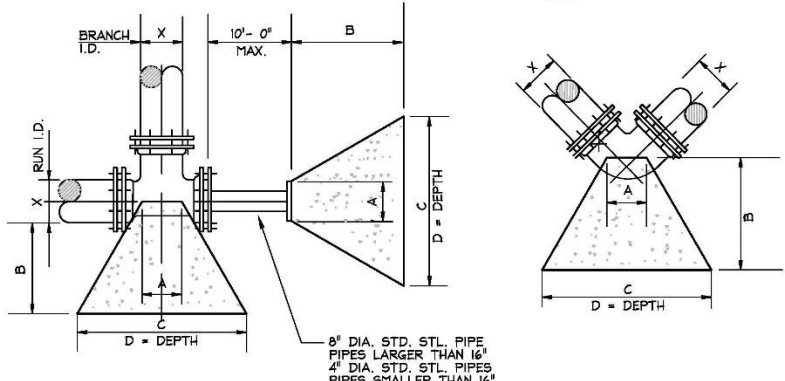
**TYPICAL FIRE HYDRANT SETTING**  
**STANDARD DETAILS**  
**WATER SYSTEM CONSTRUCTION**

DATE: FEBRUARY 2023  
SCALE: N.T.S.

STANDARD WI



NOTE: CONNECT ANCHOR RODS TO EMBEDDED FITTING BELL OR RETAINER GLAND AS REQUIRED (ANCHOR RODS, NUTS, AND WASHERS TO BE STAINLESS STEEL)



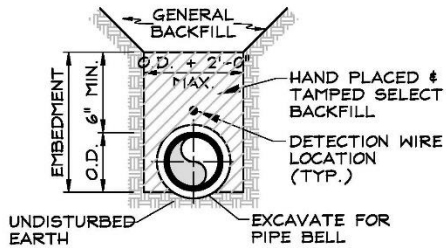
8" DIA. STD. STL. PIPE  
PIPES LARGER THAN 16"  
4" DIA. STD. STL. PIPES  
PIPES SMALLER THAN 16"

BLOCKING DIMENSIONS													
		BENDS					BENDS						
		X	A	B	C	D			X	A	B	C	D
90° BEND	30"	2'-0"	11'-6"	15'-3"	6'-0"		11-1/2° BEND	30"	1'-0"	2'-10"	4'-3"	3'-0"	
	24"	2'-0"	7'-9"	10'-9"	5'-6"			24"	1'-0"	2'-6"	3'-8"	2'-6"	
	20"	1'-9"	6'-0"	8'-6"	5'-0"			20"	10"	2'-0"	3'-0"	2'-0"	
	16"	1'-3"	4'-0"	6'-0"	4'-6"			16"	16"	1'-8"	2'-6"	1'-6"	
	12"	10"	2'-9"	4'-0"	4'-0"			12"	8"	1'-0"	1'-6"	1'-6"	
	10"	10"	2'-6"	3'-9"	3'-0"			10"	10"	1'-0"	1'-6"	1'-0"	
	8"	8"	1'-9"	2'-6"	2'-6"			8"	8"	1'-0"	1'-6"	1'-0"	
6"	6"	1'-3"	2'-0"	2'-0"		6"	6"	1'-0"	1'-0"	1'-0"			
4"	4"	1'-0"	1'-6"	1'-6"		4"	4"	1'-0"	1'-0"	9"			
45° BEND	30"	1'-6"	7'-6"	10'-0"	5'-0"		TEES & DEAD ENDS						
	24"	1'-3"	5'-9"	8'-0"	4'-0"		X	A	B	C	D		
	20"	1'-0"	4'-9"	6'-8"	3'-6"		30"	3'-0"	8'-9"	13'-0"	5'-0"		
	16"	1'-0"	3'-3"	5'-0"	3'-3"		24"	2'-6"	7'-3"	10'-8"	3'-9"		
	12"	10"	1'-9"	3'-0"	2'-9"		20"	2'-0"	5'-3"	8'-0"	3'-6"		
	10"	10"	1'-9"	3'-0"	2'-0"		16"	1'-0"	4'-8"	6'-4"	3'-6"		
	8"	8"	1'-6"	2'-0"	2'-0"		12"	10"	2'-9"	4'-6"	2'-6"		
6"	6"	1'-3"	1'-6"	1'-6"		10"	10"	2'-0"	3'-3"	2'-6"			
4"	4"	1'-0"	1'-0"	1'-0"		8"	8"	1'-9"	2'-6"	2'-0"			
22-1/2° BEND	30"	1'-0"	4'-8"	6'-4"	4'-0"		6"	6"	1'-3"	2'-0"	1'-6"		
	24"	1'-0"	3'-0"	5'-0"	3'-6"		NOTE: 200 P.S.I. TEST PRESSURE SOIL BEARING OF 2500 P.S.F. 3000 P.S.I. CONCRETE PIPE LESS THAN 4" IN DIAMETER SHALL HAVE THE SAME REQUIREMENTS AS 4" DIAMETER PIPE						
	20"	1'-0"	2'-6"	4'-4"	3'-0"								
	16"	1'-0"	1'-9"	3'-0"	2'-6"								
	12"	10"	1'-3"	2'-3"	2'-0"								
	10"	10"	1'-0"	2'-0"	1'-6"								
	8"	8"	1'-0"	1'-9"	1'-9"								
6"	6"	1'-0"	1'-6"	1'-6"									
4"	4"	1'-0"	1'-3"	1'-3"									

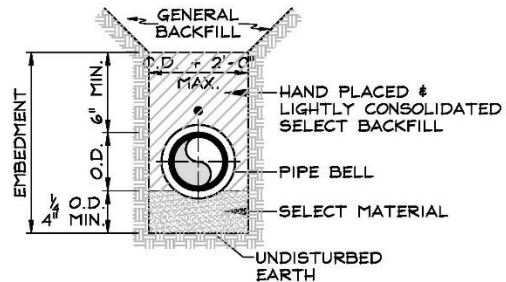


THRUST BLOCK DETAIL  
STANDARD DETAILS  
WATER SYSTEM CONSTRUCTION

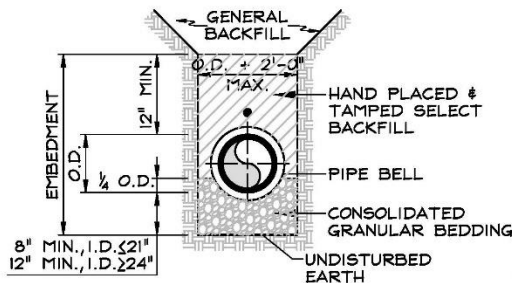
DATE: FEBRUARY 2023  
SCALE: N.T.S.  
STANDARD W2



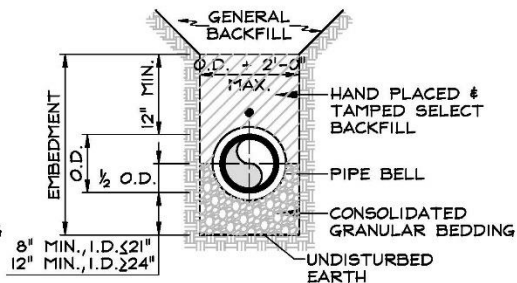
**TYPE 2**  
(FLAT BOTTOM TRENCH)



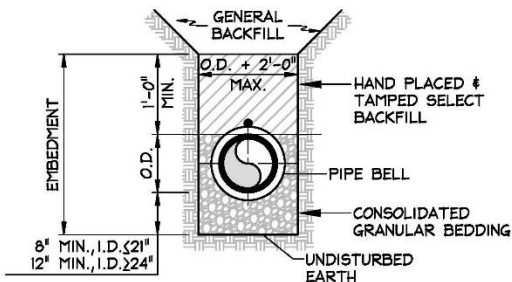
**TYPE 3**  
(LOOSE SOIL BEDDING)



