

AUGUSTA – RICHMOND COUNTY, GEORGIA

MINIMUM STANDARDS  
FOR THE DESIGN AND CONSTRUCTION  
OF WATER AND WASTEWATER SYSTEMS



PREPARED BY  
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# PREFACE

## PART 1: INTRODUCTION

Augusta Utilities Department's (AUD) MINIMUM STANDARDS FOR THE DESIGN & CONSTRUCTION OF WATER AND WASTEWATER SYSTEMS (Minimum Standards) manual identifies minimum standards and specifications, submittal requirements, and approved or acceptable procedures for water and wastewater systems of Augusta, Georgia – Richmond County. This manual applies to water and wastewater infrastructure to be inspected, dedicated, owned, operated, and maintained by AUD.

Maintainability and accessibility are both key AUD considerations towards the acceptance of a given project. It is not intended that this manual address every situation that shall arise. This document may have errors and omissions contained within and shall not substitute for professional engineering judgment. Any individual that finds any information in this manual in conflict with professionally accepted standards or newly revised laws, codes, or other standards such that it is believed that the health, safety, or welfare of the public may be compromised, is asked to bring the error, omission, or revision to the attention of Augusta Utilities Department.

These specifications shall be used in the design and construction of Augusta water and wastewater systems. The standards and specifications presented herein are subject to revisions, updates, and modifications. Said updates will be illustrated using an errata page, which will clearly identify the changes made since the last revision of the document. In case of conflicts, the following precedence will apply: Federal, State, or local regulations and/or ordinances, Augusta, GA government resolutions, Augusta, GA government approved contracts, these design standards, drawings, and specifications. Conflicts should be brought to the immediate attention of the Augusta Utilities Engineering & Construction Division.

## PART 2: DOCUMENT ORGANIZATION

This manual is presented in four chapters. A summary of the chapters and appendices is provided below to facilitate the use of this manual.

**Chapter 1 – General Requirements, Roles, and Responsibilities:** Outlines the authority and jurisdiction of the minimum standards and provides the roles and responsibilities of the users of this manual.

**Chapter 2 – Submittal Requirements and Project Design through Construction Process:** Contains the minimum criteria governing the design of water and wastewater water systems to be owned, operated, or maintained by AUD.

**Chapter 3 – Water Distribution System Design and Construction:** This chapter contains detailed technical specifications governing construction of water and water main facilities to be owned, operated, or maintained by AUD.

**Chapter 4 – Wastewater Collection System Design and Construction:** This chapter contains detailed technical specifications governing construction of wastewater and wastewater facilities to be owned, operated, or maintained by AUD.

## References

Appendix A – APPROVED ITEMS AND PRODUCT SPECIFICATIONS FOR WATER DISTRIBUTION AND WASTEWATER COLLECTION SYSTEMS

### PART 3: AUGUSTA UTILITIES DEPARTMENT WEB ACCESS

The City of Augusta Georgia's website can be found at [www.augustaga.gov](http://www.augustaga.gov). The minimum standards can be obtained via the Utilities Department <https://www.augustaga.gov/2771/Utilities> or the Planning and Development Department <https://www.augustaga.gov/336/Development-Documents> web pages.

### PART 4: REVISIONS TO MINIMUM STANDARDS

It is anticipated that revisions to the minimum standards will be made from time to time. The date appearing on the title page is the date of the latest revision. Users should apply the latest published minimum standards to the work contemplated. The standard detail drawings referenced may be revised from time to time as deemed necessary without revision to this overall document.

### PART 5: ENGINEERING POLICY

All engineering plans, reports, or documents shall be prepared by a registered Professional Engineer licensed in the State of Georgia. These documents may also be prepared by a subordinate employee under his/her responsibility for them. It shall be the engineer's responsibility to review any proposed system, extension, and/or existing system change with Augusta Utilities Department before engineering or proposed design work, to determine any special requirement or whether the proposal is permissible. An Augusta Utilities approval granted on the plans or other documents does not in any way relieve the Professional Engineer of his/her responsibility to meet all requirements of the City.

### PART 6: FORT EISENHOWER OPERATIONS

Augusta Utilities is contracted to own, operate, and maintain the water, wastewater, and non-potable irrigation utilities on Fort Eisenhower. Contact AUD for coordination of work affecting or pertaining to these utilities. Special conditions on Fort Eisenhower may apply that differ from these guidelines.

# **Chapter One – GENERAL REQUIREMENTS, ROLES, AND RESPONSIBILITIES**

## **PART 1: GENERAL**

These policies and procedures have been established to ensure that all construction of water and sanitary sewer projects that will be maintained and operated by AUD are reliable, durable, maintainable, accessible, and installed per industry approved methods that comply with the minimum standards found within this manual. AUD reserves the right to refuse or accept a design for construction if the above conditions are not met.

## **PART 2: AUTHORITY**

This manual has been approved by the Augusta Utilities Department and accepted as an official standard. This manual shall be enforced, and no part thereof altered without approval of the Utilities Department Director.

## **PART 3: JURISDICTION**

- A. This manual shall apply to water and wastewater infrastructure to be inspected, dedicated, owned, operated, and maintained by AUD.
  - 1. The improvements to be dedicated to AUD shall be constructed in compliance with the water and wastewater ordinances, subdivision regulations and the site development ordinances, and these minimum standards as amended.
  - 2. Improvements to be dedicated under the site development ordinances shall require the Design Engineer to submit certification to AUD that the improvements have been constructed according to the approved construction documents. If AUD notifies the developer or Design Engineer regarding non-compliance with the approved construction documents of faulty materials or workmanship, then such work shall be corrected. Work on the project will be suspended and/or certificate of occupancy withheld if health, safety, and welfare of the public are impacted. Laboratory tests (when appropriate) may be required for AUD to review for acceptance.
- B. Privately owned and operated water and wastewater systems that connect to AUD systems shall be constructed in accordance with this manual. AUD shall require testing and inspection on private water and wastewater systems at the point of connection.

#### PART 4: PROFESSIONAL ENGINEER ROLES AND RESPONSIBILITIES

The Professional Engineer (PE) shall be a licensed professional engineer of the State of Georgia hired by the developer/owner to prepare and design plans and project documents for the extension of new water and/or wastewater infrastructure, the improvement of existing water and/or wastewater infrastructure, or new water and/or wastewater service only.

The Professional Engineer shall submit signed, sealed, and dated design plans and calculations for all water distribution and sewer collection projects along with the following responsibilities:

- A. Request the record drawings, GIS information, and other record information to determine connection of water and/or sanitary sewer for design project.
- B. Request any hydrostatic tests, capacity studies, or any impacting information specific for the design project plan.
- C. Attend the Pre-Construction Meeting prior to the beginning of construction activities on the water and/or wastewater system.
- D. Review and ensure all water and/or sanitary sewer materials for the design project meet Augusta Utilities minimum standards and approved products list for use in system.
- E. Compile record drawings from the contractor's red-line drawings (field set) in compliance with these standards.

#### PART 5: UTILITY CONTRACTORS ROLES AND RESPONSIBILITIES

- A. The construction of AUD water and sewer infrastructure shall be performed by a contractor in possession of a current Georgia Utility Contractor's license. This licensed utility contractor shall always have a licensed utility manager onsite while work is being performed on AUD utilities by any of their unlicensed sub-contractors. This includes any required work for quality control testing of the AUD infrastructure.
- B. All utility contractors and sub-contractors will be required to be at the pre-construction meeting. If a utility contractor and/or sub-contractor is found to be working onsite that did not attend the pre-construction conference it will put the project at risk of being issued a stop work order on all water and sewer utility work until arrangements are met to get the project moving forward.
- C. AUD will hold the Primary Utility Contractor responsible for all site work and/or their sub-contractors work including warranty work for the site. Any issues with a sub-contractor's work by AUD will be the responsibility of the Primary Utility Contractor to repair said work. Any issue with sub-contractors by AUD will result in them being removed from the site and will result in the Primary Utility Contractor completing any remaining work.

## PART 6: AUGUSTA UTILITIES DEPARTMENT ROLES AND RESPONSIBILITIES

- A. Determine water and/or wastewater service availability through request of record information and GIS mapping of existing water and/or wastewater infrastructure. Request can be made via <https://forms.augustaga.gov/forms/MapRequestForm>
- B. At request, perform hydrostatic flow tests for design of water systems and fire protection systems. For more information regarding testing and associated fees, contact AUD Engineering & Construction Division.
- C. Review design plans to ensure they conform to these minimum standards and are consistent with long-term plans of the department.
- D. For design projects requiring a stand-alone permit from Georgia Department of Transportation (GDOT), AUD will submit the permit application package, as prepared by the project designer for permit consideration. See GDOT Utility Accommodation Manual for more information.
- E. Provide inspections of all water and sanitary sewer construction conforming to these minimum standards.
  - a. Any underground construction of water and/or sanitary sewer not inspected and approved prior to backfilling will be required to be removed and reinstalled before approval or acceptance.
  - b. The Contractor shall contact the Inspector at least 48-hours prior to any water or sewer system construction.
  - c. The Inspector shall always have access to the project to conduct routine visual inspections of the work.
  - d. Potholing of buried existing water and/or sewer mains may be required at the Developer's expense to allow verification that the installation meets the requirements of the Standards.
  - e. Should any inspection reveal that construction is not proceeding according to the approved plans and/or Standards, AUD may order all work stopped and all defective work removed and replaced. If a revision is necessary, the PE shall provide revised plans for review and approval before work resumes.
  - f. Work by a Contractor outside of the department's normal business hours shall require a minimum of 72-hours' notice to the Inspector and the Inspector must approve that work before it is allowed to occur. AUD reserves the right to bill the Contractor for Inspector's time after normal business hours.



## Chapter Two – SUBMITTAL REQUIREMENTS AND PROJECT DESIGN THROUGH CONSTRUCTION PROCESS

### PART 1: GENERAL REQUIREMENTS

#### A. Overview

1. This section will cover water distribution and wastewater collections improvements that are constructed in compliance with Augusta, Georgia site development and subdivision ordinances and regulations, as amended, and are to be dedicated to Augusta Utilities Department. Such water and wastewater improvements shall be planned, designed, reviewed, constructed, and accepted in accordance with the criteria set forth in this manual.
2. The design and construction of water and sanitary sewer systems shall be in accordance with these standards.
3. Construction of water and sanitary sewer systems to be turned over to Augusta Utilities Department must be performed by a licensed utility contractor by the State of Georgia.
4. All connections shown on the design plans being constructed to connect to the existing water and/or sanitary sewer system, whether by extension or service only connection must be approved by AUD and inspected by an Augusta Utilities Department Inspector.
5. No water or sanitary sewer connection or service will be put into service prior to the closeout and approval of AUD.
6. AUD has standards and detail drawings specific to the requirements of backflow prevention. As a part of the plan review process, AUD will review the plans to ensure compliance with our standards, however Augusta Utilities is not responsible for backflow prevention devices.
7. AUD has standards for grease traps, lint traps, and oil & grease separators that may have system impacts to the sanitary sewer system, however Augusta Utilities is not responsible for any grease trap, lint trap, or oil & grease separators that may be required for a commercial design project.

#### B. Design and Plan Review

1. Design of water distribution and wastewater collection system improvements associated with Augusta, Georgia approved site development and subdivisions shall follow AUD minimum design standards and details. Design plans will be reviewed for compliance with the minimum design standards and accepted by the Augusta Utilities Department – Project Manager-Infrastructure or department appointee. Utility plans shall be designed and stamped by a Professional Engineer. Design plans will go through the standard review process of AUD as a part of the overall subdivision or commercial site plan review process.

Refer to City of Augusta Planning and Development Department for all regulations, ordinances, and other requirements governing the comprehensive plan review process.

2. Upon review of the plans, the review process may be stopped, and plans disapproved when multiple comments are found and have the Engineer resubmit to meet AUD requirements. If the review is stopped because of lack of information, errors, or non-compliance to AUD requirements, a full review of that plan will occur on the next submittal of the plans.
3. The Developer or their agent shall obtain all required permits from all applicable agencies.
4. Plans must be approved before scheduling the Pre-Construction meeting. No work on the water and/or wastewater system shall occur prior to the Pre-Construction meeting. Failure to comply will result with the issuance of a stop work order until AUD and the owner complete a pre-construction meeting and a date to move forward is established.
5. Commencement of construction shall be within 1-year of the date of the approved plan. If construction has not started within 1-year of the plan approval, an extension may be granted by the department. If no extension request has been approved, the full design project must be resubmitted and shall meet the current requirements of these minimum standards.

#### C. Other Regulatory Requirements

1. It is the responsibility of the Developer/Contractor to obtain and comply with all applicable federal, state, and local regulatory permits. All required project permits bearing any coordination or subject to compliance for any disturbance or impact to the water distribution system or sanitary sewer collections system must be obtained prior to any work being allowed for connection or tie-in to the AUD systems.
2. For all projects encroaching or requiring water and/or sanitary sewer connection along a GDOT State Route shall adhere to the most current GDOT Utility Accommodation Manual and coordinate obtaining a GUPS Utility Permit through AUD for the project.

#### D. Survey Control and Datum

1. Drawings shall be geographically located in the Georgia State Plane Coordinate System.
2. A licensed surveyor shall set all project control points as shown on the Project Plans within the limits of project area.
  - a. Horizontal Datum: NAD 83 East Zone
  - b. Vertical Datum: NAVD 88

### 3. Survey Requirements

- a. Horizontal and vertical controls shall be shown on the plans sufficiently to determine locations and elevations for the contractor to establish the work.
- b. The surveyor's name, registration number, and the date the survey was performed shall be indicated on the plans.
- c. Baselines shall be parallel to the ROW and monumented at the beginning and end of the project and at all changes in direction. The plans shall indicate the types of monuments used, the state plane coordinates and the elevations for all monuments.
- d. All proposed utility easements and tracts shall be shown with dimensions and offsets tied to the baseline of the design survey.
- e. Found or set monuments for existing ROWs, easements, or pump station sites shall be clearly depicted on the plans.
- f. Surveyor shall survey the existing underground utilities marked by the respective utility owners. All existing utilities shall be shown on the plans in accordance with the CI/ASCE 38-02, ASCE Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data. Utility quality level notes, abbreviations and legend, and a quality level A data table shall be included in the plans. Utility quality labels shall be provided on the plans for all existing utilities within the ROW. Utility quality level A locations and attribute information are required for the following existing utilities outside of pavement:
  - 1) All utilities within existing ROWs along the proposed pipe within 10-feet from either side of the centerline of the proposed pipe at minimum intervals of 100-feet.
  - 2) Proposed pipe crossings of existing utilities.
  - 3) Proposed pipe connections to existing utilities.

### E. Soil Borings and Subsurface Investigations

1. All existing utilities shall be field verified (vertically and horizontally) at all points of connection and at all areas of conflict with AUD infrastructure prior to design plan approval.
2. The design professional shall examine the site and utilize subsurface investigations before submission of final design plan, or any construction activities are to begin.

3. Subsurface Investigation Indexing to follow:
- a. Quality Level A (QLA): Utility information which has been visually verified, survey located (both horizontally and vertically) and accurately reduced onto the drawings. This is typically shown as a HV verification excavation hole.
  - b. Quality Level B (QLB): Utility information derived by marking the approximate surface horizontal location of a utility using electronic methods. Marking is subsequently field survey located and accurately reduced onto the drawings.
  - c. Quality Level C (QLC): Utility information obtained as below for quality level D, plotted to correlate with surface utility features which have been field verified, survey located and accurately reduced onto the drawings. Included in this category are aerial utility information and utility depictions, which in the professional opinion of the subsurface utility engineer, represent the most probable approximate horizontal location, type and / or existence of a utility.
  - d. Quality Level D (QLD): Utility information plotted on the drawing based solely on record information, individual recollections, or the existence of utility service. It shall be noted that all information shown (other than at test hole locations, see QLA above) with reference to a utilities size, capacity, material composition, condition or service status shall be considered QLD even though the utility may be plotted and labeled QLC or QLB.
  - e. Legend and Abbreviations:
    - QLA = Quality Level A
    - QLB = Quality Level B
    - QLC = Quality Level C
    - QLD = Quality Level D
    - WM-- = Water Main
    - SAN-- = Sanitary Sewer
    - CO = San. Clean-Out
    - FM-- = WW Force Main
    - UT-- = Buried Telephone
    - OH TEL = Overhead Telephone
    - UFOC-- = Buried Fiber Optic Cable
    - UE-- = Buried Elect. Cable
    - OH ELEC-- = Overhead Elect. Cable

## PART 2: PROJECT DESIGN PLANS FOR CONSTRUCTION

### A. General

1. The design plan shall present a clear scope of work. The scope shown on the plans must match the scope of any permit(s) and follow any approved design calculations. The scope of the design plan will also be the scope encompassed by the certificates of completion and the record drawings. Once a project is under construction, changes in scope will require a revision to the approved construction plan to be resubmitted to Augusta Planning or Augusta Utilities for review based on the changes being made. All changes to the approved plan must come thru the Engineer of Record.
2. Typical line types and callouts shall be utilized to distinguish between existing and proposed utilities, structures, roads, etc. Future facilities to be constructed under a different plan or in a future phase, if shown, shall be identified as not part of the current plan using distinguishing line types with callouts such as “future by others”, “not in contract”, or similar language. An Augusta Utilities Department project number shall be called out on the plans for existing and future facilities, when known.
3. For Commercial and Residential Development project plans site development phasing is not allowed. All water and sewer infrastructure shown on approved site plan must be constructed prior to release of Certificate of Occupancy.
4. Plans shall be signed, sealed, and dated by the Professional Engineer.
5. The Engineer shall provide digital plan and profile CAD drawings to the contractor/surveyor for the creation of the as-built survey which may aid in the formatting of the final record drawings.

### B. Submittal Requirements

1. Hardcopy Submittal for Augusta Utilities Department
  - a. One letter of transmittal with description of submittal items and quantity of each item.
  - b. Two signed and sealed hardcopy plans.
  - c. Two copies of plan submittal documents to include all calculations.
2. Electronic Submittal for Augusta Utilities Department
  - a. Follow the submittal requirements of Augusta Planning Department’s E-Plan system.

