

Water & Sewer System Standards and Specifications

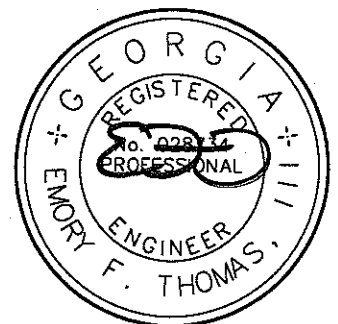


City of Covington

Engineering Department

2116 Stallings Street

Covington, Georgia 30015



May 2011

Water & Sewer System Standards and Specifications

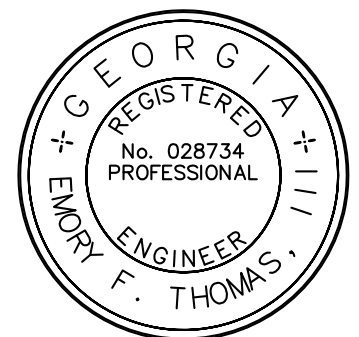


City of Covington

Engineering Department

2116 Stallings Street

Covington, Georgia 30015



May 2011

TABLE OF CONTENTS

SECTION 1.0 - INTRODUCTION	1-1
1.1 Purpose	1
1.2 General Requirements	1
1.3 Plan Review Process	2
1.3.1 Water System Additions and Expansions	2
1.3.2 Sanitary Sewer System Additions and Expansions	3
1.3.3 Permit	4
1.3.4 Approval by other Government Agencies	5
1.3.5 General Utility Locations and Installation Requirements.....	5
1.4 Construction	5
1.4.1 Preconstruction Conference	5
1.4.2 Approved Plans	5
1.4.3 Notification	5
1.4.4 Contractor Qualifications.....	5
1.4.5 Damage to Water and/or Sewer Facilities	6
1.4.6 Protection and Restoration of Work Area.....	6
1.5 Inspections.....	6
1.6 As-builts	7
1.7 One Year Maintenance.....	8
1.8 Building Permits.....	8
1.9 Appeals.....	8
SECTION 2.0 – WATER SYSTEM SPECIFICATONS.....	2-1
2.1 Preconstruction Requirments	1
2.1.1 Water Pressure Flow Test	1
2.1.2 Plan Requirements	1
2.1.3 Contractor Qualifications.....	5
2.1.4 Erosion And Sedimentation Control Plan.....	5
2.1.5 Easement Acquisition And Utility Encroachment Permits.....	6
2.2 Design Criteria	7
2.2.1 General.....	7
2.2.2 Water Supply (All Water Supply Systems)	7
2.2.3 Minimum Water Main Sizes and Fire Hydrant Requirements	8
2.2.4 Water Main Extension Requirements	9
2.2.5 Fire Protection.....	9
2.2.6 Backflow Prevention.....	10
2.2.7 Location of Water Lines and Fixtures	11
2.2.8 Fire Line Metering Requirements.....	15
2.2.9 Water Pump Stations.....	15
2.2.10 Water Mains on Private Roads	16
2.2.11 Water Sampling Stations.....	16
2.3 Materials.....	16
2.3.1 Water Main	16
2.3.2 Fire Hydrants	18
2.3.3 Valves and Accessories.....	18