**TYPE 4**  
(GRANULAR BEDDING)



**TYPE 5**  
(GRANULAR BEDDING)



**TYPE 6**  
(GRANULAR BEDDING  
EXTENDED ABOVE PIPE)

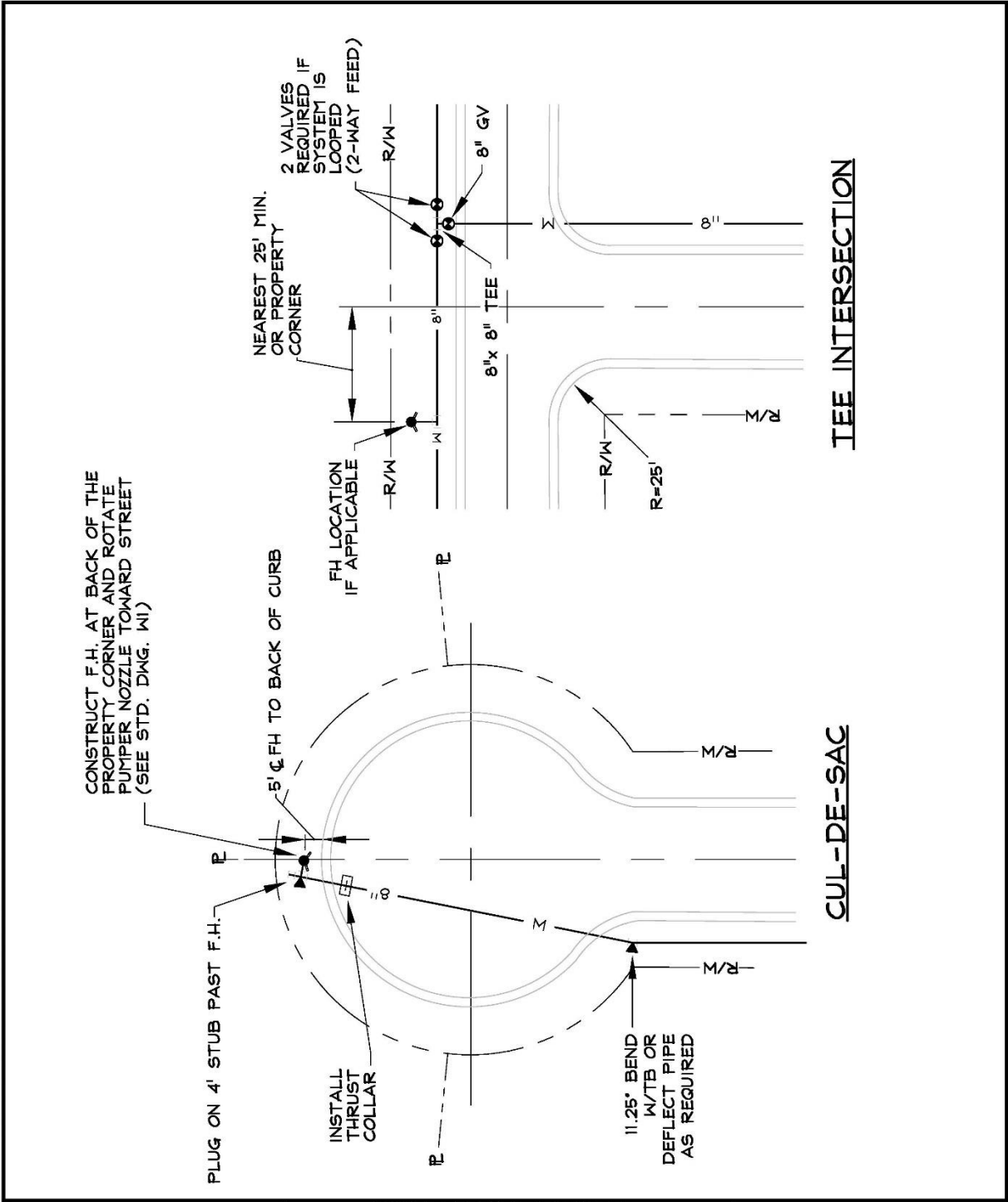
**NOTES**

1. PIPE BEDDING DETAIL APPLIES TO WATER AND SANITARY SEWER CONSTRUCTION.
2. TYPE 2 CAN ONLY BE USED IN DRY EARTH TRENCHES.
3. TYPE 2 SHALL BE USED FOR PVC & D.I. FORCE MAINS UNLESS ROCK IS ENCOUNTERED OR OVER EXCAVATION OCCURS, IN WHICH CASE 6" MIN. OF GRANULAR CRUSHED STONE SHALL BE USED AS BEDDING.
4. FOR WATER MAINS, IF ROCK IS ENCOUNTERED OR OVER EXCAVATION OCCURS, TYPE 4 SHALL BE USED.
5. TYPE 1 DOES NOT APPLY TO FORCE MAINS, SANITARY SEWER MAINS, OR WATER MAINS AND IS NOT SHOWN.



PIPE BEDDING AND HAUNCHING  
DETAIL  
STANDARD DETAILS  
WATER SYSTEM CONSTRUCTION

DATE: FEBRUARY 2023  
SCALE: N.T.S.  
STANDARD W3

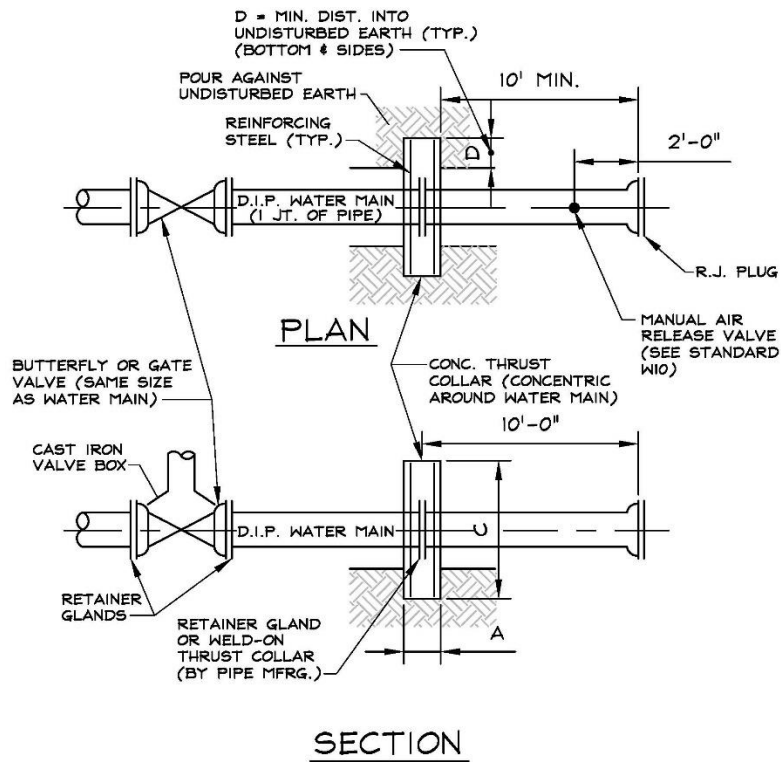


WATER MAIN LOCATION  
 SUBDIVISION # 3 WAY STREET

STANDARD DETAILS  
 WATER SYSTEM CONSTRUCTION

DATE: FEBRUARY 2023  
 SCALE: N.T.S.

STANDARD W4



MAIN DIA	CONCRETE COLLAR DIM.				REINFORCING STEEL
	A	B	C	D	
16"	1'-3"	6'-6"	6'-6"	1'-6"	#8 @ 12" O.C. E.W.E.F.
12"	1'-2"	5'-3"	5'-3"	1'-0"	#7 @ 12" O.C. E.W.E.F.
6" or 8"	1'-0"	4'-0"	4'-0"	0'-8"	#6 @ 12" O.C. E.W.E.F.

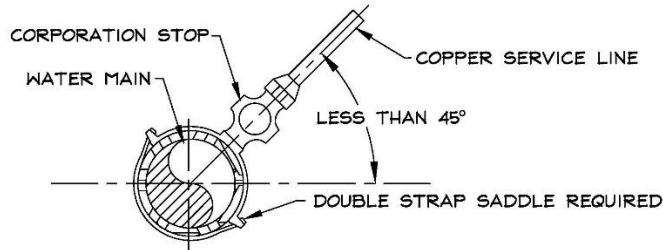
TEST PRESSURE: 200 P.S.I.  
 SOIL BEARING PRESSURE: 3000 P.S.F.



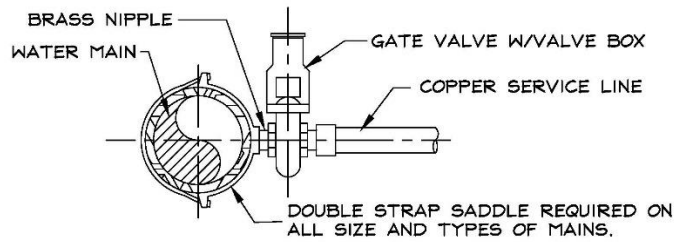
WATER MAIN TERMINATION  
 STANDARD DETAILS  
 WATER SYSTEM CONSTRUCTION

DATE: FEBRUARY 2023  
 SCALE: N.T.S.

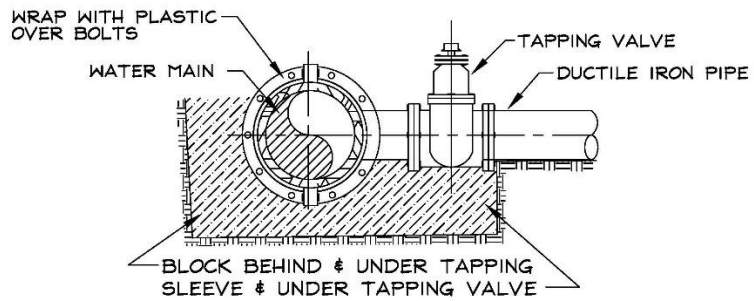
STANDARD W5



**3/4" & 1" SERVICE CONNECTIONS**



**2" SERVICE CONNECTIONS**

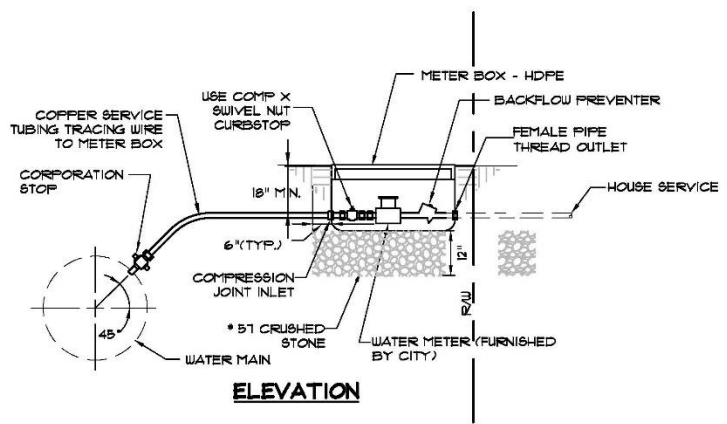
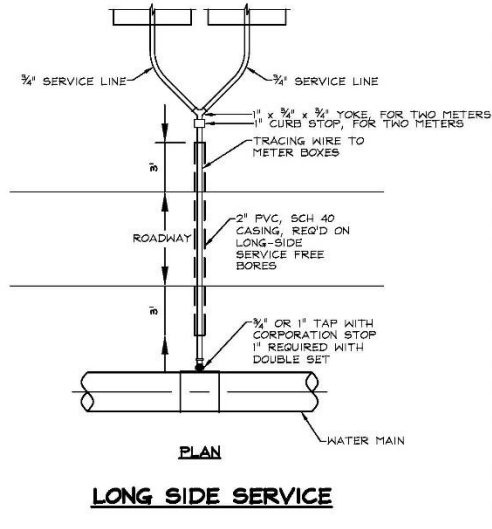
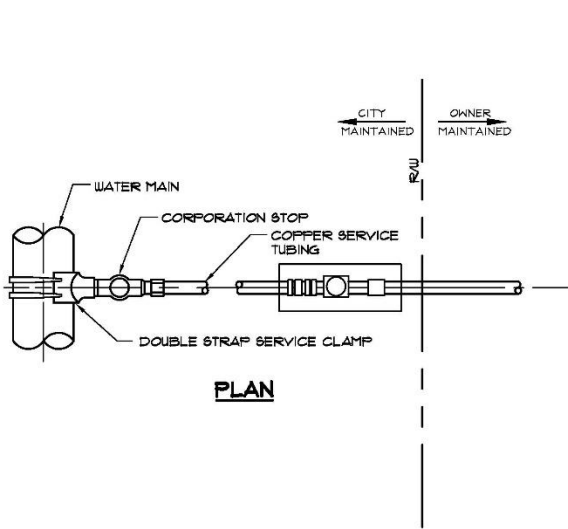