## C. Design Plan Layout

### 1. Overview

- a. Drawings shall show and call-out location of underground and above ground water and wastewater piping with size and related appurtenances within the project area.
- b. All main extensions, in the ROW or easement shall extend along the frontage of the property to the midpoint of the property, or to 10-feet beyond the furthest driveway serving the property, whichever is greater.
- c. Details of connection to the existing, field verified system. Show in a detail drawing proposed fittings and restraints.
- d. Existing and proposed ROW lines, property lines and utility easement boundaries. Distinguish between existing and proposed utility easements, show and call-out as public or private.
- e. On Utility drawings, water and sanitary sewer shall be shown on the same plan and profile sheets within the drawing set. The profile shall be vertically aligned at the beginning station or left match line for each sheet.
- f. The water and/or sanitary sewer drawings shall be on a separate sheet(s) from general site development plan, drainage improvements plan, or landscaping plan, and include fire flow requirements, sanitary sewer requirements, and any other design calculations.
- g. The overall utilities plan shall be prepared at a scale not to exceed 1-inch equals 100-feet. Plan and profile sheets must be legible and shall not exceed a scale of 1-inch equals 40-feet horizontally and 1-inch equals 4-feet vertically.
- h. Drawings shall include the following note "All existing utilities have been field verified (vertically and horizontally) at all points of connection and at all areas of conflict with infrastructure." The plans will not be approved without this note.

### 2. CAD Standards

- a. Plans shall be formatted to a standard size sheet (24-inches by 36-inches) and have a title block.
- b. The plans shall include a legend defining the meaning of all line types and symbols used on the plans.
- c. General information such as north arrow, name of Professional Engineer, revision block with dates, graphic scale and sheet number shall be included on every sheet (north arrow and scale may be left off the detail sheets).
- d. Graphic scale shall be provided on each sheet and lettering shall be 0.08-inch or larger.
- e. Special details shall be of sufficiently large scale to show pertinent construction information.

### 3. Design Plan Drawing Requirements

- a. Complete set of drawings for system design. Including but not be limited to the following plan sheets: cover sheet, general notes and maps, existing conditions, demolition, water and sanitary sewer plans, standard details, soil erosion & control plans, and any specialty drawings (i.e., traffic control plan).
- b. Cover sheet shall include but not be limited to the following information: project name, project number, owner/developer information, design engineer information, engineer's seal with signature & date, index of drawings within the plan set, and all applicable title & signature blocks.
- c. General Notes sheets shall include but not be limited to the following information: developer notes, construction notes, Augusta Utilities general notes, project specific water and/or sewer notes, utility owner's contact information list, symbology and descriptions, and other plan specific information.
- d. Existing conditions shall include but not be limited to the following information: all existing utilities within the project limits, existing conditions of the land survey of the project limits, and any notation of area to be requested for investigation to determine conditions.
- e. Demolition plan sheet shall include but not be limited to the following information: all existing water and/or sanitary sewer main, water and/or sanitary sewer service, water valve, and sanitary sewer manhole proposed for abandonment clearly identified.
- f. Water and/or sanitary sewer plans shall include the overall utilities in both plan view and profile view where applicable, and the following information:
  - 1) Water mains, sanitary sewer mains, and force mains labeled with material type, size, length of segments, and slope on all new lines. Provide (W) on water lines, (S) on sewer lines, and (FM) on force main lines.
  - 2) All fittings and appurtenances are shown clearly and labeled with both description and stationing.
  - 3) All vertical and horizontal bends shall be shown and labeled on both the plan and profile view.
  - 4) Limits and location of areas where additional restraints for existing piping shall be required. In locations where the PLAN requires modification, relocation, or removal of existing pipe; additional restraints on the existing pipe shall be required due to the proposed piping configuration (i.e., dead ends, fittings, tee, wet taps, line stops, valves, inline valves etc.). Restraint lengths shall be on the plan in a chart. Restraints are to be for each side of the fitting. Chart is to be on each utility sheet.
  - 5) Profile for all sanitary sewer gravity mains and show flow direction arrows.
  - 6) Profile for all water mains sized 12-inch and greater unless profiles are requested by AUD.

- 7) All water and sanitary sewer services are to be shown in the plan view and profile view.
  - 8) All water and sanitary sewer main installed by Jack & Bore or Horizontal Directional Drill are to be shown in both plan view and profile view.
  - 9) Manholes with inverts in and out and rim elevations shall be on the corresponding profile and plan view.
  - 10) Include retaining walls, site walls, tie backs, footers, mast arms, entry signs, permanent structures, and hardscape in plans.
  - 11) Label and show all dumpster pads with a drain or without a drain.
  - 12) Provide finish floor elevations on buildings to show 5-feet above AUD sewer lines.
  - 13) All connections to utilities infrastructure and crossings with other utilities, drainage systems and structures shall be shown in detail with field verified elevations.
  - 14) For commercial developments, provide location and size of all proposed water and sanitary sewer services and any backflow devices, grease traps, lint traps, oil/water separators, or any other private appurtenance required by these standards.
  - 15) Augusta Richmond County Tax Map reference number for parcels and any other required property information.
  - 16) All public and private right-of-way. Show ownership of roadways if state owned with right-of-way width. All roadways are to be labeled with street name.
  - 17) Location, type, ownership, and width of all existing and proposed easements to include easements of Augusta Utilities Department.
- g. Standard details in the plans shall include all applicable standard drawing details of AUD as listed in Appendix A. Additional details shall be prepared by the engineer for conditions not included in the standard drawings, additional review may be required. Details are to be placed in order by section, all on a detail sheet section, and in color.

#### 4. Asset Descriptions

- a. Utility assets and infrastructural features shall be labeled on the plans. On the plans, asset callouts at minimum shall include size, description, and space for future unique asset numbers. The size and material of each main shall be defined at minimum once per run on the plan sheet. Unique ID Numbers are not required for plan approval but may be added.
- b. Leaders shall be provided for each asset on the plan view. Leaders may be provided on the profile view for clarity. Single leader to cluster or group of assets requires an enlargement detail of cluster or directional description on the plans.
- c. Privately owned and maintained pump stations, manholes, hydrants, oil / water



separators, and grease interceptors shall be labeled as private.

#### D. Plan Approval

1. If there are plan revisions the required design changes will be sent to the design engineer. Upon receiving the changes, the engineer shall submit (1) hard copy set of the revised water and/or sanitary sewer plan along with an electronic revision submittal to Augusta Development Department's E-Plan system if required. The revised drawing shall include a copy of the engineer's responses to the official review comments provided with the plan disapproval. Drawing revisions shall be clouded and correspond with the engineer's responses to the review comments.
2. Upon notification of plan approval, the design engineer will submit the required completed sets of approved plans for Augusta Development Department and (2) approved hard copy plans to Augusta Utilities Department. The approved plans shall be stamped or labeled, "Approved for Construction".

#### E. Other Submittal Items

1. The following shall be provided when applicable, including but not limited to recorded cross-access utility agreement, other agency permits, signed and sealed wastewater pump station calculations, fire flow hydraulic calculations, grease interceptor sizing calculations, and estimated utility construction cost.

### PART 3: PLATS AND EASEMENTS

#### A. Easements

Where it is not practical or possible to install water and/or sanitary sewer system mains within a public right-of-way, the department may allow the improvements to be installed within a dedicated easement on private property.

1. Water and/or sanitary sewer mains shall be centered within the easement and adjacent to the right-of-way.
2. Easements shall allow Augusta or our contractor access for construction, operation, maintenance, replacement, addition to, and removal of the water or sanitary sewer main, including the right to remove, cut and trim trees, brush, overhanging branches, and remove structures and other obstructions as necessary for the permitted use of the easement. New trees or plants with invading roots shall not be planted within the utility easements.
3. Permanent easements shall be a minimum of 20-feet wide with the water main or sanitary sewer main installed in the center of the easement, allowing 10-feet from center of pipe to each edge of easement. No off-centering of the pipeline is allowed within the easement. Where water and sanitary sewer are in a combined easement, the minimum width shall be 30-feet. It shall maintain 10-feet from the center of pipe to the outside edge of the

easement while also maintaining 10-feet of separation between the water main and sanitary sewer main.

4. No buildings, structures, or immovable fences (such as masonry, block, or brick) shall be constructed within 25-feet of the pipeline, or 15-feet of the easement.
5. Easements shall also confer upon Augusta the right to run communication lines, or other lines carrying or containing the utilities of Augusta, Georgia.
6. If access to the easement area and associated appurtenances is not directly available from a public right-of-way, an access easement along the most direct route of access shall be granted.
7. Easement exhibits shall be prepared by a Professional Land Surveyor. Easement dimensions and language shall be subject to final approval by the department. Easements shall be recorded prior to final project acceptance.

#### B. Plats

For projects within Augusta, Georgia, utility easements and tracts can be dedicated by plat or separate instrument. It will be required to submit all legal descriptions and sketches for review to the departments' Land Acquisitions Manager for review prior any plan approval.

For any utility easement across lands outside of the developer owned land or within other municipal jurisdictions, the developer must provide recorded easement, deeds, and plats prior to plan approval.

All Final Plats shall include, at a minimum, the water distribution system and the sanitary sewer system (if applicable), including existing public systems, the systems that are proposed to be accepted by Augusta, and systems that are to remain private, all of which shall be marked with the corresponding nomenclature. Any part of a system that is outside of the right-of-way and is either existing public or proposed to be accepted by Augusta, shall show an easement over the pipeline with the width of the easement stated.

#### C. Dedication Documents

The Deed of Dedication and Maintenance Agreement (dedication documents), for water and/or sanitary sewer, shall be completed, executed by the developer and/or property owner and in the possession of AUD Land Acquisition, prior to any water meters being released for purchase for the project.

If the developer and/or property owner sells any lot(s) prior to the Deed of Dedication and Maintenance Agreement being accepted by the Augusta Commission, and that lot has an easement for water and/or sanitary sewer on it, then, in the transferring deed, they must reserve said easement unto themselves to be dedicated to Augusta during the dedication process. If the lot(s) is sold with such a reservation, then whosoever purchased the lot shall become a party to the dedication documents. In such a case, new dedication documents will be prepared, with the owner(s) of the sold lot(s) being named as one of the granting parties. These new documents shall be signed by all parties listed as grantors and presented the AUD Land Acquisition.

## PART 4: FINAL INSPECTION

- A. The purpose of the Final Inspection is to inspect all aspects of the constructed water and/or sanitary sewer system to determine the work installed conforms to the plans that were “Approved for Construction”.
- B. Upon completion of construction and prior to scheduling the final inspection for the project, a Final Project Package shall be submitted and shall include the following:
  - a. One digital and one hard copy of Record Drawings for review.
  - b. One complete copy of all easement plats for review if there are any.
  - c. Pressure test results for all water mains and sanitary force mains.
  - d. Test results for all gravity sewer mains and manholes.
  - e. Completion of Punch List Memo signed by the contractor and developer/owner.
- C. Once the Final Project Package has been completed, the Augusta Utilities Inspector shall schedule a Final Inspection with the contractor, engineer, developer/owner, and Augusta Utilities’ Development Infrastructure Manager, Water Distribution and/or Wastewater Collections Representatives, and others shall be in attendance. A minimum of (7) working days shall be allowed for scheduling.
- D. If any items are determined to be missing or if additional corrections are required, a Final Inspection’s Punch List will be issued to the developer/owner for correction prior to acceptance and approval.

## PART 5: CLOSEOUT DOCUMENTS

- A. General
  1. During Construction, the project documents shall be updated and maintained, and shall be submitted to AUD at the completion of construction prior to final walk-through and acceptance. The project record drawings and associated documents shall be signed and sealed by the Engineer.
  2. Record drawings shall contain the following information:
    - a. Developer’s name, address, and phone number.
    - b. Contractor’s name, address, and phone number.
    - c. Lot numbers.
    - d. Road names and rights-of-way widths.
    - e. Water and sanitary easements with bearings and distances.

- f. Invert of all lines, top elevations, and state plane coordinates of all manholes.
- g. Valve numbering shall be sequential to the degree possible.
- h. All valves, nodes, and fittings for water line construction shall be labeled with state plane coordinates and depths as provided by the Contractor.
- i. Additional information for the plat may be required by the AUD reviewer.

B. As-Built Submittal

1. As-built submittals need to be uploaded into the E-plan system.
2. All as-builts shall be prepared by a professional land surveyor licensed in the state of Georgia. Plans submitted for review need not bear the signature of the professional. A simple stamp marked "For Review" or "Preliminary" across the seal is adequate. The final as built shall require signature.
3. All as-builts (plans and digital files) shall be referenced to the State Plane Coordinate System of Georgia, East Zone, (NAD 83). All elevations shall be based on NAVD 88.
4. Project name and section or phase delineation
5. Label (2) known points with State Plane Coordinates and a Benchmark referencing NAVD 88 elevation.
6. North Arrow (Grid North, Georgia East Zone)
7. Bar Scale (no larger than 1-inch = 100-foot) As-builts may be large enough to fill out the entire sheet size chosen. A 24-inch x 36-inch size sheet is preferred to increase as much as built information on one page as possible and to utilize as large of a scale as possible.
8. Easements and right of ways with specific labeling describing the metes and bounds along with public or private delineations. All existing easements shall be labeled as such, and references shall be listed.
9. Lift Station site and access road (where applicable)
10. All water lines, sanitary sewer lines, and force mains, including the appurtenances. (These features should stand out on the as built. All other information shall be light and in background.)
11. Water lines shall be labeled with size and material type.
12. Sanitary sewer lines shall be labeled with length, size, slope, and material type.

13. All sanitary sewer structures shall be numbered to clearly delineate each structure and must show all rim/top elevations and all invert elevations of all incoming pipes.
14. All water meters and sanitary sewer taps shall be listed in a table on each sheet and labeled with state plane coordinates.
15. All water valves and force main valves shall be listed in a table format on each sheet and labeled with state plane coordinates. Valves for hydrant leads do not need to have state plane coordinates on them unless the lead is a termination of a water line, (i.e., at a cul-de-sac or future phase).
16. All water meters sizes shall be labeled with size "1-inch typical or as installed".
17. All cleanouts labeled "6-inch typical or as installed".
18. As-built final submittals shall be no larger than a 24-inch x 36-inch sheet and consist of two signed hard copies.
19. Sewer lines installed with less than the minimum slope per pipe size shall be certified by the design Engineer in writing for AUD to consider accepting the sewer line(s) into our system. Surveyor will also need to provide explanation to why numbers were off if it is determined that the numbers provided was a surveying error.
20. Additional information for the As-built drawing may be required by the AUD reviewer.

C. Red Line Drawings

1. Are required from the contractor if there were any deviations from the approved plans. Submittals need to be on the utility sheets denoting what changed with footages and locations of any fittings, pipe lengths, additions, or deletions. Red line needs to be signed and dated by the utility contractor.

**PART 6: ACCEPTANCE OF WORK**

- A. Once an approved Record Drawing is received, final inspection is completed, and (a) final plat(s) with maintenance agreement and/or deed of dedication is recorded, AUD will approve system connection and accept the newly constructed system. The Developer/Contractor shall be responsible for any defects in materials or workmanship within the subject system for a period of 18-months from the date of the maintenance and/or deeded of dedication agreement.
- B. **IMPORTANT:** A note stating that "Augusta Utilities shall not be responsible for pavement repair or site restoration associated with repair/replacement of a water or sewer line" shall be included on all final plats for private developments.

## Chapter Three – WATER DISTRIBUTION SYSTEM DESIGN AND CONSTRUCTION

### PART 1: GENERAL – WATER DISTRIBUTION SYSTEM

- A. The design and construction of all water distribution systems shall conform to these Minimum Standards and the requirements as set forth in “Minimum Standards for Public Water Systems” (GA EPD, latest version) as published by the Georgia Environmental Protection Division.
- B. Water mains shall be designed for the estimated service area population. When a developer’s water system master plan is required, water mains shall be designed for the estimated ultimate build out, as approved by AUD. The developer shall be required to satisfy the domestic water and fire protection design flow for their planned development, development of area impact, or other large scale planning area considered by Augusta Richmond County.
- C. Refer to Chapter One for all general design and construction requirements.
- D. There shall be no physical connection between a potable water supply and a questionable water supply (including private water wells) which could allow possibly unsafe (contaminated) water to enter or possibly enter the potable water system by direct pressure, vacuum, gravity, or any other means, unless an approved backflow prevention device is installed and tested. See Chapter 3, Part 7 for backflow protection requirements.
- E. AUD water service will not be provided to a parcel that has a private water well. This is to prevent possible cross connection between these different systems.
- F. Hydraulic designs shall be based upon pressure data applicable to the portion of the service area that will serve the proposed facility.
- G. Air release valves shall be provided at any high point in the water main to allow the release of air within the main.
- H. All water distribution systems shall be looped to the greatest extent possible.
- I. Any connection of two different water pressure zones shall be separated by a boundary valve and clearly identified on the approved plan and record drawing. Said boundary valve shall not be the tapping or connection valve but a separate in line valve not more than 20-feet away from the tap or connection valve.
- J. The design engineer may contact AUD to schedule a pressure test, for a fee, on an AUD system if one is desired. AUD does not provide flow tests on private systems or hydrants.
- K. Fire flow requirements shall be determined in accordance with applicable Augusta Richmond County Fire Codes and subdivision regulations. Where fire flow requirements exceed the

available fire flow from the existing water system, on site fire protection system or other City of Augusta Fire Department additional measures may be required.

- L. A change of existing grade by cut or fill over an existing water line must have acceptance from AUD.

## PART 2: DESIGN STANDARDS FOR WATER MAINS

### A. LOCATION OF WATER MAINS

1. Normal location of proposed water lines is on the north side of east-west streets, and the east side of north-south streets.
  2. For existing roads, the proposed water line will generally be located 5-feet from edge of pavement (EOP) or 5-feet back of curb (BOC). For existing state roads, the proposed water line must be located 5-feet inside the right-of-way. Unusual circumstances may warrant deviation.
  3. For subdivisions, the proposed water line shall be located 4-feet from the back of the curb (BOC) or 4-feet edge of pavement (EOP). Where ditches are present beside the curb, refer to the Rights- of-Way Encroachment Guidelines (Augusta Engineering Department, latest version).
  4. Water service lines for residential development shall be located at the center of the lot, unless approved by AUD or as stipulated in the plan design section.
  5. Dead end water mains shall be minimized by making appropriate tie-ins whenever practical. Permanent dead end water mains will not be accepted unless unavoidable. A temporary or permanent dead end water main shall be equipped with a fire hydrant. A temporary dead end water main shall end with a hydrant, an inline valve, a tee, and capped at the end of the tee. Restraint lengths shall be the same for either dead end cases. Under special circumstances, where water lines smaller than 6-inch in diameter are accepted, an approved blow-off shall be required for flushing purposes.
  6. All water mains shall be placed in right-of-way areas or dedicated easements. For water mains placed in dedicated easements see Chapter 2, Part 3 Plats and Easements for the requirements per these minimum standards.
  7. Wherever possible, avoid laying water lines on the same side of the road as gas lines.
- B. Augusta maintained water mains shall not be placed under buildings, retention ponds, courts, swimming pools, fountains, transformers, walls, footings, or other structures. Retaining and/or privacy walls, foundations, and gravity walls with tiebacks shall not be placed within 25-feet of water mains, active or abandoned, and shall be designed to allow sufficient room for excavation for repair or maintenance of the main without impacting the integrity of the wall or structure.