2.3.4	General Requirements.....	22
2.4	Excavation and Construction.....	22
2.4.1	General.....	23
2.4.2	Trench Excavation.....	23
2.4.3	Backfilling and Bedding.....	25
2.4.4	Laying Pipe.....	27
2.4.5	Thrust Restraint for Pressure Lines.....	27
2.4.6	Setting Fire Hydrants.....	27
2.4.7	Setting Valves and Fittings.....	28
2.4.8	Placing of Steel Casing Pipe.....	29
2.4.9	Marking Location of Valves.....	29
2.4.10	Dewatering Trenches.....	29
2.4.11	Bracing, Sheeting, and/or Shoring.....	29
2.4.12	Location and Protection of Existing Underground Utilities.....	30
2.4.13	Connection to the Existing City Water System.....	30
2.4.14	Street Cuts.....	30
2.4.15	Standard Detailed Drawings.....	31
2.4.16	Clean-Up.....	31
2.4.17	Interruption of Water Supply During Construction.....	32
2.4.18	Barricades.....	32
2.4.19	Grassing.....	32
2.5	Inspection and Test.....	33
2.5.1	General.....	33
2.5.2	Pressure and Leakage Testing.....	33
2.5.3	Disinfection of Water Mains.....	34
2.5.4	When Cutting Into or Repairing Existing Mains.....	35
2.5.5	Amount of Chlorine Necessary for Disinfection.....	35
2.6	Other Requirements.....	36
SECTION 3.0 – SEWER SYSTEM SPECIFICATIONS.....		3-1
3.1	Preconstruction Requirements.....	1
3.1.1	Sanitary Sewer Hydraulic Analysis.....	1
3.1.2	Plan Requirements.....	1
3.1.2	Contractor Qualifications.....	7
3.1.3	Erosion And Sedimentation Control Plan.....	7
3.2	Design Criteria.....	7
3.2.1	General.....	7
3.2.2	Sanitary Sewers Separate From Storm Sewers.....	7
3.2.3	Sizing Factors.....	7
3.2.4	Depth Requirements.....	8
3.2.5	Slope.....	8
3.2.6	Increasing Size.....	9
3.2.7	Ductile Iron Pipe.....	9
3.2.8	Sanitary Sewer Pipe Material Requirements.....	10
3.2.9	Subgrade and Pipe Bedding.....	10
3.2.10	Manholes.....	10
3.2.11	Protection of Water Supply.....	10
3.2.12	Service Laterals.....	11

3.2.13 Provisions for Future Extensions	12
3.2.14 Sanitary Sewer Line Extension Requirements.....	12
3.2.15 Air and Vacuum Relief Valve Assemblies	12
3.2.16 Polyethylene Encasement	12
3.2.17 Easements	12
3.2.18 Joint Restraint Inside Casing	13
3.2.19 Wastewater Lift Stations.....	13
3.3 Materials.....	20
3.3.1 Sanitary Sewer Pipe	20
3.3.2 Casing Pipe	24
3.3.3 Wyes and Bends.....	24
3.3.4 Manholes.....	24
3.3.5 Concrete and Mortar	26
3.3.6 Reinforcing Steel	27
3.3.7 Brick.....	27
3.3.8 Subgrade Stabilizer Stone.....	27
3.3.9 Polyethylene Tubing For Ductile Iron Pipe.....	27
3.3.10 Casing Spacers.....	27
3.3.11 Concrete for Thrust Blocks and Thrust Collars	27
3.3.12 Gaskets for Joint Restraint Inside Casings.....	27
3.4 Excavation and Construction.....	27
3.4.1 General.....	27
3.4.2 Trench and Manhole Excavation	28
3.4.3 Bracing and Sheeting.....	30
3.4.4 Installation of Sanitary Sewer.....	31
3.4.5 Making of Joints	32
3.4.6 Subgrade and Pipe Bedding.....	32
3.4.7 Dewatering Trenches	33
3.4.8 Backfilling.....	33
3.4.9 Stream Crossings	34
3.4.10 Casing for Sanitary Sewers.....	36
3.4.11 Sewer Service Laterals.....	36
3.4.12 Setting Fittings on Force Mains.....	37
3.4.13 Bracing, Sheeting, and/or Shoring.....	37
3.4.14 Location and Protection of Existing Underground Utilities	38
3.4.15 Connection to the Existing City Sanitary Sewer System.....	38
3.4.16 Street Cuts.....	38
3.4.17 Standard Detailed Drawings	39
3.4.18 Clean-Up.....	39
3.4.19 Barricades	40
3.4.20 Grassing	40
3.5 Inspection and Tests	41
3.5.1 General.....	41
3.5.2 Concealed Work.....	41
3.5.3 Minimum Tests	41
3.5.4 Timing of Service Connections	45
3.6 Pre-Treatment Requirements for Industrial Wastewater	45