**3" AND GREATER SERVICE CONNECTIONS**



CONNECTIONS TO WATER MAIN  
STANDARD DETAILS  
WATER SYSTEM CONSTRUCTION

DATE: FEBRUARY 2023  
SCALE: N.T.S.  
STANDARD W6

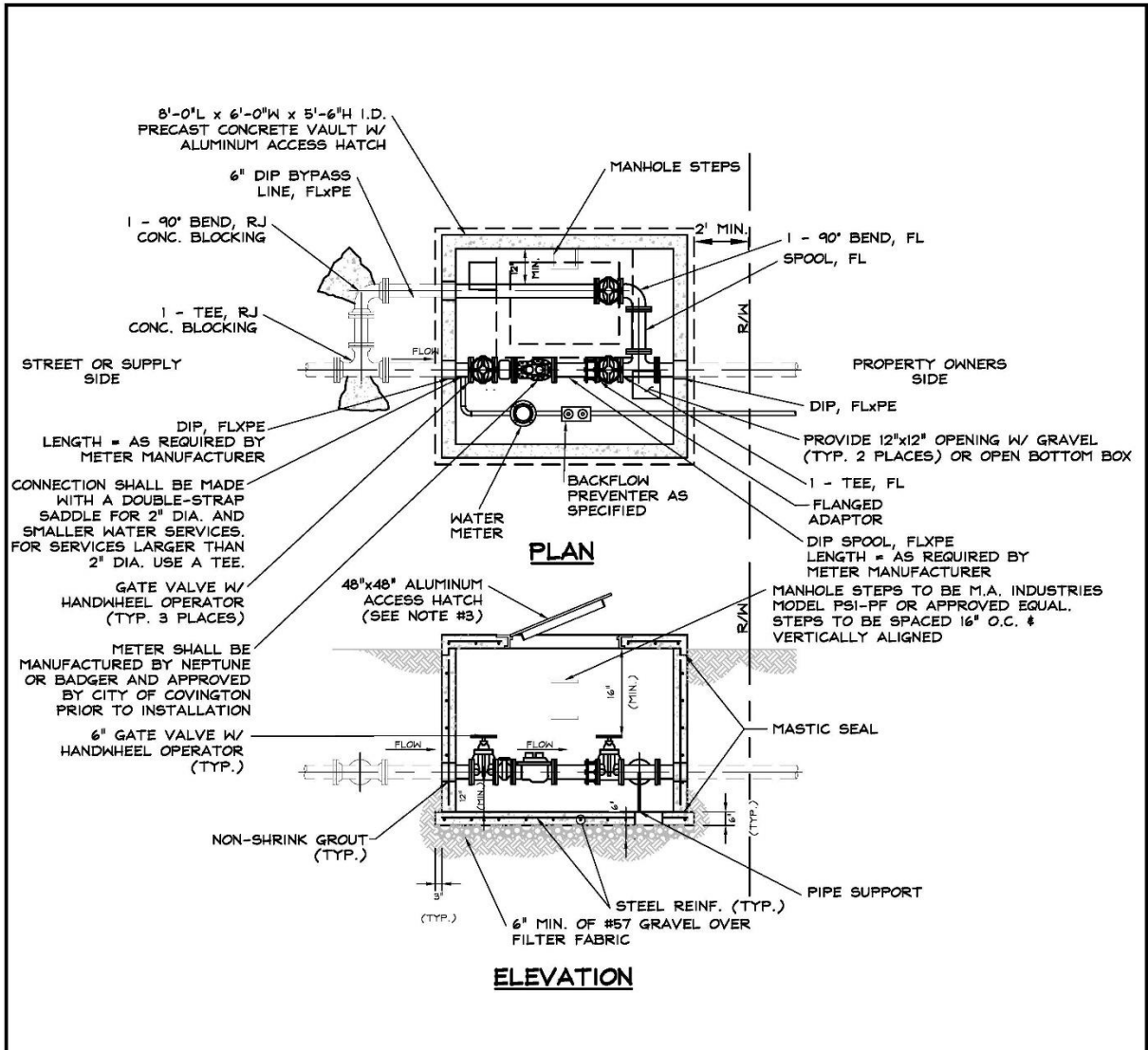


**3/4" OR 1" WATER SERVICE & METER CONNECTION**

**STANDARD DETAILS**  
**WATER SYSTEM CONSTRUCTION**

DATE: FEBRUARY 2023  
SCALE: N.T.S.

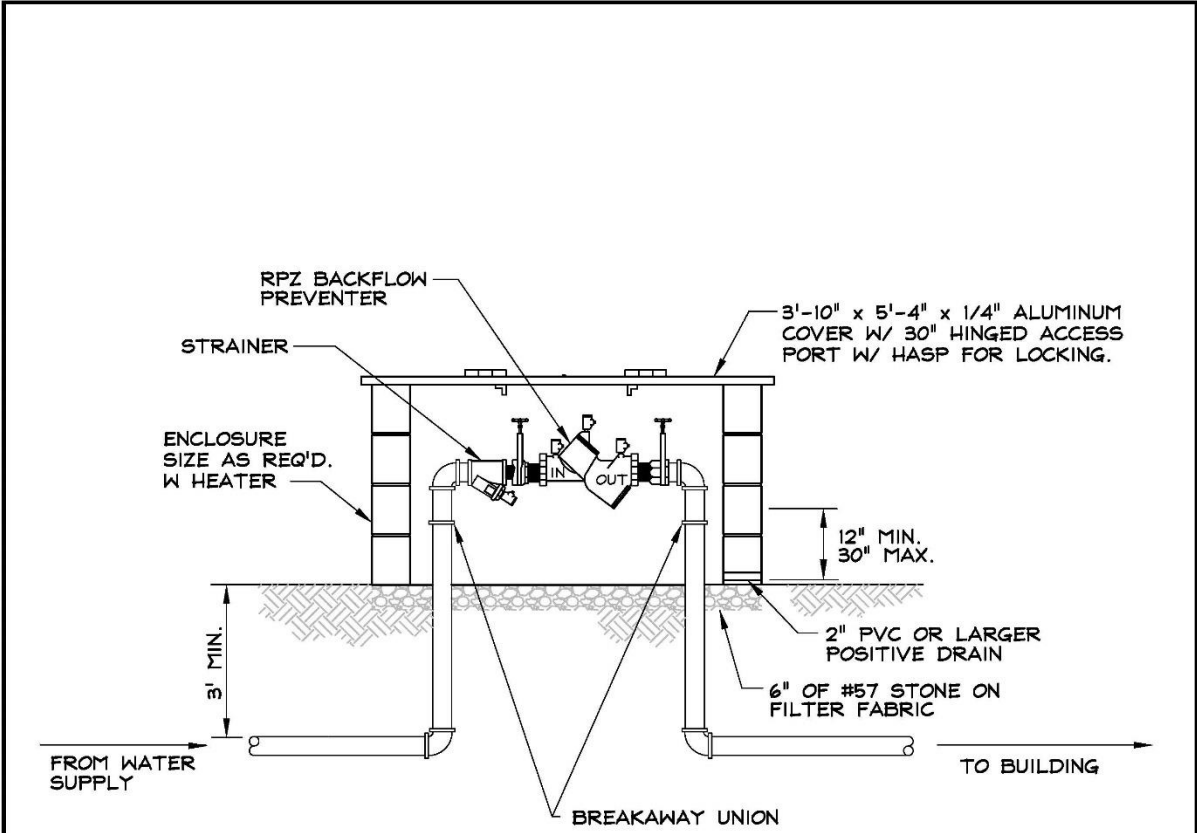
**STANDARD W7**



- NOTES:**
1. VAULT - 4,000 PSI REINFORCED PRECAST CONCRETE, CONTRACTOR'S OPTION.
  2. TOP OF VAULT ELEVATION TO BE 3" - 6" ABOVE FINISHED GRADE.
  3. ALUMINUM HATCH EQUAL TO BILCO, 300 PSF, STAINLESS STEEL HARDWARE WITH RECESSED PADLOCK HASP.
  4. VAULT MFR. SHALL CAST HATCH FLUSH IN TOP SLAB.
  5. PROVIDE MIN. 4'-0" COVER OVER LINES OR PER APPROVED SITE DRAWINGS.
  6. CLASS 350 DIP REQ'D; RESTRAIN MJ WITH MEGA-LUGS FOR BURIED SERVICE, FIELD-LOK OR TR-FLEX RJ FOR PUSH-ON JOINTS.
  7. CLASS 125 FLANGE JOINTS INSIDE VAULT: FLANGE DIP = THICKNESS CLASS 53.
  8. JOINTS IMMEDIATELY UPSTREAM OR DOWNSTREAM OF VAULT SHALL BE RESTRAINED JOINT
  9. PRESSURE TEST AND DISINFECT IN ACCORDANCE W/ AWWA.
  10. TESTABLE PER AWWA STANDARDS.
  11. BACK FLOW PREVENTION, SHALL BE INSTALLED AS SPECIFIED, ON PROPERTY OWNER'S SIDE OF METER.