- C. Water Mains shall not be designed nor installed under or over other directly aligned mains, active or abandoned, (i.e., stacked). This includes but is not limited to storm piping, sanitary sewer lines, gas mains, pressurized pipe, or any other underground utility. See Georgia EPD separation requirements for further information.
1. Horizontal Separation — Unless otherwise specified, horizontal spacing should conform to the following rules, where all separation distances listed are edge to edge:
    - a. 10-feet to any existing or proposed wastewater lines, sewer services, force main, storm sewer or sewer manhole. Horizontal separation of less than 10-feet must be approved by AUD and requires pipe material to be DIP or C-900 PVC for water mains, DIP or SDR-26 PVC wastewater lines or force mains.
    - b. 25-feet to buildings, concrete footings, top of bank or toe of slope for lakes, streams, creeks, detention ponds, or other permanent structures. 20-feet is considered the absolute minimum and will only be considered by AUD when unavoidable. If separation distance is less than 20-feet, the pipe material is required to be DIP or see above for approved material. Measurement is based on the center of the pipe 25-feet both directions depending on the side the obstacle is located. If obstacle is on both sides of the pipe, then it is 25-feet both directions. This does include residential houses and will be strictly enforced.
    - c. Where horizontal separations between storm, water, and sewer cannot be met, water and sewer lines shall be DIP, and joints staggered such that maximum separation exists between joints as approved by AUD. The minimum length of DIP pipe shall be no less than 10-feet, but a full joint is recommended.
    - d. 15-feet minimum separation to gas mains. If gas company requirements are more than 15-feet AUD will follow their requirements on separation.
    - e. 15-feet minimum to underground electric cable. If electric company requirements are more than 15-feet AUD will follow their requirements on separation.
    - f. Additional separation measures may be required within GDOT ROW or other federal agencies with jurisdiction.
  2. Vertical Separation — Unless otherwise specified, vertical spacing should conform to the following rules, where all separation distances listed are edge to edge:
    - a. Water mains shall cross above and not under other pipes and shall maintain a minimum of 2-feet of cover with no less than 18-inches of separation to other utilities. AUD will consider less than 18-inches of separation on a case-by-case basis. Written approval will be required by AUD in these cases.



- b. At the crossings, one full length of water pipe shall be located so that both joints will be as far from the sewer as possible.
  - c. When water mains cross under sewers, additional measures shall be taken. At least 18-inches of separation between the bottom of the sewer and the top of the water main shall be provided. Adequate structural support for the sewer shall be provided to prevent deflection or settling on the water main. No joint shall be encased under the crossing. Encasement of the water pipe in concrete or flowable fill will also be considered on a case-by-case basis.
  - d. Where vertical separations between water and sewer cannot be met, water and sewer lines shall be DIP, and joints staggered such that maximum separation exists between joints as approved by AUD.
- D. Water mains shall be designed with uniform positive or negative slopes to minimize high and low points in the profile.
- E. Arrange water mains that are looped and interconnected at intersections without the use of cross fittings.
- B. Minimum Pipe Diameter and Velocity
  - 1. Water mains shall have a minimum nominal inside diameter of 8-inches. However, 6-inch mains will be allowed in single-family residential subdivisions per the international fire code (Latest Addition) where the run is no longer than 500-feet or having no more than one fire hydrant on the run of water main. Water mains having an inside diameter of less than 6-inches will not be considered.
  - 2. In the event of a main extension's system connection and reconnection points are both 6-inches, a 6-inch main can be considered for approval by the department.
  - 3. Mains shall be sized so velocities do not exceed 10-feet per second for DIP mains and do not exceed 8-feet per second in PVC mains under all scenarios.
- C. Pipe Cover:
  - 1. Minimum depth of cover once installed shall be no less than 48-inches as measured to the top of pipe. A variance request must be approved in writing by AUD where 48-inches of cover is not attainable.
  - 2. Maximum depth of cover once installed shall be no more than 84-inches as measured to the top of pipe. A variance request must be approved in writing by AUD where 84-inches of cover is not attainable.

3. Additional depth at valves may be required to allow minimum cover over valves based on size and manufacturer as well as additional cover at road crossings. In these cases, approval will be needed from Augusta Utilities.

#### D. System Pressures

1. The design engineer shall not assume a pressure greater than 35-psi at the meter of a detector check valve without confirmation from AUD.
2. The new water main shall have the ability to meet maximum daily demands plus fire flow requirements as mandated by Georgia EPD "Minimum Standards for Public Water Systems" (latest edition) and the Augusta Fire Marshal. The residual design pressure under all conditions shall not be less than 20-psi.
3. For excessive pressures, privately owned pressure-reducing provisions may be required.

#### E. Water Main Material

1. The design engineer is responsible for specifying the type of pipe to be used in any design. Water mains shall be either ductile iron pipe (DIP) Class 350, or polyvinyl chloride pipe (PVC) C-900 or high-density polyethylene (HDPE) DR-9 as needed. No galvanized or PEX piping is to be used. The minimum size of water main shall be 8-inches unless otherwise approved by Augusta Utilities. For all proposed developments, a design engineer shall perform a hydraulic network analysis that will indicate the water line size needed to meet max day demand plus fire flow. Pipes larger than the minimum size must be provided if indicated by the analysis.
2. DIP Water Mains
  - a. DIP shall be centrifugally cast and shall conform to AWWA C150/ANSI A21.50 (latest version) for design and AWWA C151/ANSI A21.51 (latest version) for manufacture.
  - b. For water mains 6-inch through 16-inch, DIP Pressure Class 350 shall be allowed. For water mains 18-inch through 24-inch, DIP Pressure Class 300 shall be allowed.
  - c. Flanged DIP shall have threaded ductile iron flanges and shall conform to the requirements of AWWA C115/ANSI 21.15 (latest version). All flanges shall be ductile iron Class 150 with a minimum working pressure of 350-psi for diameters 6-inch through 12-inch, and 250-psi for 14-inch through 48-inch diameter pipe. and conform to ANSI B16.5 (latest version). Flanges shall be flat faced, and all joints shall use 1/8-inch black neoprene full-faced gaskets.
  - d. Ductile iron pipe and fittings shall have bituminous coating outside and shall be cement lined in accordance with AWWA C104/ANSI A21.4 (latest version). DIP shall have 1/16-inch cement mortar lining with rubber gasket push-on joints, restrained joint, or

mechanical joints. Mechanical joint glands shall be ductile iron. Tee bolts and nuts shall be Cor-Ten steel. Rubber gasket joints shall conform to AWWA C111/ANSI A21.11 (latest version) and shall be furnished by the pipe manufacturer with the pipe. A non-toxic vegetable soap lubricant shall be supplied with the pipe in sufficient quantities for installing the pipe. The lubricant shall be approved by NSF for use with potable water mains.

e. Applications that Require DIP Water Main to be used:

- 1) Water main approved to be installed less than 3-feet in depth.
- 2) Within 10-feet of sanitary and storm pipes.
- 3) Within 20-feet of structures (near side of concrete footing), or top of bank of lakes/streams/creeks/detention ponds.
- 4) Crossings over or under sewers and storm pipes with less than 18-inches separation, will be approved on a case-by-case basis.
- 5) Within project boundaries of subdivisions with private roads where the Utilities Department will take over the line for operations and maintenance while the roads will not be deeded to Augusta.
- 6) Along all GDOT rights-of-way.
- 7) The AUD may mandate DIP in any instances of off-site or on-site construction where future abuse to the line is possible due to location or circumstances.

3. PVC Water Mains

- a. PVC pipe 4-inch to 60-inch diameter shall conform to AWWA C900 (latest version).
- b. All PVC pipe for potable water service shall bear the approved stamp of the National Sanitation Foundation.
- c. Copper wire (12-gauge) shall be attached along the top of all buried water lines, wrapped around service corporations, and stubbed up into all valve boxes for locating purposes. This wire shall be mechanically spliced to be electrically conductive, then insulated to protect against corrosion of the bare wire.

F. Design Pressure and Restraint

1. The main and fittings, including all restrained joint fittings shall be designed to withstand pump operating pressures and pressure surges, but not less than 200-psi.

2. The method used to restrain pipe joints shall be suitable for the pipe size, pipe thickness, and test pressure as required for the specified design case. The plans shall indicate the restrained length of pipe on each side of the fittings in both the plan and profile views. The length of restrained joints required shall be provided in a chart on the plans.
3. Calculations for restrained joints shall be provided by the design engineer. The design engineer shall use a safety factor of 2.0 minimum when designing restrained length.
4. Refer to the Augusta Utilities Product Specifications and Approved Products for acceptable joint restraints.
5. Design restrained joints in accordance with the Ductile Iron Pipe Research Association (DIPRA) and/or Uni-Bell PVC Pipe Association standards for all fittings, valves, hydrants, and pipe joints as required to resist forces during testing and normal operating pressures within the water distribution system.

#### G. Fire Hydrants

1. Fire hydrants shall be provided on all water mains, transmission, and distribution systems.
2. Fire hydrants will require a 250-psi working pressure and 500-psi testing pressure.
3. All fire hydrants shall be ordered all yellow.
4. Fire hydrants shall be of the dry barrel break-away type conforming to AWWA C502 (latest version), with two 2 ½-inch threaded hose nozzles and one 4 ½-inch threaded pumper nozzle. Hose and pumper nozzle threading shall be national standard. Shoe connection shall be 6-inch mechanical joint. The center line of the nozzles shall be 18-inches above the finish grade. Hydrants shall have a 5¼-inch interior valve opening. Hydrants shall be restrained from hydrant to tee at the main to the hydrant. Fire hydrant shall be set in stone so that the weep holes drain and are free of dirt. At the discretion of the Utilities Management, additional protection for fire hydrants shall be provided including but not limited to concrete filled ductile iron traffic posts surrounding each hydrant.
5. Fire hydrant branches (from main to hydrant) shall be a minimum of 6-inches internal diameter. Each branch shall be provided with a resilient seat gate valve located between the tee and the hydrant. Hydrants shall be located at or near road right-of-way lines and on residential property corners with pumper nozzle pointing toward the road. A clear zone around all fire hydrants shall be adhered to, consisting of a 5-foot radius around the hydrant and 7-feet above the top of the hydrant. Maintain 25-foot minimum from hydrant to all structures. Placement of trees, landscaping, fencing, etc. shall be considered to meet this clear zone requirement.

6. Each hydrant shall be left turn opening and capable of delivering a flow of at least 500-gallons per minute with a residual design pressure of not less than 20-psi during maximum day demand, or a higher flow as required by the Fire Marshal.
7. Multiple fire hydrants with looped mains and/or larger main sizes may be required to provide water for higher flow demand. Flow tests shall be performed to verify the specified fire flow demand.
8. Hydrants shall be placed on the same side of the roadway as the water mains and shall be placed such that the radius of protection does not exceed 500-foot intervals and adhere to all applicable City of Augusta fire codes.
9. The Fire Marshal for the City of Augusta may require closer spacing and will provide guidance in those areas.
10. See approved products list for accepted fire hydrant models.

#### H. Dead Ends

1. To provide increased reliability of service, dead ends shall be minimized by making appropriate tie-ins whenever practical, as determined by AUD.
2. Fire hydrants shall be located on the end of all dead-end water mains either temporary or permanent. Temporary dead-end water mains shall be by tee, in-line valve, and a restrained mechanical cap at the end of the tee. The main is to be restrained per dead end restraint requirements.
3. Where dead end mains service a residential development, hydrants shall be located as close to the intersection as possible and no further than 500-feet from the last resident and at the dead end, while maintaining proper fire code. Pipe sizes from the hydrant to the blow-off shall be minimized.
4. Where permanent dead-end mains occur on lines less than 8-inch, they shall be provided with an approved flushing device and blow off assembly for flushing purposes. Automatic flushing devices may be required to maintain water quality in water mains, as determined by AUD.

#### I. Valves

1. Valving of all water distribution systems shall be designed to facilitate the isolation of each section of pipeline between intersections of the network. In high density areas (twenty-five or more dwelling units), valves shall be installed as necessary to minimize the number of persons affected by a water main break.

2. Sufficient valves shall be provided on water mains so that inconvenience and sanitary hazards will be minimized during repairs. Preferred method is three valves at each tee. Valves are to be located at each side of the tee.
3. Gate valves, 2-inch to 24-inch, must conform to AWWA C509 (latest version). Valves larger than 24-inch shall be gear operated butterfly valves, conforming to AWWA C504 (latest version). Wafer valves will not be accepted.
4. Tapping valves, 2-inch to 24-inch, shall conform to the requirements for gate valves as specified in item 4 above.
5. Valves on distribution mains shall be located no more than 500-feet apart in commercial, industrial, and residential areas and no more than 1,000-feet in all other areas.
6. Valves on transmission mains shall generally be installed at intervals of not more than 3,000-feet and 1,000-feet on all primary branches connected to these mains.
7. Valves are to have a minimum of 5-foot clearance around it.
8. Valves shall OPEN LEFT if installed south of Gordon Highway (GDOT State Route-10), or OPEN RIGHT if installed north of Gordon Highway (GDOT State Route-10). Valves shall be provided with valve stem extensions to within 6-inches of ground surface, where centerline of pipe to grade is greater than 4-feet.
9. Gate valves shall be placed at phase lines and located at the end of all water main extensions.
10. All valves shall be restrained by retainer glands, or restrained gaskets, in those instances that warrant such an installation.
11. In line valves shall be treated and restrained same as a dead-end line.

J. Valve Box

1. Each valve box shall be adjustable for a minimum cover of 4-feet.
2. The flanged base of the valve box shall be at least 6-inches above the pipe so not to stress water lines 4-inch and smaller. Extension pieces will be required for additional depth over valves and the extensions are to be DIP.
3. All domestic valve box covers shall have "WATER" cast on the tops. All dedicated fire line valve box tops shall cast "FIRE" on the tops.

4. A precast concrete valve box protection ring will be required at each valve box in an unpaved area.

#### K. Fittings

1. Pressure pipe fittings of size 4-inch internal diameter and larger shall be ductile iron conforming to AWWA C153 (latest version), with mechanical joints unless flanged or restrained joints are required.
2. Gray cast-iron fittings are not allowed.
3. Ductile iron fittings shall be epoxy coated in accordance with AWWA C116 (latest version).
4. Mechanical joint fittings, 24-inch and smaller shall be rated for 350-psi minimum working pressure, while all fittings between 30-inch and 48-inch shall be rated for 250-psi minimum working pressure. Mechanical joint fittings 54-inch through 64-inch shall be rated 150-psi minimum working pressure.
5. Glands for mechanical joint fittings shall be ductile iron. Only bolt systems furnished by the manufacturer for mechanical joints are acceptable; nuts and bolts shall be new, not reused. Pipe gaskets shall be new as supplied by the pipe manufacturer.
6. For flanged pipe, flanges shall be ductile iron Class 150, ANSI B16.5. Flanged joint fittings 14-inch and smaller shall be rated for 350-psi minimum working pressure and flanged joint fittings between 14-inch and 48-inch shall be rated for 250-psi working pressure. All flanges shall be flat faced. Full face, 1/8-inch black neoprene gaskets shall be used on all flanged joints. All joints shall conform to AWWA C115 (latest version). Bolts, nuts, and washers for flanges shall be hot dip galvanized, except tee-bolts shall be Cor-Ten steel.

#### L. Air Release Valves

1. Provisions shall be made to remove air at high points in all water mains where elevation changes exceed 5-feet. Water mains greater than 12-inch in diameter with elevation changes more than 5-feet shall require automatic air release valves located at high points.

#### M. Material Transitions

1. When transitioning the material of water mains, it shall be done by use of a restrained transition coupling.

#### N. Pigging and Cleaning Access

1. Provision for the installation of permanent access points into and egress points out of the piping system for pigging and cleaning purposes shall be incorporated into the design for pipe diameters greater than 12-inch.

O. Jack and Bore of Water Mains

1. The installation of a water main by the Jack and Bore method shall include, but not be limited to, jack and bore pits and equipment, sheeting, steel casing pipe, casing spacers, coatings, location signs as required, miscellaneous appurtenances to complete the entire work as shown on the DRAWINGS and restoration.
2. Roadway and Railroad Placement
  - a. Where boring is required under roads, the materials and workmanship will be in accordance with the standards of the Georgia Department of Transportation or local authority.
  - b. Boring and jacking under railroads will be governed by the latest A.R.E.A. Standards, Part 5, "Pipelines" and those of the railroad involved.
3. Casing Pipe
  - a. The casing pipe shall conform to the materials standard of ASTM Designation A252, with minimum wall thickness of 0.219-inch. Steel pipe will have a minimum yield strength of 35,000-psi. Casing pipe shall be joined together with welded joints or seams, and work shall be performed by a certified welder.
  - b. Casing pipe shall be two times the diameter size of water line being installed. Casing pipe shall extend a minimum of 6-feet outside edge of pavement (EOP) creek bed, commercial utility easements such as gas, electric, or railroad right of way. AUD may require longer casings for deeper bores.
  - c. Split steel casing may be required on existing utilities in a case-by-case basis and will follow the above installation requirements.
4. Carrier Pipe
  - a. The carrier pipe shall be ductile iron as specified herein. Carrier pipe shall be DIP with fully restrained joints with locking restraints.
5. Casing Spacers
  - a. Casing spacers are to be placed per manufactures requirements but minimum of two per pipe.

P. Fire Lines

1. Fire lines are dedicated water lines for the explicit use of fire protection and are to be metered, backflow protected, and to be free of any bypass piping.



2. Fire line meter shall be able to detect both low flow demands, and high flow demands.
3. Valve box top shall cast "FIRE" on the tops.
4. Fire lines shall have a minimum double-detector check valve assembly (detector check valve with a 5/8-inch by-pass meter to detect low flows) within the right-of-way or dedicated easement. Augusta Utilities may require the use of an RPZ check-valve assembly which will be determined on a case-by-case basis.
5. All post indicator valves (PIV), and fire department connections (FDC) must be beyond the meter and back flow device on the private side of the service.

### PART 3: SYSTEM CONNECTION AND SERVICE CONNECTIONS

#### A. Water connections

1. Water connections shall conform to the applicable provisions of Augusta Utilities Department and shall conform to the ASTM Specifications.