3.7 Other Requirements 45
SECTION 4.0 – STANDARD DETAILS.....4-1

LIST OF APPENDICES

**APPENDIX A
CITY FEES FOR WATER AND
SEWER EXTENSIONS5-1**

**APPENDIX B
DRINKING WATER SUBMITTAL FORM5-2**

**APPENDIX C
SANITARY SEWER EXTENSION
SUBMITTAL FORM5-3**

**APPENDIX D
CITY OF COVINGTON STIPULATIONS
FOR LIFT STATIONS.....5-4**

**APPENDIX E
SAMPLE UTILITY EASEMENT AGREEMENT5-5**

SECTION 1.0 - INTRODUCTION

1.1 Purpose

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

1.2 General Requirements

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

- 2) Definitions: Where the following words or pronouns occur herein, they shall have the following meaning:

"As-Built Plans" shall mean plans indicating the field verified location of the applicable utility and appurtenances as installed by the contractor.

"City " shall mean the City of Covington, Georgia, or its authorized and legal representatives.

"Code" shall mean Covington, Georgia Code of Ordinances.

"Commission" shall mean the Covington, Georgia Planning Commission.

"Construction Plans" shall mean plans approved by the City for installation of the applicable utility.

"EPD" shall mean Georgia Environmental Protection Division

"Developer" shall mean any party wishing to expand, develop, or improve the water distribution system, or the authorized and legal representative, contractor,

or engineer of such party

“Preliminary Plans” shall mean the initial plans submitted for the review by the City and shall apply to those plans subject to the Covington Planning Commission Planning Review Process.

“Provide” shall mean to furnish and install.

“Subdivision shall mean the division of a lot of record into two (2) or more lots, building sites or other divisions for the purpose, whether immediate or future, of sale, legacy or building development, and includes all division of land involving a new street or a change in existing streets, and includes re-subdivision, and, where appropriate to the context, relates to the process of subdividing or to the land or area subdivided.

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

1.3 Plan Review Process

1.3.1 Water System Additions and Expansions

The following steps apply to the approval for installation of water mains, fire hydrants, valves, wells and appurtenances by private developers connected to the City Water System. Water system additions and expansions associated with subdivisions; apartment complexes; and shopping centers; and pipe extensions of 1,000 feet or less are considered routine projects. All non-routine projects must be submitted to EPD for review and approval.

- 1) One (1) 24” x 36” paper copy of construction plans showing the location and general plan for water supply must be submitted to the City Engineering Department. A letter from the developer requesting review and approval, in accordance with the current fees, shall accompany the construction plans. This letter shall include all pertinent contact information for the proposed project. Information to be included on the construction plans is provided in Section 2.2.1.
- 2) Flow and pressure tests for a 24-hour duration will be conducted by the City or a representative of the City in the area of the proposed development (only where the proposed development is to be tied to or served from an existing City main). These tests shall be paid for by the developer prior to the performance of tests at the fees then in effect as established by the City. A schedule of these fees is included in Appendix A. All test records shall be submitted with the initial plan submittal.

- 3) A Drinking Water Project Submittal Form included in Appendix B shall be submitted with the construction plans.
- 4) Comments will then be addressed to the developer by the City relating to the availability of water or other items pertinent to the development.
- 5) The developer must then submit (3) copies of the revised construction plans and two (2) digital copies (in DWG and PDF format) to the City Engineering Department. Included with these plans shall be the Landfill Letter from the City, and a performance bond or letter of credit.
- 6) If approved as submitted, the constructions plans will be forwarded to the City's engineering consultant for review.
- 7) If approved by the City's engineering consultant, the developer may begin construction. If revisions are required, a checklist noting the deficiencies of the plans will be returned to the developer and the process will continue until approved.
- 8) Upon completion of the waterline installation, the developer shall present to the City Engineering Department one (1) complete set of the as-built plans and two (2) digital copies (in DWG and PDF format) showing the subdivision and its improvements. Information to be included on the as-built plans is provided in Section 1.6.