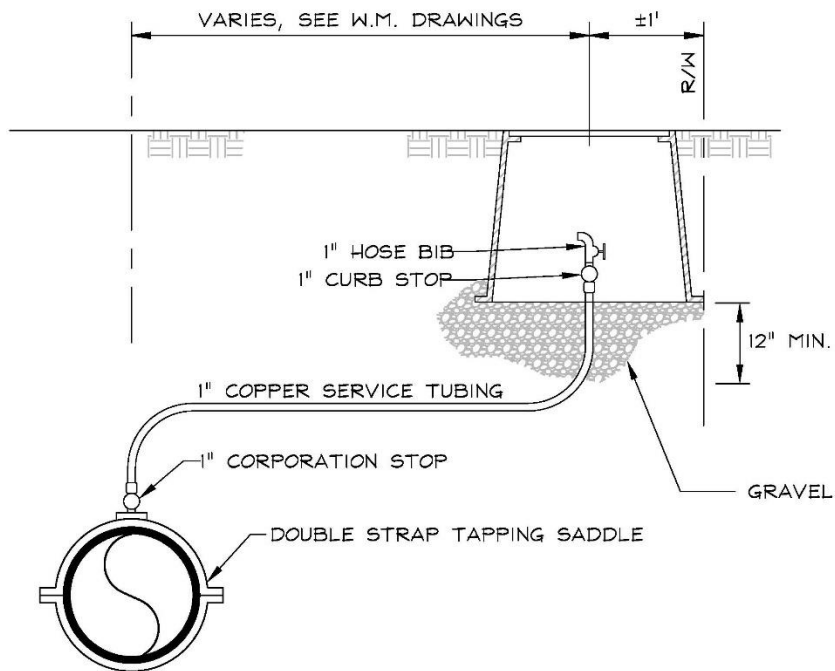
	<b>METERS 3" &amp; LARGER</b>	DATE: FEBRUARY 2023
	<b>STANDARD DETAILS WATER SYSTEM CONSTRUCTION</b>	SCALE: N.T.S.
		<b>STANDARD W8</b>





- NOTE:**
- 1) RPZ TO BE OWNER MAINTAINED
  - 2) ENCLOSURE SHOULD BE HEATED OR INSULATED TO PROTECT FROM FREEZING
  - 3) ENCLOSURE SHALL HAVE GROUND ANCHOR CAPABILITIES AND BE KEPT LOCKED AT ALL TIMES
  - 4) AT OWNER'S OPTION, A BYPASS LINE MAY BE INSTALLED FOR SERVICING THE RPZ. BYPASS SHALL HAVE A VALVE THAT IS LOCKABLE BY THE CITY.

	<b>RPZ BACKFLOW PREVENTER FOR 2" &amp; GREATER SERVICES</b>	DATE: FEBRUARY 2023 SCALE: N.T.S.
	<b>STANDARD DETAILS WATER SYSTEM CONSTRUCTION</b>	<b>STANDARD W9</b>



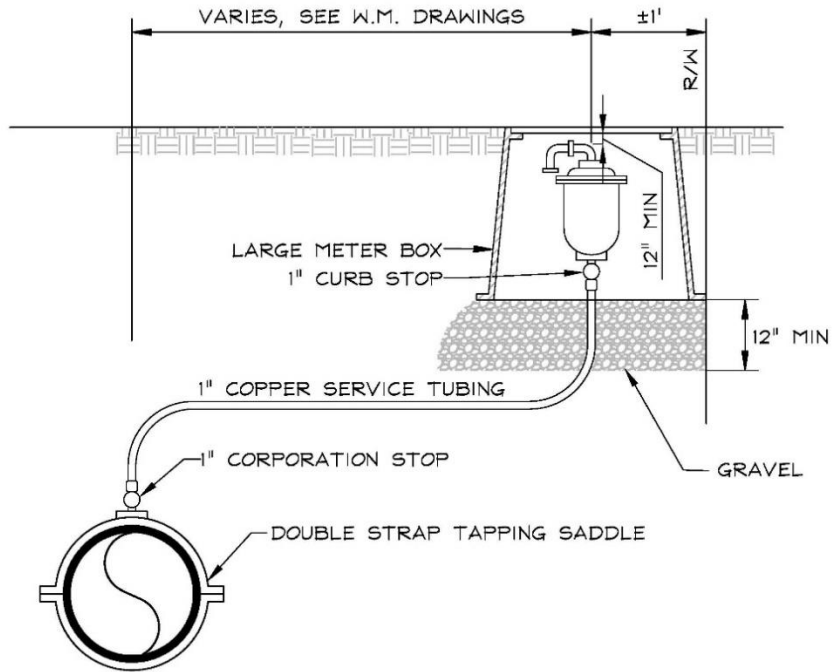
MANUAL AIR RELEASE / SAMPLE TAP

STANDARD DETAILS  
WATER SYSTEM CONSTRUCTION

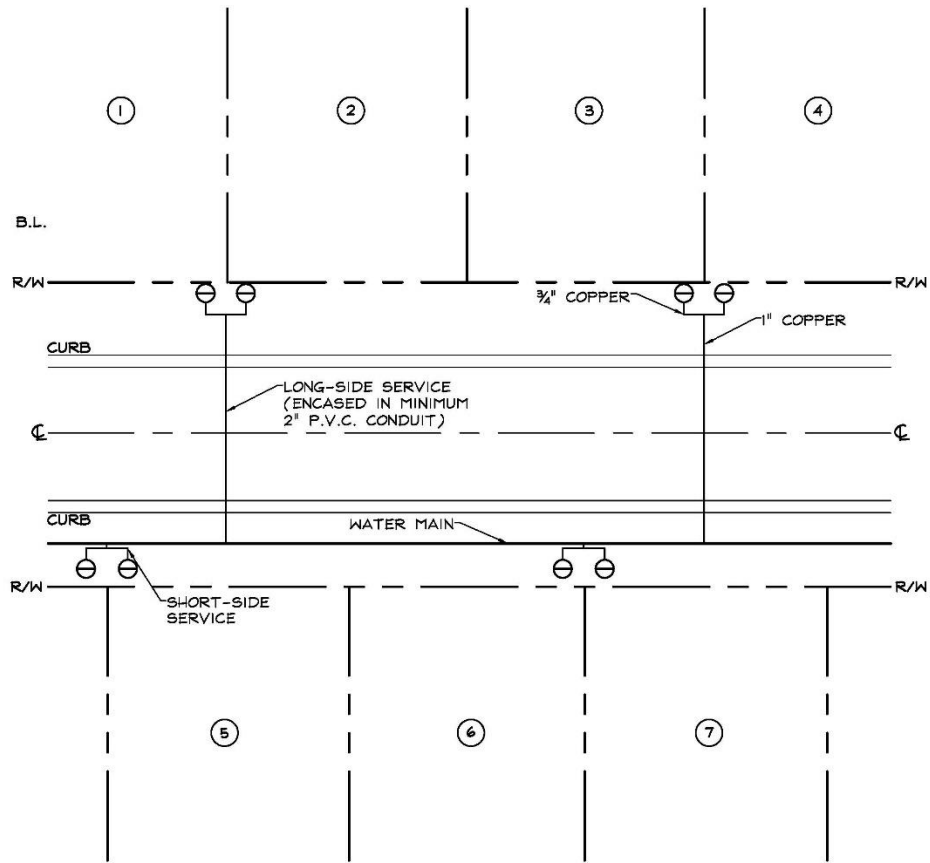
DATE: FEBRUARY 2023

SCALE: N.T.S.

STANDARD W10



	AIR RELEASE VALVE	DATE: FEBRUARY 2023
	STANDARD DETAILS WATER SYSTEM CONSTRUCTION	SCALE: N.T.S.
		STANDARD WII

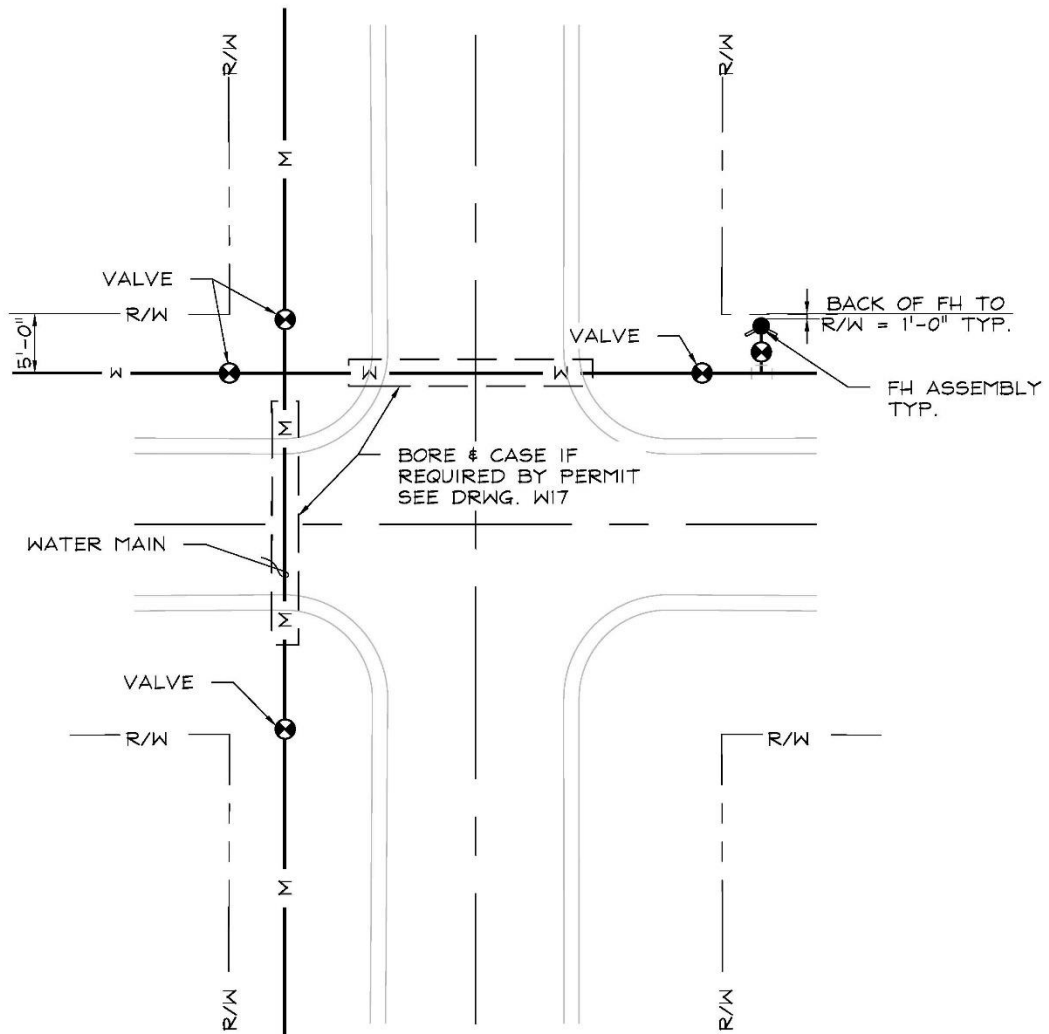


3/4" WATER METER LOCATION  
FOR SUBDIVISIONS

STANDARD DETAILS  
WATER SYSTEM CONSTRUCTION

DATE: FEBRUARY 2023  
SCALE: N.T.S.