#### B. New Water Services

1. Services shall be installed above the center of side of pipe and at no time shall a tap be made less than center of side of pipe.
2. 1-inch, 2-inch, and 4-inch are considering typical water service sizes.
3. Water service line sized above a 4-inch line shall be approved for use by AUD.
4. Services shall not terminate in driveways.
5. Critical use users such as hospitals, government operations, and approved manufactures may install at a minimum two water domestic services or provide meter bypasses which shall be submitted by a design professional for approval.
6. AUD does not accept 1 ½-inch and/or 3-inch service line piping material of any type on the AUD portion of the service.
7. No fittings are allowed on the service line.
8. PEX piping and/or galvanized piping shall not be used for water services.
9. Water service allowable material is Type K soft copper and shall be seamless, American made, and conform to ASTM specifications.

10. HDPE can be used in lieu of copper for water service pipe material if the line is longer than 100-feet for 1-inch service or 60-feet for 2-inch services. HDPE pipe shall be Copper Tubing Size (CTS) DR- 9 HDPE for 1-inch water services and Iron Pipe Size (IPS) DR- 9 HDPE for 2-inch water services.
11. Water service lines connecting to DIP or any pressure-rated pipe, service saddles must be used. No direct service taps shall be allowed. Brass double strap tapping saddles shall be used. U-bolt type straps are not acceptable.
12. Water service taps on the main shall be spaced at a minimum distance of 18-inches apart and a minimum of 18-inches from a bell or fitting. If two or more taps are required at a minimum spacing, they shall be offset 45-degrees alternatively.
13. 2-inch water service shall have a 2-inch gate valve and may have two 2-inch 90-degree brass elbows per standard detail.
14. All service line taps shall be supplied with corporation stops and curb stops. General requirements for corporation stops are as follows: for 1-inch services, a taper thread inlet and flared copper outlet.

#### C. Water Main Tap Connection

1. Existing water mains to be tapped shall be made with the new line sized being less than the diameter of the existing line's size unless otherwise approved by AUD.
2. Size-on-size connections to water mains shall be approved AUD on a case-by-case basis. Connections on the pipe and fittings shall be made in such a manner as to provide a watertight joint and adequate restraint to prevent pipe separation.
3. Tapping Sleeves shall be of a heavy body ductile iron, mechanical joint suitable for a working pressure of 200-psi for sleeves larger than 14-inch, or a working pressure of 250-psi for sleeves equal to or less than 14-inch, or as approved by AUD. Tapping sleeves and valves are required for all taps 4-inch and greater. Taps less than 4-inch shall be provided with a service saddle.
4. Tapping sleeves are to be pressure tested at 200-psi for one hour before the tap will be allowed to be made. A passing test result requires the sleeve maintain the 200-psi pressure throughout the test duration.
5. Valves shall be provided on all taps. Tapping sleeves shall be a minimum of 6-feet from pipe joints.
6. Reverse taps (back side taps) must be approved by AUD.

## PART 4: WATER METERING

### A. General

1. All water service connections (domestic, irrigation, and fire) shall be metered.
2. Water meter location for residential development shall be design/installed per AUD details.
3. Water meter location shall be accessible and unobstructed for 15-feet in all directions and shall not to be placed within side lot setbacks, fenced areas, stormwater swales, or in any asphalt or concrete areas without written approval by AUD.
4. Water services and meters are not allowed in or underneath driveways. Where water service or meter is found in or under a driveway, the service and/or meter shall be moved at the owner's expense.
5. For commercial developments such as shopping centers or retail plazas, consideration shall be given to meter location. If the meter is placed in asphalt, the top of box shall be flush with the finished surface. The meter shall have a traffic rated meter box & lid, be surrounded by bollards, and not located within a parking stall.
6. Meter boxes shall be located on the high side of the sewer service on any property.
7. Meter boxes for 1½-inch and smaller meters are standard, while 2-inch can be installed in an oversized 2-inch cast-iron box. 3-inch and larger meters shall be installed above ground in an insulated box.
8. The reducer for the 3-inch meter is to be placed past the 4-inch valve in the box on the water service line but before the meter. The bypass water line size on the 3-inch meter is to be 4-inch up to the valve on the bypass. Augusta Utilities does not accept 3-inch piping on the department-maintained service line.
9. Meter boxes shall be an oversized type, 10-inch x 19-inch x 10-inch cast iron box and lid. The top shall have cast ribs on the bottom side with four legs to prevent sliding movement. The box shall have a minimum weight of 37-lbs., for meters 1½-inch or smaller. Meter and curb stop shall be fully encased by the meter box. All meter vaults must be approved by AUD.
10. For commercial/residential applications, the meter lid shall be able to accommodate automated meter reading technology.
11. All commercial meters shall have a bypass piping arrangement same size as the service line of the meter to facilitate meter removal. This bypass valving shall bypass the meter, but not the backflow prevention device. If a bypass device is installed on the backflow prevention device, then a separate backflow prevention device should be installed on that bypass.

12. The bypass on the meter will have to have the capabilities to be locked by Augusta Utilities and is only for AUD use.

B. Meters for single family residential (single family, duplex, triplex, or townhome)

1. Meters shall be purchased by owner/developer and installed by AUD. At the time service is requested and shall remain the property of AUD.
2. Each unit within a residential building (i.e., duplex, triplex, etc.) shall have a separate meter, unless prior approval is received from AUD.
3. The proper sizing of service lines is the responsibility of the design engineer. AUD takes no responsibility for improperly sized service line.

C. Meters for Commercial Developments

1. Meters for commercial developments shall be purchased by owner/developer and installed by the Contractor. At the time service is requested and shall remain the property of AUD.
2. In general, each building shall be individually metered. Meter(s) shall be in the public ROW at the property line.
3. The proper sizing of service lines is the responsibility of the design engineer. AUD takes no responsibility for improperly sized service line.
4. For commercial developments, the service line can be master metered as approved by AUD.

D. Meters for Commercial Developments with Fire Lines

1. Meters for commercial developments identified or classified as industrial, institutional, or multi-family with dedicated fire lines will have a fire series master meter or ultra-sonic meter shall be purchased by owner/developer and installed by the Contractor. At the time service is requested and shall remain the property of AUD.
2. The proper sizing of service lines is the responsibility of the design engineer. AUD takes no responsibility for improperly sized service line.
3. For commercial developments, the service line can be master metered as approved by AUD.

E. Meter Sizing

1. The Design Engineer shall provide sufficient information on estimated average, peak, and minimum flows to prove that the meter size determined by them is adequate. AUD minimum size tap is 1-inch.

#### F. Irrigation Metering

1. The design engineer shall design any landscaping design plan or irrigation design plan to have a separate irrigation meter and back flow device that is separate from the domestic potable meter.
2. All Irrigation meters shall be shown on a site plan shall be designed by a Design Engineer.

### PART 5: BACKFLOW PREVENTION DEVICES

#### A. General

1. Backflow Prevention Devices shall be required as set forth in the ARC Backflow Ordinance, per the AUD Backflow Program requirements (current version), and these minimum standards. AUD may require a Reduced Pressure Backflow Prevention Assembly (RPZ) on the customer side of service lines (domestic, irrigation, and fire).
2. RPZ backflows are required on the domestic water and fire lines on structures that are more than 2-stories or have an elevator.
3. A certified backflow tester shall test backflow devices and the passing results furnished to AUD prior to any water use. Failure to do so may result in water service interruption.
4. All residential water services shall have a minimum of a dual check back flow device.

#### B. Commercial, Industrial, and Multi-Family Residential

1. All water services and fire lines for industrial, office, commercial, schools, mobile home parks, multi-family residences and any other locations as determined by AUD shall require a minimum of a double-check backflow prevention assembly.
2. Modifications, facility upgrades, or expansions to sites with an existing backflow device are required to submit a passing backflow pressure test performed by a certified Backflow Prevention Assembly Tester prior to construction plan approval.
3. Utilities may require an upgrade to an RPZ based on level of hazard.
4. If the current site does not have back flow protection the Owner must provide a site plan by a Design Engineer showing the addition of the back flow(s) to the site through the planning department for review and acceptance of that design. This will include building remodels.

### C. Irrigation Systems

1. Reduced pressure backflow prevention device shall be required on all commercial, Industrial, and/or residential development dedicated irrigation systems.

### D. Location and Installation

1. Backflow prevention devices are to be located directly after the water meter entirely on the developer's property.
2. RPZ Backflow prevention devices shall be installed above ground.
3. For high priority facilities such as but not limited to hospitals, doctor offices, surgical facilities, and industrial plants a dual back flow setup shall be required. These two back flow devices shall be installed in parallel, shall be the same back flow type and size, and be fully contained within a single enclosure. In addition, each individual back flow shall have OS&Y valve installed directly before and after the device.

### E. Backflow Assembly Standards

1. Backflow prevention device assemblies shall be the latest approved product of a manufacturer regularly engaged in the production of this type of equipment. All assemblies shall be as approved by the America Society of Sanitary Engineering (ASSE), The American National Standards Institute (ANSI), The American Water Works Association (AWWA), Foundation for Cross Connection Control and Hydraulic Research of the University of Southern California, and the Georgia State Plumbing Code.
2. Type and size of all assemblies shall be indicated on the drawings. Back flow size shall be equal to the meter size.
3. All back flow devices shall be tested following initial installation, following any repairs, and at minimum on an annual basis.
4. All test results shall be provided to AUD. Failure to obtain and provide a passing test result may lead to a water service interruption.
5. A failed test requires the Owner to repair or replace the device and provide Augusta Utilities with a passing test with how repair was made.

## PART 6: CONSTRUCTION GUIDELINES FOR WATER DISTRIBUTION SYSTEM

### A. General

1. This section covers general conditions the contractor shall comply with regarding the construction sites.

2. Only AUD personnel shall operate valves or hydrants unless otherwise directed or approved by AUD.
3. Construction of water systems to be turned over to Augusta Utilities must be performed by a State of Georgia licensed Utility Contractor.
4. If any requirements for carrying out project construction are not met, Augusta Utilities reserves the right to issue a STOP WORK order and work will not resume until issues are resolved.
5. AUD will require highlighted shop drawings for all water and sewer parts and material for construction projects be provided to the AUD inspector a minimum of 3-weeks before any installation of water and sewer is allowed to occur.
6. The connection point(s) to the existing water system shall be exposed by the contractor and the tie-in location verified by AUD prior to any proposed utility work shall take place.

B. Grades and Surveys

1. All approved work shall be constructed in accordance with the lines and grades shown on the plans. The full responsibility for keeping alignment and grade shall rest upon the contractor.
2. The contractor shall furnish and maintain, at their own expense stakes and other such materials for setting reference marks.
3. The contractor shall at their own expense, establish all working or construction lines and grades as required from the reference marks. The contractor shall be solely responsible for the accuracy thereof.

C. Utility Coordination

1. Prior to any trenching activity or excavation, the contractor shall be responsible for ensuring that all utilities have been located by underground locating services and have valid locating verification documentation subject to the check and review by Augusta Utilities.
2. The Contractor is responsible for verifying the exact location, size, and material of any existing water facility proposed for connection or use by the project. No publicly owned water line shall be uncovered without prior 48-hour coordination with the AUD inspector.
3. The contractor shall take all reasonable precautions against damage to existing utilities. However, in the event of a break in an existing water main, sewer main, water service, and/or sewer service, the contractor shall immediately notify the utility inspector and the 24-Hour Emergency Dispatch for Augusta Utilities. The contractor shall lend all possible

assistance in restoring services and shall assume all cost, charges, or claims connected with the interruption and repair of such services, as determined by Augusta Utilities.

D. Deviation from Plans

1. Deviation from the plan without prior approval by AUD shall not be accepted. AUD reserves the right to issue a Stop Work Order on the installation of any water mains or services based on any unapproved installation made in the field.
2. It is the contractor's responsibility to notify AUD of any issue that arise that is either unforeseen or change the approved plan.
3. A revised plan shall be submitted from the design engineer as soon as possible to AUD based on the change that is requested for approval. Minor changes not affecting capacities, flows, or operation can be approved in the field during construction by AUD's Inspector. The Inspector shall have authority as to what constitutes a minor or major change.
4. A field change not requiring a full plan submittal, shall be shown on a red line drawing and submitted to the AUD Inspector prior to a final walk thru.

E. Protection of Utility Structures

1. Adequate protection and maintenance of all surface and underground utility structures including but not limited to hydrants, valves, valve covers, meters, meter boxes, manhole ring & covers, sewers, water mains, and other miscellaneous utility structures encountered in the progress of the construction work shall be furnished by the contractor at their expense to protect and prevent any potential damage, breaking, or failure.
2. Any utility structure disturbed shall be restored to equal or better condition upon completion of the work.
3. AUD water valves, hydrants, manholes, services, and other appurtenances shall be made accessible to AUD personnel during all phases of construction.

F. Erosion and Sedimentation Act Compliance

1. All phases of construction shall be completed in accordance with the Erosion and Sedimentation Act 12-7-1 et seq.

G. Work Conducted in Right-of-way

1. Where a traffic control plan is required, it shall be in accordance with Augusta Engineering Department's Right of Way Encroachment Guidelines.



2. Where work is within GDOT Right-of-way, it shall be in accordance with Georgia Department of Transportation Utilities Accommodation Manual and will require an approved GDOT GUPS Permit.

#### H. Water Distribution System Installation

1. Authorization must be obtained from AUD to construct, alter, or modify a water line.
2. Construction of water infrastructure will be authorized by AUD upon an approved plan, a pre-construction conference, and notification to proceed by the AUD project inspector.
3. Installation of water mains and associated appurtenances shall be in accordance with these minimum standards, current AWWA specifications, and the manufacturer's requirements for the specific product.
4. AUD has the right to reject any material before or after it is installed if it found damaged, defective, or determined to be a non-approved item. Once the Contractor is notified of the rejection it shall be removed from the site so that it will not be accidentally installed into the system. It is the contractor's responsibility that no installation occurs of items that are defective or wrong item.
5. Restrained joints shall be required at each fitting involving a change of direction and on surrounding pipe, as specified in the approved plans. Locking pipe gaskets installed while the AUD inspector is not present shall not be accepted as restrained joint pipe and additional joint restraints that can be seen may be required to be installed for AUD to accept the restrained section.
6. Backfill shall be free of boulders and debris and shall conform to these minimum standards. Sharp or rocky material encountered in the base shall be replaced with proper bedding. Pipe shall be laid in-line and grade as designed. Pipe joints, gravity blocks, fittings, tees, valves, dead ends, restraints, service connections, and conflicts shall be left exposed until visually inspected and approved by AUD Inspector.
7. Fire hydrants shall be installed true and plumb with the center of the pumper nozzle facing toward the road. Hydrants shall not be placed in the sidewalk. Fire hydrants are to be placed on property corners on residential applications.
8. All valves shall be placed according to plans. Valve stems shall be installed plumb. Valve stem extensions are required if deemed so. Air relief valves shall be installed at all high points in the water main where air can collect, as shown on the plans or as directed by Augusta Utilities.
9. Jack and Bores shall be installed by the dry method only. If voids develop or if the bored hole diameter is greater than the outside diameter of the pipe by more than approximately

1-inch, remedial measures will be taken as approved by AUD. The water main shall be equipped with locking gaskets placed throughout length of casing to adequately restrain the pipe. The ends of the casing shall be sealed with pull-on wrap around end seals. No bricking of end will be accepted. The pipe shall be supported with a minimum of two casing spacers per 20-feet of pipe, with one spacer approximately 1-foot from the bell of the pipe and second spacer approximately 1-foot from end of pipe. Spacer bands are to be 8-inch to 12-inch-wide bands.

10. Water meter installation parameters for 1 ½-inch meter services, service line for that meter set up is 2-inch piping and reduce in the meter box. For 3-inch meter services, service line for this set up is 4-inch up to the 4-inch OS&Y valve before the meter and will reduce past the AUD 4-inch OS&Y valve in the box. The bypass on the 3-inch meter set up is 4-inch up to the OS&Y valve on the bypass line.

#### I. Handling and Storing of Materials

1. Unload pipe to avoid deformation or other injury thereto. Place no pipe within pipe of a larger size. Handle pipe and fittings per manufacturer's recommendations to ensure delivery to the trench in sound, undamaged condition.
2. Store rubber gaskets and polyethylene products out of direct sunlight. Do not store nuts, bolts, glands, and other accessories directly on the ground. Keep all materials free of dirt and debris. Store per manufacturer's recommendations.
3. Keep valves so not do damage moving parts and keep interior free of dirt and debris. Do not expose valve interior to direct sunlight for extended period. Store and maintain, if necessary, per manufacturer's recommendations.
4. Ensure no damaged is caused to pipe linings or material coatings.
5. Loading or unloading and storage of pipe, fittings, valves, etc. shall be done in such manner as to avoid damage. The interior of all pipes, fittings, valves, etc. shall be always kept free of dirt and foreign matter. All piping shall be placed in a dry trench with a stable bottom. Wet trench installation shall be allowed only upon approval of AUD.

#### J. General Pipe Laying

1. The interior of the pipe shall be clean and joint surfaces wiped clean and dry when the pipe is lowered into trench. Lower each pipe, fitting and valve into the trench carefully and lay true to line and without objectionable breaks in grade. The depth of cover below finished grade shall be not less than 48-inches from top of pipe, or as shown on the drawings unless approved by AUD. Give all pipes a uniform bearing on the trench bottom. Allow no trench water or dirt to enter the pipe after laying. Insert a watertight plug in the open end of the piping when pipe laying is not in progress. Water pipe shall be bedded when required by poor soil conditions and/or as directed by AUD.

2. At no time shall a contractor use the bucket of a machine to push pipe together to minimize over bellings of the pipe. It is recommended to use pinch bars, slings, or tongs for aligning and turning pipe. If the AUD inspector notices that a section of pipe has been over belled that section of pipe shall be replaced with a new joint of pipe including a new gasket installed.