1.3.2 Sanitary Sewer System Additions and Expansions

The following steps apply to the approval for installation of sewer lines, manholes, lift stations, and appurtenances by private developers connecting to the City Sanitary Sewer System. Projects involving pump stations with a capacity larger than 700 GPM or gravity sewer lines greater than 36" in diameter must be submitted to the EPD for review and approval.

- 1) One (1) 24" x 36" paper copy of construction plans showing the location and general plan for sanitary sewer must be submitted to the City Engineering Department. A letter from the developer requesting review and approval, in accordance with the current fees, shall accompany the construction plans. This letter shall include all pertinent contact information for the proposed project. Information to be included on the construction plans is provided in Section 1.2.1.
- 2) A Sanitary Sewer Extension Submittal Form, included in Appendix C, shall be submitted with the construction plans.
- 3) Three (2) copies of the design calculations for lift stations shall be submitted with the construction plans. Verification of compliance with the City of Covington Stipulations for Lift Stations shall be submitted with the design calculations. These stipulations are included in Appendix D.

- 4) Three (2) copies of the hydraulic calculations shall be submitted with the construction plans. These calculations must verify that the sewerline(s) directly and indirectly involved in the project have adequate capacity to carry the peak flow. Flow test can be performed by the City to verify the capacity of each sewer line. This test shall be paid for by the developer prior to the performance of tests at the fees then in effect as established by the City. A schedule of these fees is included in Appendix A.
- 5) The City will review the construction plans to determine if the wastewater treatment facilities, lift stations, and sanitary sewer lines in the area of the proposed development have sufficient remaining capacity to serve the proposed development.
- 6) Comments will then be addressed to the developer by the City relating the availability of sewers including any special requirements or needs the developer may have to address in the construction plans.
- 7) The developer must then submit (2) copies of the revised construction plans and two (2) digital copies (in DWG and PDF format) to the City Engineering Department. Included with these plans shall be a performance bond or letter of credit.
- 8) If approved as submitted, the constructions plans will be forwarded to the City's engineering consultant for review.
- 9) If approved by the City's engineering consultant, the developer may begin construction. If revisions are required, a checklist noting the deficiencies of the plans will be returned to the developer and the process will continue until approved.
- 10) Upon completion of the waterline installation, the developer shall present to the City Engineering Department one (1) complete set of the as-built plans and two (2) digital copies (in DWG and PDF format) showing the subdivision and its improvements. Information to be included on the as-built plans is provided in Section 1.6.

1.3.3 Permit

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

1.3.4 Approval by other Government Agencies

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

1.3.5 General Utility Locations and Installation Requirements

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

1.4 Construction

1.4.1 Preconstruction Conference

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

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

1.4.2 Approved Plans

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

1.4.3 Notification

The City shall be notified by the developer or his contractor before construction begins, and at the various stages in construction as required by the City. The City shall be given a 48 hour advance notice before an inspection is needed.

1.4.4 Contractor Qualifications

Contractors performing utility construction must be licensed in accordance with State of Georgia law and local ordinances and approved by the City. They should be completely familiar with the procedures and contract requirements associated with this type of project. Unsatisfactory work will cause a contractor to not be approved for future work.

Any and all subcontractors must be approved by the City.

1.4.5 Damage to Water and/or Sewer Facilities

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

1.4.6 Protection and Restoration of Work Area

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

1.5 Inspections

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

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

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

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

1.6 As-builts

One (2) 24" x 36" set of as-built drawings and one (1) digital copy provided in Autocad 2000 .dwg format must be submitted to the City immediately after the completion of construction. These as-built drawings shall include:

The water system as-builts shall show: locations of fire hydrants, line valves, tees, bends, service locations, water main sizes and types of materials. Fire hydrants waterline valves, and air release valves shall be tied with distances to (3) permanent structures adjacent to the water system. Road names and lot numbers shall be on all as-built plans.