STANDARD W12



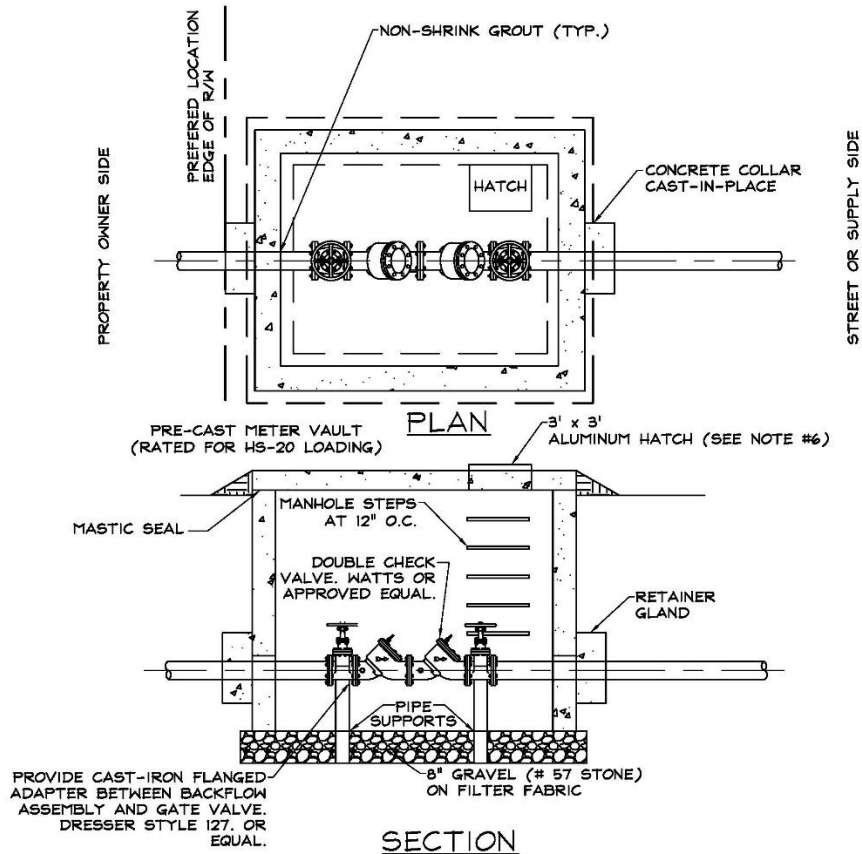
INTERSECTION



WATER MAIN LOCATION  
 GDOT & COUNTY ROAD  
 STANDARD DETAILS  
 WATER SYSTEM CONSTRUCTION

DATE: FEBRUARY 2023  
 SCALE: N.T.S.

STANDARD W13



**NOTES:**

1. BOXES EXCEEDING 7' IN DEPTH MUST BE APPROVED BY THE CITY.
2. WHEN METER BOX CANNOT BE LOCATED ENTIRELY ON R/W, A PERMANENT EASEMENT SHALL BE OBTAINED TO PREVENT FENCES OR OTHER OBSTRUCTION FROM BEING ERRECTED AROUND THE METER BOX.
3. COVER OPENING & STEPS TO BE PLACED NEAREST THE METER REGISTER.
4. THESE BOXES ARE NOT TO BE INSTALLED IN TRAFFIC AREAS WITHOUT PRIOR PERMISSION FROM THE CITY.
5. ALL VALVES AND FITTINGS INSIDE THE VAULT SHALL BE FLANGED.
6. ALUMINUM HATCH EQUAL TO BILCO, 300 PSF, STAINLESS STEEL HARDWARE WITH RECESSED PADLOCK HASP.

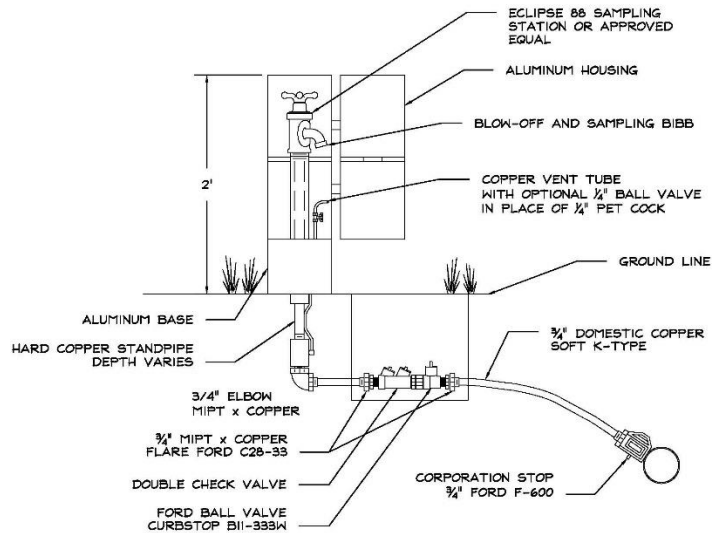


**DOUBLE CHECK BACKFLOW  
PREVENTER DETAIL**

**STANDARD DETAILS  
WATER SYSTEM CONSTRUCTION**

DATE: FEBRUARY 2023  
SCALE: N.T.S.

STANDARD W14



SAMPLING STATIONS SHALL BE BURIED WITH A 3/4" FIP INLET, AND A (3/4" HOSE OR UNTHREADED) NOZZLE.

ALL STATIONS SHALL BE ENCLOSED IN A LOCKABLE, NON-REMOVABLE, ALUMINUM-CAST HOUSING.

WHEN OPENED, THE STATION SHALL REQUIRE NO KEY FOR OPERATION, AND THE WATER WILL FLOW IN AN ALL BRASS WATERWAY.

ALL WORKING PARTS WILL ALSO BE OF BRASS AND BE REMOVABLE FROM ABOVE GROUND WITH NO DIGGING. EXTERIOR PIPING SHALL BE GALVANIZED STEEL (BRASS PIPE ALSO AVAILABLE).

A COPPER VENT TUBE WILL ENABLE EACH STATION TO BE PUMPED FREE OF STANDING WATER TO PREVENT FREEZING AND TO MINIMIZE BACTERIA GROWTH.

THE SAMPLING STATION SHALL BE AN ECLIPSE NO. 88 OR APPROVED EQUAL.



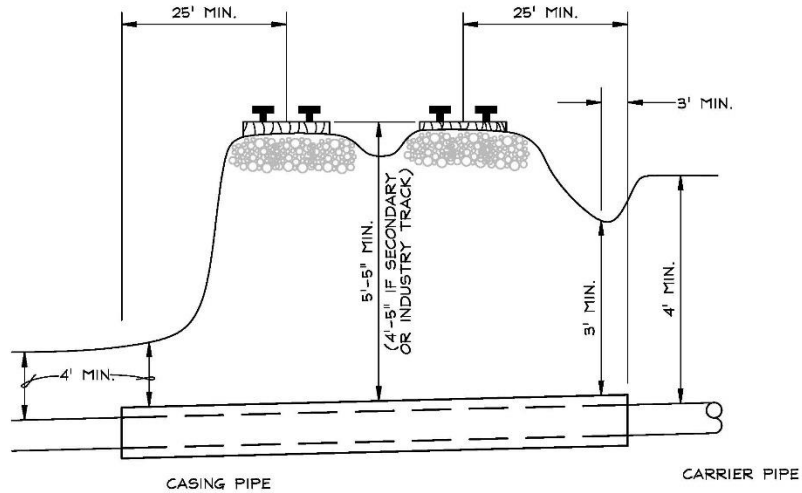
**SAMPLING STATION  
DETAIL**

---

**STANDARD DETAILS  
WATER SYSTEM CONSTRUCTION**

DATE: FEBRUARY 2023  
SCALE: N.T.S.

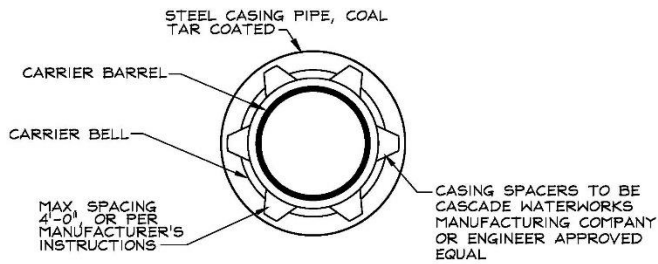
STANDARD W15



NOTE: CONSTRUCTION IN RAILROAD RIGHT-OF-WAYS SHALL CONFORM TO AMERICAN RAILWAY ENGINEERING SPECIFICATIONS AND CASING SHALL BE SUPPLIED AS SPECIFIED IN THE DEVELOPMENT STANDARDS.

NOTE: BOTH ENDS OF CASING SHALL BE PROTECTED AGAINST ENTRANCE OF FOREIGN MATERIAL.