K. Pressurization and Leakage Testing

1. After installation, all water mains shall be leak tested, in accordance with AWWA C600, (latest version) for DIP, and AWWA C605 (latest version) for PVC. The Contractor shall provide all equipment, materials, and labor necessary for pressure and leak testing. This test must be observed by an Augusta Utilities Department representative. A pumping pressure of 200-psi, or 1.5 times the working pressure at the point of testing depending on the discretion of an AUD representative, must be supplied at the expense of the Contractor/Developer. The main tested shall be isolated from all active potable lines by an air gap. Pressure testing against an existing valve on an existing water line is prohibited. All water used for pressure testing must be potable water with adequate chlorine residual and filled through an RPZ back flow or water truck. Water lines shall be tested by valve sections. Maximum allowable leakage shall be as determined in accordance with current AWWA specifications. The standard duration of test is two hours or unless approved by AUD. Testing procedures shall meet or exceed AWWA C600 (latest version) requirements. Pressure test shall be a minimum of 2 hours and line shall hold 200-psi with no more than a 5-psi drop during the test period. The AUD inspector must witness the full pressure test for it to pass. After the test is complete and the AUD inspector passes the test, the line shall be drained at the furthest point from the area the line was pumped up to verify that the line was pressure tested the full length. All water service taps shall be made before the pressure test is requested. Gauge shall drop back to zero at the end of the test for the test to pass. At no time shall the line be depressurized at the same area the line was pumped up from. For the test to pass at the two-hour mark, the line must end at 200-psi or above with no more than 5-psi drop during the test and the gauge must drop to zero after depressurization. If pressure drops below 200-psi test fails even if the line does not drop 5-psi. Contractor may ask for an allowable leakage test and that shall be requested before test starts. If allowable leaked test is requested contractor shall provide the makeup water before hand in a measurable container for water to be used during the test. Container shall measure in ounces up to gallons. A water meter will not be allowed as a measuring device for the allowable leakage test. If the allowable leakage test is requested the makeup water must be added during the test each time the pressure drops 5-psi but must remain above the 200-psi, if the water runs out before the two-hour test is complete the line fails the test. AUD will determine how much water is to be used for the allowable leakage test. Any portions of the main which fail the test shall be replaced or adjusted until the entire new main passes the test criteria. Concurrent with the pressure test, and before any work will be accepted for payment, the Contractor may perform a leakage test but must be requested before the test begins. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section thereof necessary to maintain the water pressure to within 5-psi of the

test pressure. No pipe installation will be accepted until the leakage is less than the number of gallons per hour as determined by equation from AWWA C600 for DIP:

$$r = \frac{(SD\sqrt{P})}{133200}$$

where L = allowable leakage in gallons per hour, S = the length of pipe in the section tested, D = the nominal diameter of the pipe in inches, P = the average test pressure during the leakage test in pounds per square inch gauge. For PVC pipe, the following equation shall be used:

$$r = \frac{(ND\sqrt{P})}{7400}$$

where N = Number of joints in the pipeline being tested.

#### L. Connecting to Existing Systems

1. All connections to existing mains shall be made under the direct supervision of the AUD's Inspector. Valves on existing mains shall be operated by or under direct supervision of AUD personnel. Tapping sleeves and valves shall be pressure tested prior to tapping.
2. If service to existing customers must be interrupted, AUD shall be notified at least one week in advance. The contractor shall make the necessary notifications to the impacted customers.
3. Tie-in to existing main shall be done by use of wet tap using a tapping sleeve and valve or by installation of a tee and valve. When tap is completed, remove the pipe coupon from the cutter and provide to the Augusta Utilities Project Inspector. If coupon is not retained at the completion of the tap, the main line shall be cut, and coupon located and retrieved.
4. All new mains shall undergo chlorination, bacteriological testing, and flushing before being put into service. See sections on disinfection, cleaning, and flushing for more information.
5. If cut-off of service is required, the Contractor shall be ready to proceed with as much material pre-assembled as possible at the site to minimize the length of service interruption with any restraints on the existing system pre-installed. Augusta Utilities reserves the right to postpone service cut-off if in the opinion of Management if the Contractor is not ready to proceed on schedule. Scheduled interruptions should not exceed four hours. The Contractor/Developer shall arrange for temporary services to Customer(s) if water will be shut off for more than four hours.
6. Local chlorination will be required for all pipe and fittings used to complete connections with the potable water system. Tapping machines, tapping sleeves, and valves shall be chlorinated in accordance with AWWA requirements. All wet taps shall be witnessed by the AUD's Inspector.

## M. Disinfection

1. Augusta Utilities shall be notified at least 48-hours in advance to schedule bacteriological testing of water mains. Bacteriological test must occur by no later than a Wednesday before 1:00 P.M. to make it to the lab that week. The samples shall be pulled by a certified AUD lab technician, The Contractor shall replace or adjust components of the pipeline which fail the test. Test results must pass before AUD will allow the main to be put into service.
2. All piping complete with fittings and appurtenances shall be sterilized as specified in the applicable sections of AWWA Specification C651 (latest version) "Disinfecting Water Mains." Piping and appurtenances shall be thoroughly flushed then chlorinated with not less than fifty parts per million (50-ppm). Calcium hypochlorite can be used. Water from the existing distribution system or other source of supply should be controlled to flow slowly into the newly laid pipeline during the application of chlorine. The solution should be retained in the pipeline for not less than 24-hours and the system shall maintain the chlorination level originally introduced into the line, which should not be less than 50-ppm or more than 80-ppm. The system shall then be flushed with potable water and the sampling program started. A minimum chlorine residual of 1.0-ppm should be available in the line after flushing.
3. Sampling taps and chlorinated water used for disinfection shall be flushed to a location that will not damage property, persons, etc., and shall be provided by the Contractor/Developer at the expense of the Contractor/Developer. The provisions of this paragraph apply equally to new pipe and fittings and to existing pipelines into which connections have been made or which may have been otherwise disturbed to the extent that contamination may have occurred. All requirements of the health authorities shall be observed in executing this work. The Contractor is responsible for the disposal of heavily chlorinated water (following disinfection) must be accomplished in accordance with the latest editions of the AWWA Standard C651 and the EPD's Minimum Standards for Public Water Systems.
4. No dry chlorine shall be placed in the pipes while installing.
5. A minimum of two samples shall be pulled and tested by the State approved AUD lab and by a certified AUD lab technician and, shall indicate bacteriologically satisfactory water and the results shall be submitted to the Inspector.
6. There shall be no connection between a new line and an existing water line until Augusta Utilities approves the connection.
7. If water lines set inactive more than thirty days connected or not connected without water movement a new chlorination may need to occur. Water lines are not to be flushed without line being metered if not accepted by AUD.

## N. Cleaning and Flushing

1. Upon completion of installation, the mains shall be flushed, and the water disposed of without creating a nuisance. Flushing must achieve a minimum water velocity of 2.5-fps in all portions of the pipe. The duration of the flushing will be determined by the AUD's Inspector. No flushing or cleaning should take place without an Augusta Utilities representative present. The existing mains where the new mains connect may require flushing under the direction of AUD when service is restored. The Contractor shall be responsible for the treatment of discharge and disinfection water. All flushing activities shall be in accordance with AWWA C651.

## Chapter Four – WASTEWATER COLLECTION SYSTEM DESIGN AND CONSTRUCTION

### PART 1: GENERAL – WASTEWATER COLLECTION SYSTEM

- A. All sewer collection system designs shall conform to Augusta Utilities Minimum Standards and the requirements as set forth in “Recommended Standards for Wastewater Facilities” (latest version) published by the Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers and must follow EPD guidelines.
- B. For sewer system design, the area to be served should be studied for the purpose of estimating the type and quantity of flow to be handled, the development area of impact, and consider other large scale planning developments by Augusta, Georgia.
- C. Refer to Chapter One for all general design and construction requirements.
- D. There shall be no physical connection between sanitary sewer systems and stormwater systems.
- E. Sewer systems shall be designed for the ultimate tributary service area population. When a developer’s sewer master plan is required, sewer mains shall be designed for the estimated ultimate build out, as approved by AUD. The developer shall be required to satisfy the maximum anticipated capacity of institutions, industrial parks, etc. Where future relief sewers are planned, economic analysis of alternatives should accompany initial permit application.
- F. Design pipe capacity should be based on peak sewage flows plus the anticipated maximum infiltration/inflow levels under normal open channel flow conditions. The average daily flow of the tributary areas must be stated by the design engineer.
- G. All food service operations are required to install, operate, clean, and maintain sufficiently sized oil and grease separators (grease traps) to prevent obstruction or interference with the proper operation of the wastewater collection system and treatment plants.
- H. The design engineer shall provide AUD with the calculations supporting the recommended design in the form of a written concept report. The report should summarize the work performed to arrive at the peak flow calculations and include a “peak flow summary schematic”.
- I. A change of existing grade by cut or fill over an existing sewer line must have acceptance from AUD.

## PART 2: DESIGN STANDARDS GRAVITY SEWER MAINS

### A. Average Daily Flow

1. The gravity main design shall be based on ultimate development or projected flow. The average daily flow can be defined as the annual volume of wastewater flowing into a wastewater system divided by the number of days of a year.

### B. Peak Design Flow

1. Gravity mains shall be designed based on ultimate development maximum rates of flow, which shall be the product of a selected peaking factor multiplied by the accumulative average daily flow.
2. Peaking factor of 2.5 or greater shall be used in calculations.

### C. Design Parameters

1. The design parameters of sewer mains for Augusta Utilities are as shown in the table below.

*Table 1: Design Parameters for Wastewater for Augusta, Georgia*

<b>Parameter</b>	<b>Value</b>
Per Capita Flow, Average	125 gallons per day (gpd)
Minimum velocity in gravity sewers	2.0 feet per second (fps)
Maximum velocity in gravity sewers	10.0 feet per second (fps)
Minimum gravity sewer pipe size	8-inch
Minimum Peaking Factor	2.5
Design depth of flow at Peak Flow	0.75 of Full
Design Period	30 Years
Minimum Manning's "n" Factor	0.014

### D. Design Calculations

1. The Design Engineer shall submit sealed, signed, and dated design calculations with the plans for all sewer projects. Calculations shall illustrate the gravity mains will not be more than 75% full at peak flow.
2. Buoyancy of sewers shall be considered, and flotation of the pipe shall be prevented with appropriate construction where high groundwater conditions are anticipated. Calculations shall be provided with plan submittal.



## E. Location of Gravity Sewer

Mains, manholes, service laterals, and cleanouts shall be located within the right of way (ROW) or a dedicated utility easement.

1. For Subdivisions and new developments, sewers shall be laid straight along the road centerline. Where sewer is placed adjacent to the roadway and will be crossing through proposed yards, the sewer shall be laid straight along property lines and will require a dedicated sanitary sewer easement.
2. For sewer designed for private streets, sewers and manholes shall be accepted for maintenance if they are designed and meet these minimum standards. A dedicated sanitary sewer easement will be required, and AUD will not be held responsible for roadway restoration.
3. For sewer designed in existing City ROW, sewers and manholes shall be located within the roadway. In the curves of roads, the outside of the mains shall fall no less than 48-inches horizontally from the edge of pavement while maintaining all separations from other utilities. In the curves of the roadway the distance from the curb line shall be called out on the plan sheets stating the footage from curb to the sewer main.
4. For sewer designed along a GDOT ROW, sewer shall be located a maximum of 5-feet inside the right-of-way limit. A GDOT Utility Permit shall be obtained from GDOT prior to construction. Permit application shall be submitted with final approved drawings.
5. For sewers designed in dedicated sewer utility easements, the centerline of the pipe shall be located within the centerline of the easement. The minimum width of the easement shall be 20-feet. Additional easement width may be required under the following conditions:
  - a. Pipe sizes greater than 8-inches
  - b. When the pipe invert depth exceeds 6-feet
  - c. When the pipe cannot be centered within the easement due to other restrictions
6. Sewer mains, manholes, service laterals, and cleanouts shall not be placed under buildings, retention ponds, courts, swimming pools, fountains, transformers, walls, footings, or other structures. Retaining and/or privacy walls, foundations, and gravity walls with tiebacks shall not be placed within 25-feet of sewer mains, active or abandoned, and shall be designed to allow sufficient room for excavation for repair or maintenance of the main without impacting the integrity of the wall or structure.
7. The placement of mains along interior, side, or rear of lot lines or storm water retention pond berms shall be allowed on a case-by-case basis if such a configuration results in

efficient placement, maintainability, accessibility, and use of the system and if it meets the distance requirements from edge of slope, as determined by AUD.

8. In relation to water mains, there shall be no physical connection between a public or private potable water supply system and a sewer, or appurtenance thereto which shall permit the passage of any sewage or polluted water into the potable supply. No potable water pipe shall pass through or come into contact with any part of a gravity sewer manhole.
9. In relation to storm drains, no gravity sewer main shall pass through or come into contact with any part of a storm drainage pipe or structure.
10. In relation to the discharging of surface water, groundwater, well water, runoff, subsurface drainage, swimming pool drainage, and other unpolluted or uncontaminated water to any sanitary sewer is prohibited.

F. Minimum Size

1. The minimum pipe size for gravity sewer collection main shall be 8-inch in diameter.

G. Slope

1. Gravity mains shall be designed and constructed to give mean velocities, when flowing full, of not less than 2.0-fps and a maximum of 10-fps.
2. Gravity mains shall adhere to the minimum slope requirements. The minimum slopes as shown in Table 2 shall be provided below.
3. Gravity mains shall have uniform slope between manholes.
4. The maximum slope for a wastewater line shall be 10%.
5. Gravity mains at a slope greater than 10% shall be approved by AUD. Special design provisions shall be utilized and clearly shown on plans. These provisions must adhere to the "Steep Slope Protection" as outlined within the Ten States Standards.

Table 2: Minimum Slope Requirements of Gravity Main

<b>Pipe Inside Diameter (inches)</b>	<b>Minimum Slope in Percent (%)</b>
8	0.40
10	0.28
12	0.22
14	0.17
15	0.15
16	0.14
18	0.12
21	0.10
24	0.08
27	0.067
30	0.058
33	0.052
36	0.046
39	0.041
42	0.037

H. Pipe Cover

1. The depth of cover is measured from the top of the pipe to the natural or finished ground surface above the pipe.
2. The minimum cover over gravity mains shall be no less than 4-feet below the finished grade. Gravity main invert depth shall not exceed 20-feet below finished grade, unless approved by AUD.
3. All offsite sewer lines between structures shall have a maximum depth of 10-foot at finish grade and shall be 25-feet away from any permanent structure including footings.
4. All downstream manholes between houses or structures shall have no more than a 2-foot drop between the invert elevation in and invert elevation out.

I. PVC Sewer Pipe SDR 35 and SDR 26

1. PVC pipe shall be manufactured from virgin resin conforming to ASTM D-3034 (latest version) with minimum classification of SDR-35 for pipes less than 15-inch diameter and SDR-26 for pipes greater than 15-inch diameter.
2. PVC shall be jointed with a rubber gasket and shall conform to ASTM F477 (latest version) and manufacturer's recommendations, solvent weld is prohibited.

3. The pipe shall be colored green for in-ground identification as sewer pipe.
4. Fittings and accessories shall be as manufactured and furnished by the pipe supplier or approved equal and have bell and/or spigot configurations compatible with that of the pipe.

J. C-900 DR-18 PVC Pipe

1. Pipe and fittings shall meet the requirements of AWWA C900.
2. The bell shall consist of an integral thickened wall section with an elastomeric seal. The wall thickness in the bell section shall conform to the requirements of Section 6.2 of ASTM D3139.
3. The pipe shall be manufactured to cast iron outside diameter in accordance with AWWA C900
4. The seal shall meet the requirements of ASTM F477.
5. Standard laying lengths shall be 20-feet.
6. The pipe shall be colored green for in-ground identification as sewer pipe.

K. Epoxy Lined Ductile Iron Pipe (DIP) and Fittings

1. Pipe and fittings shall be epoxy lined with an epoxy chemically resistant protective lining applied at a 40 mils nominal thickness.
2. Pipe shall be in accordance with ANSI A21.50/AWWA C150 and conform to the requirements of A21.51/AWWA C151. Push-on and restrained joint pipe shall have a minimum rated working pressure of 150 psi.
3. Pipe and fittings shall be furnished with push-on joints, push-on restrained joints, mechanical joints, and flanged joints as required. Pipe ends (spigot end, bell, and socket) for all pipes shall comply with the standard dimensions of ANSI/AWWA C151/A1.5.
4. Push-on joints shall conform to ANSI A21.11/AWWA C111.
5. Mechanical joints and bolts shall conform to AWWA C111. Bolts shall be high strength low alloy steel.
6. Specific Applications of DIP are as follows:
  - a. Aerial Sewers to be mounted to piers inside casing pipe. Casing pipe shall have stainless steel straps.

- b. When wastewater line has less than 4-feet of cover. Minimum depth of cover for DIP is 2-feet but must be approved by Augusta Utilities.
  - c. When a wastewater line crosses over storm pipe (Must be one joint of DIP centered on the crossing)
  - d. Within 20-feet of structures (near side of concrete footing), toe of slope, or top of bank of lakes/streams/creeks/detention ponds.
  - e. When a wastewater line is being crossed laterally within 18-inches by a storm sewer line (The joint crossing the storm sewer must be DIP).
  - f. When a wastewater line is to have more than 15-feet of fill.
  - g. When a wastewater line exceeds the maximum slope of 10%.
  - h. For last joint of pipe at all drop manholes greater than 2-feet including drop pipe.
  - i. When a wastewater line is less than 6-feet under a street.
  - j. AUD shall mandate DIP in any instances of off-site or on-site construction where future abuse to the line is possible due to location or circumstances, extensive length under pavement, or in private property away from right-of-way areas.
- L. High Density Polyethylene (HDPE) DR-9 Pipe and Fittings:
1. Pipe shall be manufactured from a PE 3408 resin. The resin material shall meet the specifications of ASTM D3350-02.
  2. Pipe O.D. sizes shall be ductile iron pipe sizes (DIPS).
  3. Pipe shall have a manufacturing standard of ASTM D3035 and be manufactured by an ISO 9001 certified manufacturer.
  4. The pipe shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.
  5. HDPE Fittings shall be in accordance with the following:
    - a. Butt fusion fittings shall be in accordance with ASTM D3261 and shall be manufactured by injection molding, a combination of extrusion and machining, or fabricated from HDPE pipe conforming to this specification. All fittings shall be pressure rated to provide a working pressure rating no less than that of the pipe.

- b. Electrofusion fittings shall be PE3408 HDPE, Cell Classification of 345464C as determined by ASTM D3350-02 and be the same base resin as the pipe. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055.
- c. Flanged and Mechanical Joint Adapters shall be PE 3408 HDPE, Cell Classification of 345464C as determined by ASTM D3350-02 and be the same base resin as the pipe. Flanged and mechanical joint adapters shall have a manufacturing standard of ASTM D3216. All adapters shall be pressure rated to provide a working pressure rating no less than that of the pipe.

M. Material Transitions

- 1. When transitioning sanitary sewer lines, the material types to be used shall be indicated and must be approved by AUD. The transitioning of sewer line material between manholes shall require the use of transition couplings.
- 2. For transitions between PVC and Ductile Iron Pipe use epoxy lined ductile iron transition coupling or approved equal.

N. Pipe Size Uniformity and Alignment:

- 1. Pipe size shall remain constant between manholes and pipe alignment must remain straight between manholes.

O. Horizontal Separation

- 1. Horizontal separation distances are as follows, with distances listed from edge-to-edge of listed items.
  - a. 10-feet to water lines, force mains, and storm sewer lines anything less than 10-foot must be approved by AUD and requires the pipe material to be DIP.
  - b. 25-feet to buildings, toe of slopes (will be determine on a case-by-case basis), top of bank of lakes/streams/creeks, detention ponds, concrete footings, or other permanent structures (20-foot absolute minimum – and will only be considered by AUD when unavoidable, and pipe material is required to be DIP). This shall include residential houses and will be strictly enforced.
  - c. Where horizontal separations between storm, water, and sewer cannot be met, water and sewer lines shall be DIP, and joints staggered such that maximum separation exists between joints as approved by AUD. The minimum length of DIP pipe shall be no less than 10-feet, but a full joint is recommended.
  - d. 15-feet minimum separation to gas mains. If gas company requirements are more than 15-foot AUD will follow their requirements on separation.

- e. 15-foot minimum to underground electric cable. If electric company requirements are more than 15-foot AUD will follow their requirements on separation.

P. Vertical Separation

1. 18-inch minimum separation (edge-to-edge) between all pipes and cables shall be maintained. When unavoidable, AUD can approve a 6-inch absolute minimum separation requiring the pipe material to be DIP.
2. Where vertical separations between water and sewer cannot be met, water and sewer lines shall be DIP, and joints staggered such that maximum separation exists between joints as approved by AUD.
3. All sanitary sewer is to be designed and installed to be underneath all water mains.

Q. Future Connections / Stub-outs

1. All gravity main extensions for future connections shall terminate at a manhole at the property / ROW line or phase line.
  - a. Public manholes shall be located within an easement or ROW.
  - b. Private manholes shall be located within private property, immediately adjacent to the ROW. Private manhole cover shall be labeled private.
2. If an existing 8-inch gravity main has been stubbed out and capped, it shall terminate with a manhole.
3. Connections to existing manholes shall be core drilled in the field. Cores shall be placed a minimum of 12-inches from existing cores, penetrations, and joints.
4. For proposed projects connecting to existing inactive or new dry sewer, the entire unused system shall be re-inspected, including but not limited to CCTV inspection by the contractor and shall comply with the minimum standards of AUD. The developer shall inspect, repair, or replace all defects found by a method approved by AUD at no cost to AUD.

R. Wastewater Line Bedding

1. Bedding requirements shall apply to wastewater lines only. They are considered minimum bedding requirements and as such, do not relieve the Engineer/Contractor of the responsibility to provide any additional bedding necessary for proper construction.
2. Bedding shall be carefully placed along the full width of the trench so that the pipe is true to line and grade of the pipe barrel. Bell holes shall be provided to relieve pipe bells of all loads, but small enough to ensure that support is provided throughout the length of pipe.

Crushed stone embedment material shall conform to ASTM C33, Graduation #57 (GA DOT STD 800.1). Bedding material shall be placed underneath and be carried up the sides of the pipe as specified below.

3. Class B Bedding shall be performed by first undercutting the trench an adequate amount to provide bedding under the pipe bell. The trench shall then be brought to grade with compacted crushed stone as specified above for the full width of the trench. The bedding material shall be placed in the zone 4-inches below the pipe and the pipe laid to line and grade and backfilled with compacted crushed stone placed the full width of the trench up to one-half the outside diameter of the pipe. Select backfill placed in 6-inch layers and compacted shall be the backfill from the spring-line of pipe to 18-inches above the pipe. A minimum Class B Bedding shall be used for all plastic pipes.
4. Class C Bedding shall be performed by first undercutting the trench an adequate amount to provide bedding under the pipe bell. The trench shall then be brought to grade with compacted crushed stone as specified above for the full width of the trench. The bedding material shall be placed in the zone 4-inches below the pipe and the pipe laid to line and grade and backfilled with compacted crushed stone placed the full width of the trench up to one-fourth the outside diameter of the pipe. Select backfill placed in 6-inch layers and compacted shall be the backfill from the bedding material to 18-inches above the pipe. A minimum Class C Bedding shall be used for all ductile iron pipes when required by AUD.

#### S. Backfilling Around Pipe

1. As soon as the joint material has set, fine earth shall be carefully tamped around each joint, and around and over the pipe to a depth of at least 2-feet above the top of gravity pipelines. Selected materials for this purpose shall be Class I or II soils as specified in ASTM D2321. Reconstruction of any roadway section or right-of-way shall be in accordance with the Georgia Department of Transportation and Augusta, Georgia Specifications

#### T. Jack and Bore of Sewer Mains

The installation of a sewer main by Jack and Bore method shall include, but not be limited to, jack and bore pits and equipment, sheeting, steel casing pipe, casing spacers, coatings, location signs as required, miscellaneous appurtenances to complete the entire work as shown on the DRAWINGS and restoration.

##### 1. Roadway and Railroad Placement

- a. Where boring is required under roads, the materials and workmanship will be in accordance with the standards of the Georgia Department of Transportation or local authority.
- b. Boring and jacking under railroads will be governed by the latest A.R.E.A. Standards, Part 5, "Pipelines" and those of the railroad involved.



- c. Verify and coordinate with all existing utility location prior to constructing the drilling and receiving pits.

## 2. Casing Pipe

- a. The casing pipe shall conform to the materials standard of ASTM Designation A252, with minimum wall thickness of 0.219-inch. Steel pipe will have a minimum yield strength of 35,000-psi. Casing pipe shall be joined together with welded joints and seams, and work shall be performed by a certified welder.
- b. Casing pipe shall be two times the diameter size of water line being installed. Casing pipe shall extend a minimum of 6-feet outside edge of pavement (EOP) creek bed, commercial utility easements such as gas, electric, or railroad right of way. AUD shall require longer casings for deeper bores.
- c. Split steel casing shall be required on existing utilities in a case-by-case basis and will follow the above installation requirements.

## 3. Carrier Pipe

- a. The carrier pipe shall be epoxy-lined ductile iron as specified herein. Carrier pipe shall be DIP with fully restrained joints with locking restraints.

## 4. Casing Spacers

- a. Casing spacers are to be placed per manufactures requirements but minimum of two per pipe.

## U. New Sewer Mains

1. New sewer mains shall be tied-in to the existing sewers at locations indicated on the plans. No lines smaller than 6-inch shall be tied to a sewer line or manhole.
2. The Contractor shall be responsible for maintaining uninterrupted service of the wastewater during tie-in operations.
3. No connection to existing wastewater facilities shall be allowed until the proposed sewer line is inspected and approved by AUD's Inspector.
4. Tying into a trunk line shall be made by manhole connection only. New line coming in must come into the manhole above the top of the outfall pipe to prevent back up of line.

## PART 3: MANHOLES

### A. Location

1. Manholes shall be installed at the end of each gravity main; at all changes in grade, size, or alignment; at all gravity main intersections; and at distances not greater than 400-feet. Manholes shall also be provided at phase lines on projects.
2. The elevation drop across the manhole inverts shall be no less than 0.20-feet unless otherwise approved by AUD.
3. Private sewer systems must be separated from AUD gravity main system by a private manhole located within private property, immediately adjacent to the ROW.
  - a. If private gravity main system is 8-inch, a manhole is to be used at the ROW line to separate public from privately owned portions of the gravity collection system.
  - b. If private gravity main system is less than 8-inch, a 6-inch cleanout shall be used at the ROW line to separate public from privately owned portions of the gravity collection system.
  - c. Under no circumstances shall a cleanout be permitted on an 8-inch main to separate public from privately owned portions of the gravity collection system.
4. All manholes constructed outside the right of way and paved area shall be elevated 2-feet above the ground surface. An exception is if the manhole is in a visible and maintained area which will be approved by AUD on a case-by-case basis.
5. All manholes constructed within the 100-year flood plain shall be elevated a minimum of 4-feet above the ground surface and include a water-tight ring and cover.
6. Manholes should not be located where surface water can drain into the manhole. When this is not possible, a watertight cover shall be specified. For this purpose, and for assisting in locating manholes across country, the rim of the manhole shall be set above grade.
7. Where corrosive conditions due to septicity or other causes is anticipated, consideration shall be given to providing corrosion protection on the interior of the manholes.

### B. Type

1. Standard Manhole
  - a. Where the difference in elevation between the incoming gravity main invert and the manhole invert is less than 24-inches, the manhole invert shall be filleted to prevent solids deposition.

2. Drop Manhole:

- a. An outside drop pipe shall be provided for a sewer entering a manhole at an elevation of 24-inches or more above the manhole out invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24-inches the invert shall be filleted to prevent solids deposition.

3. Doghouse Manhole

- a. Doghouse manholes or construction of a new manhole around an existing sewer main are to be approved on a case-by-case basis.

4. Force Main to Gravity Manhole

- a. Force main to gravity manholes are to be used where a pressurized force main system terminates into a manhole that is on a gravity system.
- b. The receiving manhole and the immediate manhole downstream shall have the interior coated with an immersion grade epoxy applied in 2 coatings for a minimum thickness of 16 mils.

C. Diameter

- 1. A minimum access cover diameter of 23.5-inch shall be provided in all manholes. Manholes shall meet the minimum diameters as shown in the following table.

*Table 3: Minimum Manhole Diameters*

<b>Gravity Main Diameter (inches)</b>	<b>Minimum Inside Manhole Diameter (inches)</b>
Up to 16	48
18 to 30	60
36 and larger	72

D. Flow Channel

- 1. The flow channel through manholes shall be made to conform in shape and slope to that of the gravity mains with a minimum flow line elevation drop of 0.20-feet across the manhole shall be provided. Flow direction changes of less than 90-degrees will not be allowed in gravity main alignments.
- 2. Manhole flow channels shall be constructed of concrete, sewer pipe, or precast, and shall be of semicircular section. Each manhole shall be provided with such channels for all connecting sewers. No brick shall be used to construct channels. Flow channels shall be as shown in the standard drawings.

3. The inverts shall conform accurately to the size of the adjoining pipes. Side inverts shall be curved and main inverts where direction changes shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining sewers.
4. A bench shall be provided on each side of any manhole channel when the pipe diameters are less than the manhole diameter. The bench should be sloped no less than ½-inch per foot (4%). No lateral sewer, service connection, or drop manhole pipe shall discharge onto the surface of the bench.

#### E. Materials

1. Pre-cast manholes shall conform to specifications for ASTM C478 “Pre-cast Reinforced Concrete Manhole Sections”.
2. No brick or cast-in-place manholes are to be used.
3. All holes for incoming and outgoing pipe will, whenever possible, be precast, with pipe tie-in made using PS10 flexible gasket.
4. Cutting new holes (coring), the holes shall be machined cored neatly and carefully so as not to damage the structural integrity of the manhole and large enough to allow the insertion of a flexible rubber boot. Precast holes shall be flexible boot fitted.
5. Barrel joints shall be tongue and groove with preformed plastic meeting the requirements of Federal Specifications SS-S-00210, “Sealing Compound, Preformed Plastic Pipe Joints” Type I, rope form.
6. Eccentric manhole cones are required. Inverts shall be constructed of 3,000-psi plant mix. Manhole steps shall be installed in all sections of each manhole as indicated on the drawings but not over the inlet or outlet pipes.
7. Frame and cover shall be cast, or ductile iron bolted down and set in a bed of mortar on the top of the manhole and completely grouted outside and wiped smooth.
8. Offsite ring and cover shall be integrated into the cone. Cover shall read “Augusta Georgia Sanitary Sewer.”
9. Locked manhole cover shall be required in isolated easement locations or where vandalism may be a problem.

#### F. Castings

1. Bolt down and/or gasketed covers shall be provided for manholes located in areas outside of improved ROW and subject to ponding or flooding.

#### G. Access

1. All manholes are to be accessible.
2. Access shall be provided for all manholes that are located outside of the roadways at a minimum of 16-foot-wide road or trail-path. The access to the manholes shall be drivable and free of obstructions such as structure or fence.
3. Maximum slope on the access road shall be 5%. Access road shall be able to accommodate at least 50,000-pound loads for maintenance equipment.
4. The design engineer shall determine if access road is paved, concrete, grassed, or stone but must meet the above requirements. AUD is not responsible for maintenance of these access roads.
5. All access points to offsite sewer lines are to be shown on the plans and clearly labeled with easements or ROW access. A profile of that road shall be provided.
6. Gates shall be required on offsite sewer access points.

#### H. Coating or Lining

1. When coating or lining is required, existing manholes may be coated or lined, and new manholes shall be lined.
2. If a force main enters a collection system, a liner or coating shall be provided for the manhole the force main enters and the next manhole downstream of that connection.

### PART 4: SERVICE LATERALS AND CLEANOUTS

#### A. Standard Drawings and Location Marking

1. All service connections shall be as shown in the standard drawings.
2. Service connections shall be permanently marked by cutting an "S" in the curb in direct alignment with the cleanout and the installation of a stake at the temporary plug to indicate the location of the service pipe as per the standard drawings.
3. Locating tracer wire shall be attached to all service cleanouts connected to sewer mains, see standard detail.

#### B. Size and Length

1. Individual sewer services shall be a minimum of 6-inch in diameter and shall extend from the main and terminate with a clean-out constructed at the edge of right-of-way.

2. All service laterals shall be less than 60-feet in length between sewer main or manhole to the property line unless approved by AUD.
3. The required service lateral with clean-out shall be inspected by the Augusta Utilities Inspector prior to physical tie-in of private service line.

C. Slope

1. Service laterals shall have a minimum slope of 1%.
2. The services shall be installed as deep as possible.
3. If a floor elevation is less than 18-inches higher than the closest manhole top elevation, then a private prefabricated pump station shall be required to pump wastewater to the lateral at the cleanout in the road ROW. The lateral receiving the pump station discharge shall be a single lateral, not shared by an adjacent property, and the pump discharge line shall include a check valve. The private pump station shall be operated and maintained by the property owner. This must be called out on the plans for each building that meets this requirement.

D. Connection

1. Under no circumstances shall house sewer services and water services be laid in the same trench. Water and sewer services must maintain 10-foot separation.
2. No fittings in the sewer service between the main and the cleanout.
3. Minimum angle between influent and effluent wastewater lines at a service at the main line shall be 90-degrees and installed perpendicular to the main.
4. Service laterals shall not be directly connected to sanitary manholes, except at terminal manholes unless approved by AUD.
5. All lateral connections on new sanitary sewer gravity main shall be made at time of installation of new gravity main.
6. Where sidewalk is installed, 2-feet of clearance is required between the customer's side of the sidewalk edge and the cleanout.
7. The cleanout shall be accessible and unobstructed for 10-feet in all directions and shall not be placed within side lot setbacks, fenced areas, stormwater swales, or in any asphalt or concrete areas without written approval by AUD.
8. Cleanouts placed in or under driveways shall be moved at the owner's expense.

9. For commercial developments shopping center/plaza) when the cleanout cannot avoid placement in asphalt, the top of cleanout shall be flush with the asphalt surface. Street rated top will be required.
10. Cleanouts shall be located on the low side of the water meter on any property. Cleanouts shall have a concrete protection ring.

## PART 5: GREASE TRAPS, OIL & WATER SEPARATORS, AND SAND & GRIT SEPARATORS

### A. Grease Interceptors

1. A grease interceptor is required for all commercial establishments where food or beverages will be processed, cooked, or prepared in any way. All kitchen and/or food and beverage preparation waste lines will be routed through the grease interceptor. However, no domestic waste will be allowed to enter the grease interceptor. All wastewater flow from kitchen areas and/or food and beverage preparation areas shall flow through approved grease interceptors prior to entering the AUD system.
2. Grease interceptors shall be located outside of buildings in accordance with the most current County Development Codes, as such special provisions shall be periodically amended or accepted by AUD. Interceptors shall be placed where the proposed food waste line will have adequate slope and be always accessible for maintenance and inspection.
3. The grease interceptor will be sized per AUD standards and must be approved by AUD. The minimum size grease trap is 2000-gallons, special exceptions will be looked at on a case-by case basis. The grease interceptor shall be designed and installed in accordance with the manufacturer's instructions, the requirements of this section, per the standard drawings, AUD standard details, and per Augusta Engineering compaction standards if within the pavement.
4. All new grease traps will be required to install an alarm system on each grease trap and provide an engineered electrical design.

### B. Oil and Water Separators

1. Oil and water separators are required for all facilities where commercial vehicles or equipment are repaired, maintained, or washed, including vehicle repair garages, car-washing facilities, factories, commercial facilities with hydraulic lifts, hydraulic elevators, dumpster pads, compactors, and all other facilities where oily liquid wastes are produced.
2. Oil and water separators shall be individually designed and sized for each site-specific application. The minimum size is 500-gallons.
3. Where automobiles are serviced, greased, repaired, or washed or where gasoline is dispensed, oil and water separators shall have a minimum capacity of 6-cubic feet for the

first 100-square feet of area to be drained, plus 1-cubic foot for each additional 100-square feet of area to be drained into the separator.

C. Sand and Grit Separators

1. Sand and grit separators/traps are required for all commercial facilities discharging fine particles, floating matter, or other debris that could cause clogs or blockages in the AUD collection system. Examples include sand, dust, metal shavings, rags, strings, feathers, glass, etc. Sand and grit separators shall be individually designed and sized for each site-specific application.

D. Lint separators

1. The lint separator shall be installed on all laundry facilities and where large-scale clothes washing/dry facilities are located. The engineer is to design size of the lint separator based on numbers of units going to separator.

## PART 6: DESIGN STANDARDS FOR FORCE MAINS

Sewer force main must be installed in accordance with the AUD standards for water distribution systems and comply with all force main design standards that are based on Federal, State, and local health requirements.

A. Location

1. Force main shall maintain a consistent alignment with respect to the centerline of the roadway and maintain separations from other utilities. Sewer force mains shall be installed on the opposite side of the road of water mains.
2. Force main constructed within an easement; the centerline of the pipe shall be located within the centerline of the easement. The minimum width of the easement shall be 20-feet and exclusive for sewer force mains and Fiber Optic cable only.
3. Force mains shall be designed with uniform positive or negative slopes to avoid undulations and minimize high points and low points in the profile.
4. Force mains and water mains are to have a minimum separation of 10-feet horizontally. Where the 10-foot separation is not practical, then the force main may be closer provided:
  - a. It is installed in a separate trench.
  - b. The force main is installed below the water main in a separate trench with a minimum of 18-inches of vertical separation.