PLAN



CROSS SECTION  
CARRIER IN CASING



**RAILROAD UTILITY CROSSING  
DETAIL**  
**STANDARD DETAILS  
WATER SYSTEM CONSTRUCTION**

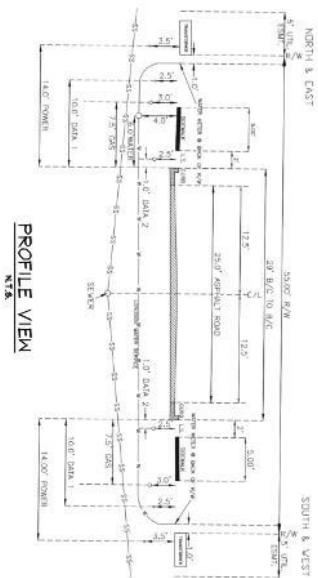
DATE: FEBRUARY 2023  
SCALE: N.T.S.

STANDARD W16

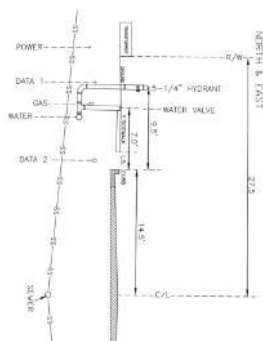




# CITY OF COVINGTON, GEORGIA UTILITY PLACEMENT STANDARD 55' R/W

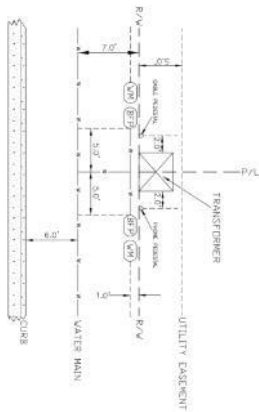


**PROFILE VIEW**  
N.T.S.



NOTE: GAS, LINE AND DATA 1 MAY DEVIATE FROM STANDARD PLACEMENT DETAIL AT HYDRANT LOCATION TO AVOID CONFLICTS.

- NOTES:
- 1) THE CURB AND GUTTER SHALL BE INSTALLED PRIOR TO THE INSTALLATION OF WATER, GAS, AND UTILITY LINES.
  - 2) COORDINATE CURB LOCATIONS WITH UTILITY PROVIDERS PRIOR TO CURB INSTALLATION.
  - 3) FIRE HYDRANTS, WATER METERS, & CATCH BASINS SHALL BE INSTALLED WITHIN THE 5 FOOT UTILITY EASEMENT.
  - 4) NO OBSTRUCTIONS SHALL BE LOCATED WITHIN THE 5 FOOT UTILITY EASEMENT.
  - 5) SEWER SERVICE LATERALS SHALL BE LOCATED MAIN LINE WITHIN THE RIGHT OF WAY AND SHALL PING TO A BURY OF 18" AT THE WATER METER LOCATION.



**PLAN VIEW**  
N.T.S.

06-01-2023 mrc

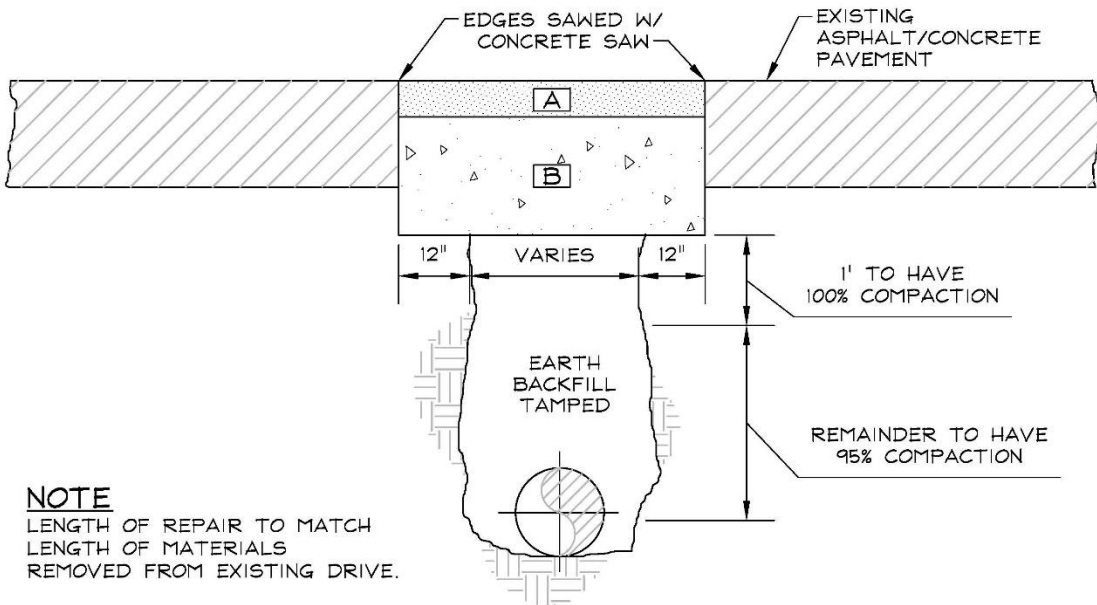
55' R/W UTILITY PLACEMENT STANDARD 6-1-2023 & OVER



## UTILITY PLACEMENT STANDARDS DETAIL STANDARD DETAILS WATER SYSTEM CONSTRUCTION

DATE: FEBRUARY 2023  
SCALE: N.T.S.

STANDARD W18



**NOTE**  
 LENGTH OF REPAIR TO MATCH  
 LENGTH OF MATERIALS  
 REMOVED FROM EXISTING DRIVE.

**CONCRETE ROADWAY**

A: 8" CLASS "B" CONCRETE  
 PER GDOT SPEC 500

B: N/A

**ASPHALT ROADWAY**

A: TOP 2" OF PATCH TO BE REPLACED WITH SAME MATERIAL  
 AS EXISTING SURFACE. BITUMINOUS TACK COAT OR PRIME  
 APPLIED BEFORE PLACEMENT OF ASPHALTIC TOP.

B: 8" CLASS "A" PORTLAND CEMENT CONCRETE

**CONCRETE DRIVEWAY**

A: 6" CLASS "B" CONCRETE  
 PER GDOT SPEC 500

B: N/A

**GRAVEL DRIVEWAY**

A: 6" GRAVEL

B: N/A

**ASPHALT DRIVEWAY**

A: 2" TYPE F ASPHALT

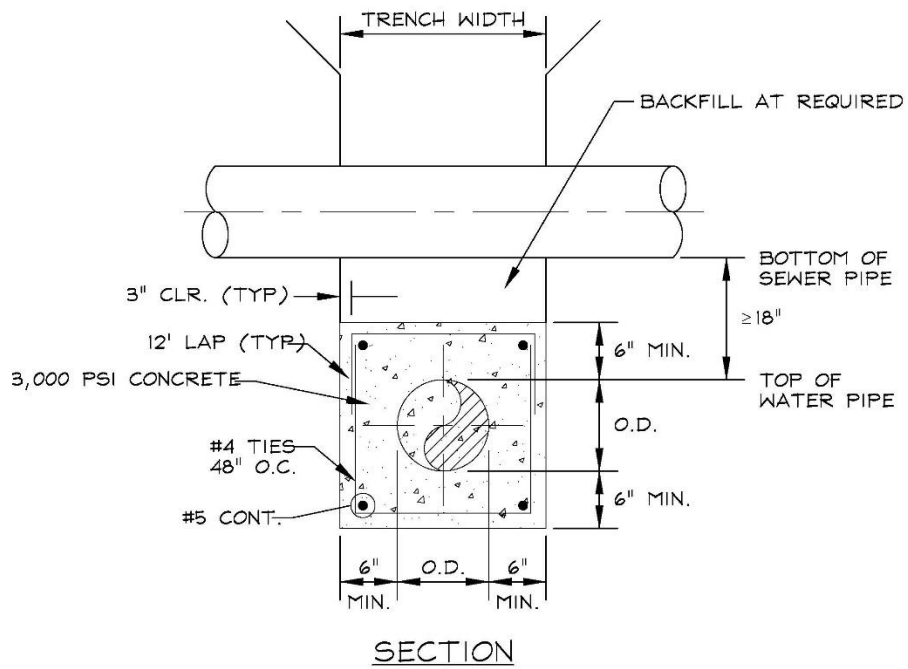
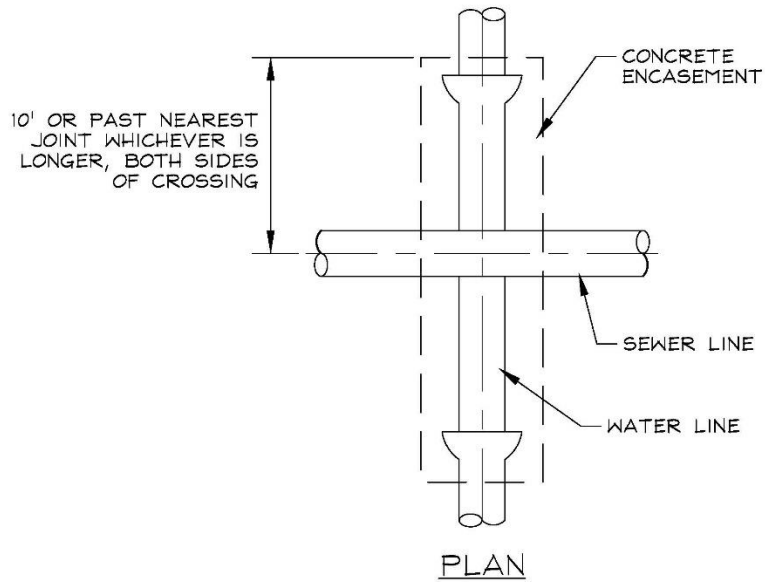
B: N/A



**PAVEMENT REPLACEMENT  
 DETAIL**  
**STANDARD DETAILS  
 WATER SYSTEM CONSTRUCTION**

DATE: FEBRUARY 2023  
 SCALE: N.T.S.

STANDARD W19

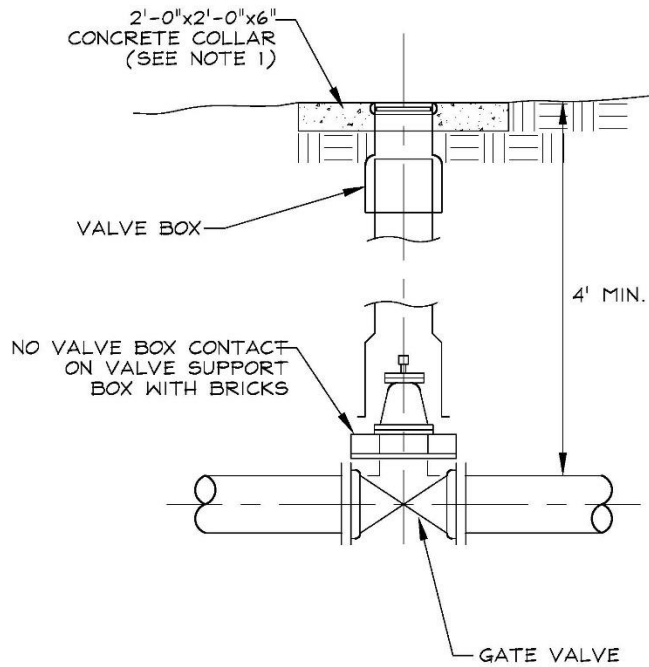


CONCRETE ENCASEMENT  
DETAIL

STANDARD DETAILS  
WATER SYSTEM CONSTRUCTION


DATE: FEBRUARY 2023  
SCALE: N.T.S.

STANDARD W20



**NOTES**

1. TYPE II CONCRETE IN ACCORDANCE WITH ASTM C 150 FOR ALL UNPAVED AREAS. CENTER WITH #4 REBAR EA. SIDE, EA. WAY.
2. WHERE DEPTH TO MAIN REQUIRES, PROVIDE VALVE EXTENSION.

	<b>GATE VALVE DETAIL</b>	DATE: FEBRUARY 2023 SCALE: N.T.S.
	<b>STANDARD DETAILS WATER SYSTEM CONSTRUCTION</b>	<b>STANDARD W21</b>

**SECTION 9 APPENDIX B - DRINKING WATER SUBMITTAL FORM**



**ENVIRONMENTAL PROTECTION DIVISION**

Drinking Water Permitting Unit  
 Phone: (404) 656-2750  
 Fax: (404) 651-9590

**Richard E. Dunn, Director**

**Watershed Protection Branch**  
 2 Martin Luther King, Jr. Drive  
 Suite 1152, East Tower  
 Atlanta, Georgia 30334  
 404-463-1511

**Drinking Water Project Submittal Form**

Water System Name: \_\_\_\_\_ WSID: \_\_\_\_\_

This project is:

- A new water system to be served by:  Wells  Surface water  Purchased water  
 An extension to an existing system

**General Project Information:**

Project Name: \_\_\_\_\_  
 Project Description: \_\_\_\_\_  
 Project Location: \_\_\_\_\_ County: \_\_\_\_\_

**Type of project:**

<input type="checkbox"/> Water Line Extension (i.e. Subdivisions, Industrial Parks, etc)	<input type="checkbox"/> Transmission Main Extension	<input type="checkbox"/> New Source
<input type="checkbox"/> Treatment	<input type="checkbox"/> Storage	<input type="checkbox"/> Pumps
Other: _____		

**Complete, as applicable, for proposed project:**

New Service Connections: \_\_\_\_\_ Water Line Material: \_\_\_\_\_  
 Size(s) of Water Lines \_\_\_\_\_ Length(s) of Water Line: \_\_\_\_\_  
 Wastewater Disposal by:  Sewer  Septic Tank

For water line extensions to existing systems provide the following information for the proposed point of tie-in:

Static pressure\* (psi) \_\_\_\_\_ Elevation (ft) \_\_\_\_\_  
 Flow available (gpm) \_\_\_\_\_ Residual pressure (psi): \_\_\_\_\_  
 Size of existing main (in) \_\_\_\_\_ \*Attach 24-hour pressure test to this form

**PLEASE NOTE:** ALL APPLICABLE APPROVALS AND/OR PERMITS RELATING TO THE CONSTRUCTION OF THE PROJECT MUST BE OBTAINED PRIOR TO THE START OF ANY CONSTRUCTION, AS REQUIRED.

**To the best of my knowledge, the above named project conforms with all applicable state and local government requirements for the approval of public drinking water supply construction projects.**

**Signature:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Name:** \_\_\_\_\_ **Title:** \_\_\_\_\_

For governmentally owned water systems (Cities, Counties, and Authorities):

To the best of my knowledge, the water system is in compliance with the Service Delivery Strategy (House Bill 489, 1997) for all counties in which its boundaries lie.

Owner's or Authorized Agent's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Revised 4/17/2017

# SECTION 10 APPENDIX C - SANITARY SEWER EXTENSION SUBMITTAL FORM

## SANITARY SEWER EXTENSION SUBMITTAL FORM

Submitted for review pursuant Georgia Rules for Water Quality Control Chapter 391-3-6-.02(3)(a) are this form and attachments (as applicable):

- Project Description, design data
- Funding Source** \_\_\_\_\_
- General map of proposed sewer extensions, outlined proposed service area, connection to the existing system, and flood plain contours and elevations if applicable
- Downstream Flow Schematic
- Plans (**one copy**)
- Specifications (**one copy**)

**Part I- General Information**

- a. Name of local government \_\_\_\_\_
- b. Local government official \_\_\_\_\_
- c. Mailing Address \_\_\_\_\_  
 \_\_\_\_\_  
 City, County, State, Zip Code \_\_\_\_\_
- d. Project name or identification \_\_\_\_\_
- e. Designing engineer(s) \_\_\_\_\_
- f. GA P.E. # \_\_\_\_\_ Expiration Date \_\_\_\_\_
- g. Mailing Address \_\_\_\_\_  
 \_\_\_\_\_  
 City, County, State, Zip Code \_\_\_\_\_

**Part II. – Treatment System Information**

- a. Wastewater treatment plant to which extensions are tributary  
 Name \_\_\_\_\_  
 Permit flow \_\_\_\_\_ MGD      Current Peak Flow \_\_\_\_\_ MGD  
 Permit # \_\_\_\_\_
- b. In the table below list the average daily flow (MGD) and effluent concentrations (mg/l) for biochemical oxygen demand (BOD<sub>5</sub>), suspended solids (SS), Nitrogen (as NH<sub>3</sub>), and phosphorus (P) for the last 12 months (preceding the sewer extension submittal) for the wastewater (from discharge monitoring reports).

<u>Month</u>	<u>Flow</u>	<u>BOD<sub>5</sub></u>	<u>SS</u>	<u>NH<sub>3</sub></u>	<u>P</u>	<u>Month</u>	<u>Flow</u>	<u>BOD<sub>5</sub></u>	<u>NH<sub>3</sub></u>	<u>P</u>	<u>SS</u>
January						July					
February						August					
March						September					
April						October					
May						November					
June						December					

**SANITARY SEWER EXTENSION SUBMITTAL FORM**

**Part III- Project Information**

- a. Name and address of the Developer. If not a local government please include a certified statement (as indicated in Section IV of this form).

\_\_\_\_\_  
Name

\_\_\_\_\_  
Mailing Address

\_\_\_\_\_  
City, County, State, Zip Code

- b. Proposed service area for this project.

Immediate \_\_\_\_\_ acres      Ultimate \_\_\_\_\_ acres

- c. Type of developments: (check as applicable)

Industrial \_\_\_\_\_ Residential \_\_\_\_\_ Commercial \_\_\_\_\_

Other \_\_\_\_\_ (explain) \_\_\_\_\_

- d. Population to be served

Population \_\_\_\_\_ Density/acre \_\_\_\_\_

- e. Per capita wastewater contribution

Average \_\_\_\_\_ GPD Peak \_\_\_\_\_ GPD

- f. If receiving industrial wastewater, describe industrial waste characteristics.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Quantity \_\_\_\_\_ GPD. Describe pretreatment received (if any)

\_\_\_\_\_  
(use extra sheet if needed)

- g. Average Design Flow (this project) \_\_\_\_\_ GPD Peak \_\_\_\_\_ GPD

or max. pipe capacity \_\_\_\_\_

- h. Design BOD (this project)

Average \_\_\_\_\_ lbs/day



**SANITARY SEWER EXTENSION SUBMITTAL FORM**

- i. List nominal pipe diameter(s) and length

---

---

---

---

- j. List number, size and type of pump stations (if any)

---

---

Please submit design calculations with this form. Include system head calculations; pump curves, system curves, and buoyancies calculations, etc.

**Part IV- Certification**

- a. Provide the name of the Georgia P.E. that the project inspector will report to:

\_\_\_\_\_ Georgia P.E. # \_\_\_\_\_

- b. Provide the name of the local government who will own and maintain the proposed sewers if it is different from the authority responsible for treatment of wastewater from this project.

\_\_\_\_\_

- c. As the authority responsible for the treatment of wastewater from this project, I certify that: a) this project has been reviewed, b) the existing system has adequate transport and treatment capacity to treat wastewater generated from this project, c) we are willing to accept the project wastewater for treatment; d) that the sewers are not constructed on or serving structures constructed or proposed to be constructed on solid waste landfills; and e) we are willing to accept ownership and maintain the proposed sewers.

To the best of my knowledge, I certify that the above information is true and correct.

Signature \_\_\_\_\_

Responsible Local Official

Name (Print) \_\_\_\_\_

Title or Position \_\_\_\_\_

Date \_\_\_\_\_

Please provide any additional comments on a separate sheet of paper.

Submit completed form to: **DEPARTMENT OF NATURAL RESOURCES  
ENVIRONMENTAL PROTECTION DIVISION  
WASTEWATER REGULATORY PROGRAM  
2 MARTIN LUTHER KING, JR. DRIVE, SUITE 1152 EAST  
ATLANTA, GEORGIA 30334**

**SANITARY SEWER EXTENSION SUBMITTAL FORM**  
Information Sheet

The following information is provided to help you understand the reasons that a form must be completed and accompany each sanitary sewer extension request.