B. Minimum Size

1. Sewer force mains shall be 2-inch in diameter or greater.

C. Pipe Cover

1. A minimum cover of 48-inches of cover from the top of pipe. Grade and depth of cover shall be adjusted as needed to minimize the number of high points on the force main as well as to maintain a positive grade upstream and negative grade downstream of each high point.

D. Velocity and Diameter

1. At design pumping rates, a cleaning velocity of at least 2.5-feet per second shall be maintained. Maximum velocity at design pumping rates should not exceed 5-feet per second. The minimum force main diameter shall be 2-inch. The maximum force main diameter shall be 12-inch. Additional approval is required for force mains larger than 12-inch diameter.

E. Design Friction Losses

1. Friction losses through mains shall be based on the Hazen Williams or Darcy-Weisbach formula. In the use of Hazen Williams formula, the value for "C" shall be 120 for all force main and pump station pipe.

F. Design Pressure and Restraint

1. The main and fittings, including all restrained joint fittings shall be designed to withstand pump operating pressures and pressure surges, but no less than 200-psi.
2. All new pipe installed in the ROW shall be completely restrained at each bell.
3. All pipes shall be restrained at minimum per the design engineer's submitted design calculations.

G. Connections

1. For projects connecting to existing force main systems, the Engineer shall incorporate methods, materials, or requirements in the design for pressure testing of the new systems without reliance on the condition of the existing system.
2. For proposed projects connecting to constructed inactive systems, the entire system shall be re-inspected prior to connection, including but not limited to pressure testing by the contractor and shall comply with the specifications and standards approved at time of original installation. The developer shall inspect, repair, or replace all defects found by a method approved by AUD at no cost to the city.

3. Connection to an existing gravity system shall be made at an existing manhole or by constructing a force main to gravity main manhole (see standard detail drawing).
4. Connection to an existing force main shall be made by installing a tee or wye, provide a check valve, and an isolating plug valve.

H. Pipe Deflection and Change in Direction.

1. Fittings shall be used for all changes in direction.
2. No allowable deflection is permitted for design of PVC mains. Fittings shall be designed in lieu of deflection for all changes in direction.
3. Force main material size changes or connecting branches will require a manhole.

I. Force Main Termination

1. Force mains shall enter the gravity sewer system no greater than 2-foot above the lowest invert of the receiving manhole and orientated to minimize turbulence. Force mains shall terminate directly into a wastewater manhole or connecting force main.

J. Air Release Valves

1. Air release valves (ARV) shall be provided, as necessary, to vent air out of the system. All such valves are also required at the high points if the vertical change in elevation is 2-feet or greater.
2. Valves shall be clearly delineated on the force main profile as shown in the standard drawings.

K. Valves

1. Valves shall be located on force main systems to facilitate effective isolation of the pipe system for repairs and maintenance. On straight runs of force mains, valve spacing shall not exceed 2,000-feet. Additional valves shall be provided where force mains intersect to facilitate isolation of pipe segments.
2. Valves shall also be provided at the division of AUD versus private ownership such as at the ROW line. Plug valves at the ROW shall have a minimum size of 2-inches.
3. Tapping valves and ball valves shall be installed and abandoned in the open position followed by a plug valve.

## PART 7: DESIGN STANDARDS FOR WASTEWATER LIFT STATION

### A. General

1. The design standards outlined in this Section apply to all wastewater lift stations maintained by AUD. All such stations shall be underground installed type stations.
2. Wet well size and pump sizing shall be determined by a design engineer and reviewed by AUD, after a comparative study has been done of the area surrounding the proposed construction. Potential future development of the surrounding area should be incorporated into the design.
3. All potable water services around sewage pumping facilities shall be provided with an approved reduced pressure zone backflow prevention (RPZ) device.

### B. Design Basis

1. Pumps, valves, and pipe sizes shall be designed by a professional engineer and shall be capable of providing a minimum flow rate of 2.5-fps.
2. The design engineer shall submit sealed, signed, and dated design calculations with the plans for wastewater lift stations. Calculations shall include the system curve based on the AUD current pump standard, hydraulic analysis of force main system including all friction and minor losses, operating cycles with wet well sizing, and buoyancy calculations. The system curve shall verify that the pumps are operating at peak efficiency and are suitable for the design flow application.
3. Pump and motor selection shall be designed based on AUD current standardization of equipment and the hydraulic grade line at the point of connection provided by AUD.
4. The Design Engineer shall submit design calculations for all pump manufacturers approved in the Approved Products List. However, no pump substitutions shall be permitted during construction and only pump selections utilized in the design calculations shall be approved for installation during construction.

### C. Location

1. Lift station sites shall be tracts of land adjacent to ROW. The actual location of all equipment shall be on-site and within the approved products list or as approved by AUD.

### D. Pump and Motor Selection

1. The pump station shall be capable of pumping the peak design flow with the largest pumping unit out of service. The horsepower of the motors provided shall be capable of functioning without overloading over the entire range of the published performance curve.

This is so that the motor will not overload if the system hydraulic conditions for the pump change in the future.

## E. Design and Construction

### 1. Accessibility

- a. The pumping station shall be readily accessible by maintenance vehicles during all weather conditions.
- b. Accessibility requirements for large equipment requires a minimum 51-foot turning radius curb to curb and 54-foot turning radius free from obstructions to access to the pump station.

### 2. Site Sizing, Tract and Easement Requirements

- a. Pump station sites shall be sized and pre-approved by AUD.
- b. All new pump station tracts shall be located a minimum of 50-feet away from any existing, proposed, or future single family residential lots.
- c. Pump stations must maintain a minimum 50-feet spacing from pool decks, amenity areas, and other public gathering spaces.
- d. The developer shall dedicate the pump station site and driveway by plat or separate instrument to AUD.

### 3. Piping

- a. All pipes entering the wet well and discharging from the wet well into the valve pit shall be mechanical joint DIP. PVC pipe will not be permitted.

### 4. Station Requirements

- a. The top of the valve pit shall be a minimum of 6-inches above finished grade.
- b. A location for permanently installed or portable engine-driven generating equipment or permanently installed bypass pump must be in the plans for emergency operation of all lift stations.
- c. Pre-approved plug valves shall be installed to allow for bypass pumping of the facility. Valves shall have a minimum of an 18-inch clearance in all directions.

5. Electrical systems and components
  - a. Electrical systems and components shall be specified by or designed and built by AUD.
6. Emergency Generator
  - a. Pump stations shall be provided with emergency power or permanent Bypass Pumps, which could be purchased by Augusta Utilities or the Contractor on a case-by-case basis, with prior approval from AUD.
  - b. Generating unit size shall be determined by or approved by AUD.
  - c. Design engineer and/or contractor shall coordinate the type and size of all permanent or portable generators based on approval from AUD prior to lift station construction.

## PART 8: CONSTRUCTION GUIDELINES FOR WASTEWATER SYSTEMS

### A. General

1. This section covers general conditions the contractor shall comply with regarding the construction sites.
2. Construction of sewer systems to be turned over to Augusta Utilities must be performed by a State of Georgia licensed Utility Contractor
3. Prior to construction activities taking place, the contractor shall attend an advance a Pre-Construction Meeting with the assigned AUD Inspector.
4. The contractor is to provide work schedule for all utility installation with the inspector prior to the start of construction. Should the schedule change or need to be revised, a new schedule should be provided in a timely manner.
5. AUD will require highlighted shop drawings for all water and sewer parts and material for the site be provided to the AUD inspector a minimum of 3-weeks before any installation of water and sewer is allowed to occur.
6. The connection point(s) to the existing sanitary sewer collection system shall be exposed by the contractor and the tie-in location verified by AUD prior to any proposed utility work shall take place.

## B. Grades and Surveys

1. All approved work shall be constructed in accordance with the lines and grades shown on the plans. The full responsibility for keeping alignment and grade shall rest upon the contractor.
2. The contractor shall furnish and maintain, at their own expense, stakes, and other such materials, for setting reference marks.
3. The contractor shall, at their own expense, establish all working or construction lines and grades as required from the reference marks, and shall be solely responsible for the accuracy thereof.

## C. Utility Coordination

1. Prior to any trenching activity or excavation, the contractor shall be responsible for ensuring that all utilities have been located by underground locating services and have valid locating verification documentation subject to the check and review by Augusta Utilities.
2. The Contractor/Developer is responsible for verifying the exact location, size and material of any existing sewer facility proposed for connection or use by the project. No publicly owned sewer line shall be uncovered without prior 48-hour coordination with the AUD inspector.
3. The contractor shall take all reasonable precautions against damage to existing utilities. However, in the event of a break in an existing water main or sewer main or a water or sewer service line, the contractor shall immediately notify the utility inspector and the 24-Hour Emergency Dispatch for Augusta Utilities. The contractor shall lend all possible assistance in restoring services and shall assume all cost, charges, or claims connected with the interruption and repair of such services, as determined by Augusta Utilities.

## D. Deviation from Plans

1. When deviation from approved plan is required, AUD's Inspector, Project Manager, and the Design Engineer shall be notified before the deviation can occur.
2. It is the contractor's responsibility to notify AUD of any issue that arise that is either unforeseen or change the approved plan.
3. A revised plan shall be submitted from the design engineer as soon as possible to AUD based on the change that is requested for approval. Minor changes not affecting capacities, flows, or operation can be approved in the field during construction by AUD's Inspector. The Inspector shall have authority as to what constitutes a minor or major change.
4. A field change not requiring a full plan submittal, shall be shown on a red line drawing, and submitted to the AUD Inspector prior to a final walk thru.

5. An approved set of red- line drawings (Record Drawings) clearly showing any changes shall be submitted to the AUD Inspector at the completion of the work and prior to the final walk thru of the project.

E. Protection of Utility Structures

1. Adequate protection and maintenance of all surface and underground utility structures including but not limited to hydrants, valves, valve covers, meters, meter boxes, manhole ring & covers, sewers, water mains, and miscellaneous other utility structures encountered in the progress of the construction work shall be furnished by the contractor at their expense to protect and prevent any potential damage, breaking, or failure.
2. Any such structures that are disturbed shall be restored to equal or better condition upon completion of the work.
3. AUD water valves, hydrants, manholes, services, and other appurtenances shall be made accessible to AUD personnel during all phases of construction.

F. Erosion and Sedimentation Act Compliance

1. All phases of construction shall be completed in accordance with the Erosion and Sedimentation Act 12-7-1 et seq.

G. Work Conducted in Right-of-way

1. Where a traffic control plan is required, it shall be in accordance with Augusta Engineering Department's Right of Way Encroachment Guidelines.
2. Where work is within GDOT Right-of-way, it shall be in accordance with Georgia Department of Transportation Utilities Accommodation Manual and will require an approved GDOT GUPS Permit.

H. Construction Easements

1. In easements across private property, the contractor shall confine all operations within the easement area and shall be responsible and liable for all damage outside of the easement area.

I. Sanitary Sewer Overflows

1. The contractor shall be liable for all sanitary sewer overflows (SSO) associated with the work, regardless of fault. The contractor shall be liable for all AUD personnel, labor, and equipment costs, as well any penalties and fines resulting from an SSO caused due to construction project activity.

J. Handling and Care of Stored Materials

1. All materials delivered, stored, and installed shall be new and of the highest quality. Materials that are damaged, used, defective, refurbished or in any way found to be not of the highest quality shall be rejected and replaced at no cost to AUD.
2. The contractor shall remove all rejected materials from the project site within five NORMAL WORKING DAYS.
3. Unload pipe to avoid deformation or other injury thereto. Place no pipe within pipe of a larger size. Handle pipe and fittings per manufacturer's recommendations to ensure delivery to the trench in sound, undamaged condition.
4. Store manholes level to ground surface to avoid injury thereto. Inspect to ensure there is no damage and/or defect.

K. Open Excavation

1. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights, and other means to prevent accident to persons and damage to property.
2. The length of open trench will be controlled by the surrounding conditions. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, AUD may require special construction procedures such as limiting the length of open trench, fencing, and prohibiting excavated material in the street.
3. The contractor shall take precautions to prevent injury to the public due to open trenches. All trench excavated material, equipment, or other obstacles that could be dangerous to the public shall be barricaded and well lighted at night.

L. Wastewater Collection System Installation

1. Authorization must be obtained from AUD to construct, alter, or modify a wastewater line. Construction of sewer infrastructure will be authorized by the Utilities Department upon approval of submitted plans and notification of the AUD Project Inspector at least 48-hours (two working days) prior to starting construction.
2. PVC gravity sewer pipe and force main shall be installed in accordance with ASTM D2321, latest version. Epoxy lined ductile iron gravity sewer pipe shall be installed in accordance with AWWA C600, latest version.
3. At no time shall a contractor use the bucket of a machine to push pipe together to minimize over bellings of the pipe. If the AUD inspector notices that a section of pipe has been over



belled that section of pipe shall be replaced with a new joint of pipe including a new gasket installed.

4. Backfill shall be free of boulders and debris and shall conform these minimum standards. Sharp or rocky material encountered in the base shall be replaced with proper bedding.
5. Pipe shall be laid on-line, and grade as designed. Pipe joints, gravity blocks, service connections, and conflicts shall be left exposed until visually inspected and approved by the AUD's Inspector.
6. All concrete cradles, saddles, or encasements shall be installed as shown on the plans. These structures shall be constructed in strict accordance with the details shown on the plans. Concrete shall have a 28-day compressive strength of no less than 3,000-psi when tested in accordance with ASTM Specification C-39.
7. All manholes indicated on the plans shall be furnished and installed by the Contractor in strict accordance with the plans. The invert channels shall be smooth and accurately shaped to the semicircular bottom conforming to the inside of the adjacent sewer sections. Changes in direction of the sewer and entering branches shall have as long a radius of the true curvature as the size of the manhole will permit.
8. The top of manholes shall be adjusted with ring riser but no more than 6-inches with risers will be allowed. Order manholes to finish grade so that adjustments are not needed.
9. All construction material shall be first quality, not previously used. Repair clamps are not acceptable. Damaged or faulty pipe and materials must be properly replaced.

#### M. Laying Sewer Pipe

1. Gravity sewer pipe installation must comply with ANSI/ASTM D2321 as the minimum acceptable standard as well as any additional requirements as stated herein. Pipe shall be tested for soundness, clear interior, and satisfactory joint surfaces before lowering the pipe into the trench.
2. PVC and DIP shall be laid in a full bed of No. 57 stone. Pipe laying shall proceed upgrade, starting at the lower end of the grade and with the bells upgrade. Pipe shall be straight when placed in the trench. Trench bottoms found to be at incorrect grade after pipe laying operations having begun shall be corrected and brought to exact line and grade.
3. The line and invert grade of each pipe shall be checked from a top line carried on batter boards not over 25-feet apart or by use of a laser beam target inserted in each joint. Pipes shall be laid to form a smooth, uniform invert. A stopper shall be installed in the pipe mouth when pipe laying is not in progress.

4. Each joint shall be laid so that it will form a close concentric joint with adjoining pipe to avoid sudden deflections. All jointing of pipe and fittings shall be in accordance with the pipe manufacturer's recommendations.
5. Any leaks or defects discovered after completion of the work shall be repaired immediately. All pipes in place shall be carefully protected from damage until the backfilling operations have been completed.

#### N. Temporary Plugs

1. Care shall be taken to prevent earth, water, and other materials from entering the pipe, and when pipe laying operations are suspended, the Contractor shall maintain a suitable stopper in the end of the pipe and at openings for manholes at all times when pipe laying is not actually in progress.
2. Open ends of pipe and branches shall be closed with pre-molded gasket joint stoppers which conform with the same requirements as pipe being used. If water is in the trench when work is resumed, the plug shall not be removed until all danger of water entering the pipe has passed.

#### O. Setting Manhole Frames and Covers

1. Manhole frames shall match the grade with the pavement or finished concentric with the top of the masonry bolted down and in a full bed of mortar so that the space between the top of the manhole masonry and the bottom flange of the frame shall be filled and made watertight. A thick ring of mortar extending to the outer edge of the masonry shall be placed all around the bottom flange. The mortar shall be smoothly finished to be flush with the top of the flange and have a slight slope to shed water away from the frame. Manhole covers shall be left in place in the frames on completion of other work at the manholes.
2. Offsite manholes shall have ring and cover integrated into the manhole cone, with watertight fittings.

#### P. Setting Precast Manhole Sections

1. Precast-reinforced concrete manhole sections shall be set to be vertical and with sections and steps in true alignment. All holes in sections, used for their handling, shall be thoroughly plugged with mortar. The mortar shall be 1-part cement to 12-parts sand; mixed slightly damp to the touch until it is dense, and an excess of paste appears on the surface; and then finished smooth and flush with adjoining surfaces. Exterior manhole wraps shall be required in corrosive soils.

Q. Bulkheads for Tying-In and New Line Flushing

1. The contractor shall build a tight bulkhead in the pipeline where new work enters an existing sewer. The bulkhead shall remain in place until AUD authorizes its removal.
2. All wastewater collection lines, except building connections, shall be flushed with water in sufficient volume to obtain free flow through each line. All obstructions shall be removed, and all defects corrected. As soon as possible after the pipe and manholes are completed on any line, the Contractor shall flush out the pipeline using a rubber ball ahead of the water. None of the flushing water or debris shall be permitted to enter any existing sewer. No tie into an AUD system until the AUD inspector allows tie in to occur.

R. Removal and Replacement of Existing Pipe and Equipment

1. Where indicated on the drawings or required to properly place the work under the contract, as approved by the Engineer, the Contractor shall remove and replace such pipelines and equipment in a manner as approved by the Engineer.

S. Inspection Infiltration/Exfiltration Leakage Test, Air Test, Vacuum Test, and Mandrel Test

1. Upon completion of a section of the sewer, the Contractor shall dewater it and conduct a satisfactory test to measure infiltration or exfiltration.
2. The testing shall be conducted prior to any connections to buildings or active sewers. The Contractor shall be responsible for the satisfactory watertightness of the entire section of sewer.
3. All pipe joints shall be made watertight. There shall be no visible leakage at the joints and there shall be no sand, silt, clay, or soil of any description entering the pipelines at the joints. Leaks in the pipelines which cause infiltration or exfiltration to exceed limits shall be repaired by replacing defective pipe. Grouting and/or caulking to repair pipelines where excessive infiltration or exfiltration is evident will not be permitted.
4. The Contractor shall construct such weirs and bulkheads as required, shall furnish all water, labor, test plugs, power, pumps, meters, and other equipment necessary for the test to be properly made.
5. The Contractor shall use a low-pressure air test whereby the line is plugged and pressurized to 4-psi, and then held at that pressure for five minutes. The low-pressure air test shall be performed in accordance with the applicable sections of the Uni-Bell UNI-B-6-90, latest version.
6. In addition to line testing, manholes shall be tested via vacuum testing per ASTM C1244. Vacuum testing shall not be performed until the manhole is finished, including applying any protective coating where specified. Manholes shall be thoroughly cleaned of all silt, debris,

and foreign matter of any kind prior to the vacuum testing and then again prior to final inspection as required.

7. Mandrel testing of sewer lines shall occur after 30 days of finish grading or after 30 days of installation, unless otherwise approved by AUD on a case-by-case bases. Mandrel testing shall occur before paving or curb and gutter are placed in case of a failure. The Contractor shall test PVC sewer pipe for initial diametric deflections using a 5% mandrel. The mandrel pull shall be as described in the Ten State Standards. The Contractor shall not use any mechanical device in the mandrel pull.

## REFERENCES

All standards are listed as the latest known version. Any future revision to these standards will supersede the listed standard.

References/Acronyms within this section,

- ANSI refers to the American National Standards Institute, 25 West 43rd Street, 4th floor New York, NY 10036.
- AWWA refers to the American Water Works Association, 6666 West Quincy Avenue, Denver, Colorado, 80235.
- APWA refers to the American Public Works Society, 2345 Grand Boulevard, Suite 500, Kansas City, MO 64108-2641.

ANSI/AWWA, C104/A21.4. Latest Edition. American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.

ANSI/AWWA, C110/A21.10. Latest Edition. American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm), for Water.

ANSI/AWWA, C111/A21.11. Latest Edition. American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

ANSI/AWWA, C115/A21.15. Latest Edition. American National Standard for Flanged Ductile-Iron Pipe with Threaded Flanges.

ANSI/AWWA, C150/A21.50. Latest Edition American National Standard for Thickness Design of Ductile-Iron Pipe.

ANSI/AWWA, C151/A21.51. Latest Edition. American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.

ANSI/AWWA, C500. Latest Edition. Metal-Seated Gate Valves for Water Supply Service. ANSI/AWWA, C502-94. 1994. Dry-Barrel Fire Hydrants.

ANSI/AWWA, C503. Latest Edition. Wet-Barrel Fire Hydrants. ANSI/AWWA, C504 Rubber-Sealed Butterfly Valves.

ANSI/AWWA, C507. Latest Edition. Ball Valves 6 in. through 48 in. (150 mm through 1200 mm).

ANSI/AWWA, C508. Latest Edition. Swing-Check Valves for Waterworks Service, 2 in. (50mm) Through 24 in. (600mm) NPS.

ANSI/AWWA, C509. Latest Edition. Resilient-Seated Gate Valves for Water-Supply Service.

ANSI/AWWA, C510. Latest Edition. Double Check Valve Backflow-Prevention Assembly.

ANSI/AWWA, C511. Latest Edition. Reduced-Pressure Principal Backflow-Prevention Assembly.

ANSI/AWWA, C512. Latest Edition. Air Release, Air/Vacuum and Combination Air Valves for Water Works Service.

ANSI/AWWA, C550. Latest Edition. Protective Epoxy Interior Coating for Valves and Hydrants.

ANSI/AWWA, C600. Latest Edition. Installation of Ductile-Iron Water Mains and Their Appurtenances.

ANSI/AWWA, C605. Latest Edition. Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.

APWA, Latest Edition. Permanent Buried Line Marking.

<http://www.apwa.net/Documents/GovtAffairs/Policies/ROW/permburied.pdf>

Department of Community Affairs, Office of Coordinated Planning. Latest Edition. Georgia State Amendments to the Standard Plumbing Code Latest Edition

Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers. Latest Edition. Recommended Standards for Wastewater Facilities.

ASTM D2321, Latest Edition. –Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other gravity-flow Applications

Appendix A: APPROVED ITEMS AND PRODUCT SPECIFICATIONS FOR WATER  
DISTRIBUTION AND WASTEWATER COLLECTION SYSTEMS

It is the intent of AUD to review and update the production specifications and approved materials as appropriate to ensure efficient operation of the services and facilities.

SEE FOLLOWING PAGE

**AUGUSTA UTILITIES APPROVED ITEMS AND PRODUCT SPECIFICATIONS  
APPENDIX A**

<b>AUD Water Distribution System Fire Hydrant Standardization</b>			
Hydrants Shall comply with ANSI/AWWA C502 dry-barrel fire hydrants, existing nation standards and ANSI B26. Hydrants are to have a 5 1/4-inch main valve, open left, have a 1-1/2" pentagon operating nut and painted yellow above ground line			
<b>Manufacturer</b>		<b>Hydrant Model #</b>	
M&H		A129	
Mueller		Super Centurion 250	
American Darling		B-84-B-5	
<b>All products and materials to be used within the August Utilities Water Distribution and Wastewater Collections Systems shall comply with the following product specifications. All selected materials are to be submitted for review and approval prior to its intended use.</b>			
Cat.	Description	Water	Wastewater
		Product Specification	Product Specification
Air Release	ARV Enclosure	All ARV above ground enclosures shall be vented with tamper proof locking device. ASSE Classification II - ASSE 1060	All ARV above ground enclosures shall be vented with tamper proof locking device. ASSE Classification II - ASSE 1060
	Air Release Valves	Air Release Valve (ARV) shall be Combination Type, 316 Stainless Steel Float and have a minimum Operational Pressure of 250 PSI All ARV's shall meet AWWA C-512	Air Release Valve (ARV) shall be Combination Type, 316 Stainless Steel Float and have a minimum Operational Pressure of 250 PSI All ARV's shall meet AWWA C-512
Casing Seals / Spacers	Casing End Seals	Casing End Seals. Annular space between pipe and steel casing shall be brick and mortar with end seals to secure ends.	Casing End Seals. Annular space between pipe and steel casing shall be brick and mortar with end seals to secure ends.
	Casing spacer	Casing spacers shall be a min. 8-inches wide for pipe 12" Dia or less or min. 12-inches wide for pipe 16" Dia or greater, shall have a minimum 14 gauge 304 stainless steel shell/band, minimum 10 gauge 304 reinforced risers; minimum thickness of 0.090 EPDM or PVC interior liners, glass reinforces polymer or ultra high molecular weight polyethylene and 304 stainless bolts, nuts and washers.	Casing spacers shall be a min. 8-inches wide for pipe 12" Dia or less or min. 12-inches wide for pipe 16" Dia or greater, shall have a minimum 14 gauge 304 stainless steel shell/band, minimum 10 gauge 304 reinforced risers; minimum thickness of 0.090 EPDM or PVC interior liners, glass reinforces polymer or ultra high molecular weight polyethylene and 304 stainless bolts, nuts and washers.
Fittings	Fittings	Ductile Iron Fittings shall meet AWWA C153/A21.53 and/or C110/A21.10; Ductile Iron Fittings shall meet AWWA C153/A21.53 and/or C110/A21.10; Water fittings shall be compact cement lined. All fittings are to be shipped with gaskets, glands, nuts, and bolts unless specified otherwise.	Ductile Iron Fittings shall meet AWWA C153/A21.53 and/or C110/A21.10; Ductile Iron Fittings shall meet AWWA C153/A21.53 and/or C110/A21.10; Wastewater compact fittings interior shall be coated with Protecto 401. All fittings are to be shipped with gaskets, glands, nuts, and bolts unless specified otherwise.
	Fittings Bolt thru MJ Restraint	The MJ x MJ Adapter and spacers shall be ductile iron in accordance with ASTM A536. NSF-61 Approved asphaltic seal coat that conforms to ANSI/AWWA C104/A21. It will incorporate a bolt-through restraint mechanism design that allows for connection of MJ x MJ bells of valves and fittings with T-head bolts	
Joint Restraints	Ductile iron pipe MJ Restraints	Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain ductile iron pipe to mechanical joint fittings, pipe and appurtenances shall comply with ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A21.53.	Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain ductile iron pipe to mechanical joint fittings, pipe and appurtenances shall comply with ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A21.53.
	Ductile Iron pipe (4"-12") (New & Existing)	Bell Joint Restraints for Ductile Iron Pipe (4"-12") (New & Existing) - All restraints split serrated on bell and spigot ends. Pipe 16" and greater shall have restraint gaskets or locking bells.	Bell Joint Restraints for Ductile Iron Pipe (4"-12") (New & Existing) - All restraints split serrated on bell and spigot ends. Pipe 16" and greater shall have restraint gaskets or locking bells. (Wastewater only for restraint of existing DIP FM).
	Ductile Iron Bell Joint Restraints (16" & Greater)	Ductile Iron Pipe Bell Joint Restraints for Ductile Iron Pipe (16" & Greater) - All restraints shall have a split back-up ring for the bell and a serrated or wedge action gland for the spigot end. New installation for water 16" and greater shall have restraint gaskets or locking bells.	Ductile Iron Pipe Bell Joint Restraints for Ductile Iron Pipe (16" & Greater) - All restraints shall have a split back-up ring for the bell and a serrated or wedge action gland for the spigot end. New installation for 16" and greater shall have restraint gaskets or locking bells.
	Ductile iron pipe Bell Joint Restraint Gaskets and Locking Bell (4" & Above)	Bell Joint Restraint Gaskets and Locking Bell wedges built into the gasket-rubber. ANSI/AWWA C111/A21.11 Standard for Rubber-Gasket Joints for Ductile Iron Pressure Pipe. Ductile Iron Bell Joint Restraint for Push-On Pipe- Locking bell joint system that prevents joint separation and allows for joint deflection. Bells shall be painted red to verify restrained gasket.	
	PVC Pipe MJ Restraints	Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain PVC pipe to mechanical joint fittings, and appurtenances conforming to ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A2153.	Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain PVC pipe to mechanical joint fittings, and appurtenances conforming to ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A2153.



**AUGUSTA UTILITIES APPROVED ITEMS AND PRODUCT SPECIFICATIONS  
APPENDIX A**

Cat.	Description	Water	Wastewater
		Product Specification	Product Specification
Joint Restraints	PVC Bell Joint (New & Existing)	Restraint for PVC pipe bell (AWWA C900) shall conform to ASTM A536. A split serrated ring shall be used to grip the pipe, and a sufficient number of bolts shall be used to connect the bell ring and the gripping ring. The combination shall have a minimum working pressure rating 200 PSI (DR-18)	Restraint for PVC pipe bell (AWWA C900) shall conform to ASTM A536. A split serrated ring shall be used to grip the pipe, and a sufficient number of bolts shall be used to connect the bell ring and the gripping ring. The combination shall have a minimum working pressure rating 200 PSI (DR-18)
	PVC Bell Joint Restraints (16" & Greater)	Restraint for PVC pipe bell (AWWA C900) shall conform to ASTM A536. A restraint ring, incorporating a plurality of individually-actuating gripping surfaces, shall be used to grip the pipe, and a sufficient number of bolts shall be used to connect the bell ring and the gripping ring. The combination shall have a minimum working pressure rating 200 PSI (DR-18)	Restraint for PVC pipe bell (AWWA C900) shall conform to ASTM A536. A restraint ring, incorporating a plurality of individually-actuating gripping surfaces, shall be used to grip the pipe, and a sufficient number of bolts shall be used to connect the bell ring and the gripping ring. The combination shall have a minimum working pressure rating 200 PSI (DR-18) Wastewater shall be new and existing pipe.
Pipe	PVC C900 Bell & Spigot	AWWA C-900 PVC Pipe: Pipe size 4-inch to 36-inch shall be DR18 for water mains and shall conform to the requirements of NSF Standard 61 as well as the requirements of the Safe Drinking Water Act. Minimum DR18 for wastewater force mains	AWWA C-900 PVC Pipe: Pipe size 4-inch to 36-inch shall be DR18 for water mains and shall conform to the requirements of NSF Standard 61 Minimum DR18 for wastewater force mains
	HDPE C906 DR9	HDPE Pipe DR9 AWWA C906 shall be Ductile Iron Pipe Size (DIPS), PE 4710 manufactured in accordance with ASTM F-714 and listed with NSF. Pipe shall be marked in accordance with either AWWA C901, AWWA C906. All HDPE shall be color coded to the Utility. Color identifications are in accordance with the APWA/ULCC Uniform Color Code.	HDPE Pipe DR9 AWWA C906 shall be Ductile Iron Pipe Size (DIPS), PE 4710 manufactured in accordance with ASTM F-714 and listed with NSF. Pipe shall be marked in accordance with either AWWA C901, AWWA C906. All HDPE shall be color coded to the Utility. Color identifications are in accordance with the APWA/ULCC Uniform Color Code.
	Ductile Iron Pipe	DI Pipe shall comply with AWWA/C104 and ANSI/A21.4, standard thickness and be 20-foot joints: (4" to 12" = Class 350, 16" and up - Class 300). Water shall be cement lined. Exterior coatings shall be Asphaltic coating.	DI Pipe shall comply with AWWA/C104 and ANSI/A21.4, standard thickness and be 20-foot joints: (4" to 12" = Class 350, 16" and up - Class 300). Wastewater Piping shall be Protecto 401. Exterior coatings as specified.
	Polyethylene Encasement	Polyethylene encasement: Shall be required for all ductile iron pipe water mains, DI fittings, and appurtenances. The encasement shall be installed in accordance with ANSI/AWWA A21.51/C105.	
Services	Brass Service Saddles PVC Pipe	Service Saddles for 1" & 2" Water services on mains are to be double strap saddles with gasket and corrosion resistant strap and conform to AWWA C800. Shall have no lead components.	
	Service Saddles DI Pipe	Service Saddles for 1" (CC) & 2" (Iron pipe threads) Water services on mains up to 12". stainless steel 18-8-type 304 double straps, controlled O.D. saddles to be used on C-900 and DIP for all 1" and 2" taps on pipes over 12". Shall be no lead brass.	
	1" Corporation Stops Ball Type	Corporation Stops Ball Type shall conform to AWWA C800 with a working pressure of 300 PSI. CC Taper Thread by Pack Joint for CTS. No lead brass shall be use for all parts that come in contact with potable water.	
	2" Corporation Stop MIP x FIP	Corporation Stop MIP x FIP Ballcorp shall conform to AWWA C800 with a working pressure of 300PSI. Corp Stop to be used in applications for 1.5" and 2" water services. No lead brass shall be use for all parts that come in contact with potable water.	
	Curb Stop	Ball Valve Curb Stop FIP x FIP shall conform to AWWA C800 with a working pressure of 300 PSI. Curb Stop to be used in applications for 1.5" and 2" installations. No lead brass shall be used for all parts that come in contact with potable water.	
	Elbow Coupling	Service Elbow Coupling MIP x COMP for CTS shall conform to AWWA C800 with a working pressure of 300 PSI. Coupling to be used in applications from 3/4" to 2" installations. No lead brass shall be used for all parts that come in contact with potable water.	

**AUGUSTA UTILITIES APPROVED ITEMS AND PRODUCT SPECIFICATIONS  
APPENDIX A**

Cat.	Description	Water	Wastewater
		Product Specification	Product Specification
Services	Copper Tubing	Services 1-inch to 2-inch, provide Type K copper tubing, 0.065" minimum thickness, suitable for underground water services and supplied in conformance with ASTM B88	
	PE tubing	Polyethylene tubing: AWWA C901 or C904. UV protection (SDR-9) 2-inch only. PE 4710	
Tapping Sleeve and Valve	Tapping Sleeves	Tapping Sleeves: (Mechanical joint for taps on cast iron, ductile iron, PVC & AC pipe, including size on size) with stainless steel nuts and bolts. Working Pressure shall be minimum 250 psi. Tapping sleeves shall conform to ANSI/AWWA C110/A21.10-21.	
	Tapping Valves	Tapping Valves: Tapping valves shall be resilient seated only and meet the requirements of AWWA C509 or C515. Conform to the requirements for gate valves	
Valves	Butterfly Valve	Butterfly valves shall conform to AWWA C504, Cast Iron body with a DI disc and a pressure class 150. Valve seats shall be leak-tight in both directions at 150 psi and seat in body. Only approved valve actuators shall be accepted.	
	Check Valve		Check Valves shall be a resilient seated valve conforming to AWWA C508. Check valves are of self-contained, free-swinging disc style
	Gate Valve	Gate Valves resilient seated only conforming to AWWA C509 or C515. Gate valves are to have a non-rising stem Valve seat shall be leak-tight in both directions at 250 psi.	
	Plug Valves		Plug Valves shall conform to AWWA C517. - Bi-directional, MJ, gear operator to be sized for rated pressure of the valve. Plug valves shall be eccentric, port rectangular plug. Only approved valve actuators shall be accepted and gear box shall be AWWA certified.
Valve Boxes	Valve Boxes with Heavy Duty Lids (Cast Iron)	Two piece standard screw type Heavy Duty Valve Boxes with Heavy Duty Lids (Cast Iron) and type of service cast in heavy duty traffic lid (H20 loading) ASTM A48.	
PVC Pipe and fittings	Pipe SDR 35/26 Gravity Mains		PVC Pipe for Gravity (including service laterals) shall conform to AWWA C900. SDR-35 for pipes less than 15-inch diameter and SDR-26 for pipes greater than 15-inch diameter (Green in color) ASTM D3034 and ASTM F679.
PVC Pipe and fittings	Fittings SDR 26/35		Fittings, Adapters and Plugs - Gravity PVC ASTM-D3034, Min SDR26 / SDR 35
	Gravity Pipe Transition		Flexible Transition Coupling shall conform to ASTM C1173-22. The coupling shall provide a water-tight, leak-proof seal that is resistant to both infiltration and exfiltration. All components are to provide effective corrosion resistance.
Precast Concrete Structures	Manhole Frame & Cover		MH Frame and Cover shall conform to the requirements of AASHTO M 105 Class 35 B or ASTM A48 Class 35 B, see AASHTO M 306-10 Specifications for drainage, sewer, utility, and related castings. Covers shall have to pick holes for access and provide a water-tight seal when closed
	Precast Concrete Structures		Precast Manhole Structures ASTM C478. Precast concrete shall be lined with an interior protective coating, Perma-Glaze Series 435 or approved equal. Concrete without interior coating shall be rejected. Minimum wall thickness shall be 4", if depth exceeds 20' wall thickness shall be 6".
	Jointing Material		Jointing Material Min. 2" width for all products shall be a modified bitumen based, flexible gasket-type sealant. Shall conform to AASHTO M-198 75 1 and ASTM C990-09.
	Resilient Connector Pipe Seals. Manhole. Gravity		Resilient Connector Pipe Seals, Manhole - Gravity shall conform to the specifications of ASTM C923 - Gravity less than 12-inch and less than 15-ft deep