**Question:** Why is a form needed?

**Answer:** To enable us to process the extension request efficiently and to let us know if further review information is needed.

**Question:** How does one complete the form?

**Answer:** Answer each question in the space provided and refer to the checklist when appropriate. Below are brief explanations of the information is required.

**Part I** Provide the name of the local government in which the proposed sewer extension will be located. Provide the name of the local government official to whom the correspondence should be addressed.

Provide the name of firm, which prepares the sewerage plans and specifications and the name of the Georgia registered professional engineer who signed the plans.

**Part II** Provide the name of the wastewater treatment facility to which the proposed sewer extension(s) will be tributary. Provide wastewater treatment plant permitted flow in million gallons per day to the wastewater treatment facility listed in Part II.

From the discharge monitoring reports for the wastewater treatment facility, for the months listed, provide the flow, biochemical oxygen demand (BOD<sub>5</sub>), suspended solids (SS), Nitrogen (NH<sub>3</sub>), and Phosphorus (P) for the 12 months preceding the sewer extension submittal.

**Part III** Provide the name and address of the developer (firm) requesting the sewer extension. If the party responsible for initiating the sewer extension request is not a local government, a certified statement will be required.

Immediate acres to be served by this project includes development directly tributary to the proposed sewer extension. Ultimate acres to be served by this project includes development that will be tributary to the proposed sewer extension in the future.

Population density for the immediate service area should be listed. Dividing the population served by the immediate acres should equal the density per acre.

Average gallons per day per capita wastewater contribution should be based on realistic, preferably documentable data for residential development and documentable, equivalent flows for commercial and industrial development. The peaking factor should reflect documentable flow data for the appropriate types of development.

List pollutants and their concentration in mg/L and quantity in gallons per day of industrial wastewater discharging to the proposed sewer extension. Briefly describe the industrial pretreatment process employed.

Provide the average flow in gallons per day for the proposed sewer extension for the immediate service area. The second blank shows either the capacity of the sewer pipe for the proposed sewer extension or the ultimate flow in gallons per day if it is less than the pipe capacity.

Biochemical oxygen demand (5-day) for the immediate service area.

## SANITARY SEWER EXTENSION SUBMITTAL FORM

Provide a list of nominal pipe diameters to be used in this project in this blank (8-inch, 12-inch, etc.).

### Part IV

Provide the name of the Georgia registered professional engineer who the project inspector will report to. If the project inspector is a Georgia registered professional engineer, list the name of the project inspector.

EPD requires all sewers to be owned and maintained by the local government to which the extensions are tributary.

The local government with in-house sanitary engineering capability must review and approve the plans and specifications and provide downstream flow schematics. The local government (with no in-house sanitary engineering capability) must provide a certified statement that it is willing to accept the project wastewater for treatment and ownership of the sewers and pump stations. The local government must certify that the proposed sewers are not constructed on or serving structures constructed or proposed to be constructed on solid waste landfills.

**SECTION 11 APPENDIX D - SAMPLE UTILITY EASEMENT AGREEMENT**

STATE OF GEORGIA  
COUNTY OF NEWTON

UTILITY EASEMENT

THIS GRANT OF EASEMENT made this \_\_\_\_ day of \_\_\_\_\_, 20\_\_ by and between \_\_\_\_\_, as party of the first part (hereinafter called "Grantor"), to **THE CITY OF COVINGTON**, a Georgia municipal corporation of Newton County, Georgia, as party of the second part (hereinafter called "Grantee").

WITNESSETH: That the Grantor, for and in consideration of the recitals herein contained, including the special conditions below, if any, and the sum of TEN DOLLARS and other valuable consideration, cash in hand paid, at and before the sealing and delivery of these presents, the receipt whereof being hereby acknowledged, has granted, bargained, sold and conveyed, and by these presents does, grant bargain, sell and convey unto the Grantee, its successors and assigns, a construction and permanent easement and perpetual right-of-way over, across and under the property of the Grantor located in Land Lot \_\_\_\_ of the \_\_\_\_\_ Land District, Newton County, Georgia, all as more particularly described as follows and shown on Exhibit "A":

Grantee shall have permission to use at least a width of \_\_\_\_\_ (\_\_\_\_') feet wide during construction, all as shown on the aforementioned plat.

The easements covered by this instrument are for construction and operation of an \_\_\_\_" water and/or sewer main, together with the right to go upon said land to inspect, maintain and repair the same as may from time to time be necessary; with all the rights, members and appurtenances to said easements in anywise appertaining to or belonging.

It is agreed by the Grantee that it will install the water and/or sewer main herein authorized in a workmanlike manner and upon the completion of same will remove from the property all severed bushes, underbrush, branches and trees along with other debris, including excess dirt that might have accumulated by reason of the required excavation, and will restore the terrain to its original condition insofar as reasonably possible in view of the necessary construction.

TO HAVE AND TO HOLD the said described easement unto the Grantee, its successors and assigns, so that neither the Grantor nor the Grantor's successors or assigns, nor any other person or persons claiming under the Grantor, shall at any time have, claim or demand any right, title or interest to the aforesaid easement or its appurtenances.

IN WITNESS WHEREOF, the Grantor, by and through its undersigned duly authorized officers, has executed this grant of easement under seal, the day and year first above written.

Signed, sealed and delivered  
in the presence of:

OWNER:

\_\_\_\_\_  
Unofficial Witness

\_\_\_\_\_  
BY:  
AS ITS:

\_\_\_\_\_  
Notary Public

Attest: \_\_\_\_\_  
Secretary  
SEAL

(NOTARIAL SEAL)

## **SECTION 12 APPENDIX E - DESIGN CHECKLIST**

### 12.1 WATER SYSTEM

- Site plan contains water layout only (topographic overlay required).
- Pipe locations and sizes are indicated (8" minimum for water mains except as described herein).
- Materials - ductile iron pipe required under all intersections, stream crossings, road crossings, over and under all cross drains and at all other locations specified by the City.
- Location and size of gate valves at intersections, along water mains, at fire hydrants, and at connection to existing mains.
- Thrust restraint at all bends and tees.
- Location of all existing and proposed fire hydrants.
- Existing water main locations, sizes, and types of material surrounding the project.
- Detail of connection to existing water main.
- Nearest existing line valves on both sides of connection to existing water main.
- Proposed meter sizes and locations.
- Water mains on north and east side of road.
- If proposed line crosses private property, a 20-foot permanent easement must be provided.
- Minimum Details:
  - a. Fire hydrant at end of line in cul-de-sacs
  - b. Air & Vacuum release valve assembly
  - c. House service installation
  - d. Line valve
  - e. Typical fire hydrant installation
- Location of air release valves.
- A gate valve and a minimum of 36 feet of pipe shall be provided at the end of all lines for phased developments. The end of the line shall be provided with temporary plug and concrete thrust collar.
- Detail dead end line with one full joint of D.I. Pipe, Fire Hydrant, M.J. Plug, Retainer Glands and concrete thrust blocking.
- Horizontal separation of at least 10 feet between water main and existing or proposed sewer (measured edge to edge).
- Where water main crosses existing or proposed sewer, 18" vertical separation is required between the two mains (measured edge to edge) and include a note that a full joint of water main is required to be centered at sewer main crossing so that both joints are as far away from the sewer as possible.
- Water and sewer plans bear the stamp of a professional registered in the State of Georgia as required by GaEPD.
- City of Covington General Notes for Construction are located on plans.
- Utilities Protection Center detail is located on the plans.
- Existing water mains along existing roads shall be shown to be replaced with D.I.P. (if they are not already D.I.P.) beneath the proposed subdivision entrance and acceleration/deceleration lanes.
- Include the following information on the first plan sheet:
  - Water Source:
  - WSID Number: 2170001
  - Covington/Newton County Water System
  - Cornish Creek WRF

11905 Alcovy Road  
Covington, Georgia 30014  
Phone: 770-784-2128

## 12.2 SANITARY SEWER SYSTEM

- Site plan showing sewer layout (topography overlay required).
- Sewer layout should have manhole numbers, line designations, flow arrows, street names, and topography.
- Sewer layout showing proposed storm drain crossings.
- Detail tie-in of proposed lines with existing lines providing existing and proposed pipe sizes, invert elevations.
- Profile of proposed sewer lines with proposed grades.
- Where applicable normal pool elevations for water-body crossings are indicated on the profile
- Manhole numbers and locations on plan and profile.
- Outside drop-manhole designated on profile where invert "in" elevation is more than 2.0 feet above the invert "out" elevation.
- Percent grade and length on profile.
- Size of mains on profile.
- Lateral locations on plan. As-builts should have distances in feet from manhole to lateral as well as station numbers and GPS coordinates for all manholes.
- Materials to be used. Ductile Iron Pipe where required such as fills, shallow cover, less than 2 feet of clearance, over 14' of fill, etc.
- Location in profile of streams and storm drains.
- Permanent easements are to be 20 feet wide for sanitary sewer and 30 feet wide for easements containing both sanitary sewer and storm drains with indication of ownership shown on plat.
- Easements for future sewer.
- Details:
  - a. Precast concrete manhole
  - b. 6" service connection
  - c. Sewer service location
  - d. Manhole frame and cover
  - e. Class A, B, C bedding
  - f. Pipe adapter - Joining different types of pipe
  - g. Cleanout Detail
- No acute angles between "in" lines and "out" line in manhole.
- Proper manhole spacing (maximum 400').
- Sewers within minimum and maximum slope requirements for expected flow, pipe material and pipe size.
- In manholes where the pipe size increases, the crown of the smaller pipe must be at the same elevation or higher than the crown elevation of the larger pipe.
- Minimum cover of 7 feet in roadway where laterals are located to obtain 6 feet of cover over lateral at R/W limit, or D.I.P. laterals designated.
- Utilities Protection Center detail is located on the plans.