The sanitary sewer system as-builts shall show locations of manholes, lines, services, line sizes, types of materials, manhole invert elevations, and line grades.

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

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

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

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

1.7 One Year Maintenance

The Developer shall sign a one year maintenance agreement. This maintenance period shall begin on the date that written final acceptance is issued by the City. In addition to the maintenance agreement, the Developer shall submit a maintenance bond to the City in the amount during the initial plan submittal to the City. The bond shall remain in effect from the date of the written final acceptance by the City for 12 consecutive months.

After the one year period, if the work is free from defects and required repairs have been completed to the satisfaction of the City, a letter of final acceptance will be issued to the Developer. The letter will state that the one year maintenance period has expired and that the City is now the owner of the water and sewer facilities and is responsible for all future maintenance of these facilities.

After the water main is operational and throughout the one year maintenance period, the Developer will be responsible for locating all water and sewer facilities when called upon by the Utilities Protection Center or the City. These utilities must be marked within 48 hours of the time notified. Any water or sewer facilities cut by others will be repaired by the Developer's contractor at the Developer's expense if the lines are not located or if they are improperly located.

1.8 Building Permits

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

1.9 Appeals

Any requirement that is outlined in these specifications may be modified or revoked by a majority vote of the full membership of the City of Covington Planning Commission.

Persons wishing to file an appeal must submit a written request to the City not less than one week prior to the next City meeting stating the nature of the request to be made. If the request is not made at least one week prior to the City's regular meeting it will be considered at the following regular meeting of the City.

SECTION 2.0 – WATER SYSTEM SPECIFICATONS

2.1 Preconstruction Requirements

2.1.1 Water Pressure Flow Test

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

Test information shall consist of:

- A) Static Pressure and Elevation of Static Gauge
- B) Recorded Flow in GPM and Residual Pressure
- C) Maximum Elevation in Development
- D) Available Flow at Maximum Elevation with 20 PSI Residual Pressure
- E) Twenty-four (24) hour pressure chart

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

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

2.1.2 Plan Requirements

All plans for public drinking water systems shall be prepared in accordance with the requirements outlined herein and as required in regulations promulgated by the Georgia Environmental Protection Division. The developer shall be responsible for submitting plans and other data to the City for required approvals

Water layout

- Site plan contains water layout only (topographic overlay required).
- Pipe locations and sizes are indicated (8" minimum for water mains).
- Materials - ductile iron pipe required under all intersections, stream crossings, road crossings, over and under all cross drains and at all other locations specified by the City.

- Location and size of gate valves at intersections, along water mains, at fire hydrants, and at connection to existing mains.
- Thrust blocks at all bends and tees.
- Location of all existing and proposed fire hydrants.
- Existing water mains locations, sizes, and types of material surrounding the project.
- Detail of connection to existing water main.
- Nearest existing line valves on both sides of connection to existing water main.
- Proposed meter sizes and locations.
- Water mains on north and east side of road.
- If proposed water line crosses private property, a 20 foot permanent easement must be provided.
- Details:
 - A. Fire hydrant at end of line in cul-de-sacs
 - B. Air & Vacuum release valve assembly
 - C. House service installation
 - D. Line valve
 - E. Typical fire hydrant installation
 - F. Newton County Utility Placement Standard
- Location of air release valves.
- A gate valve and a minimum of 36 feet of pipe shall be provided at the end of all lines for phased developments. The end of the line shall be provided with temporary plug and concrete thrust collar.
- Detail dead end line with one full joint of D.I. Pipe, Fire Hydrant, M.J. Plug, Retainer Glands and concrete thrust blocking.
- Horizontal separation of at least 10 feet between water main and existing or proposed sewer (measured edge to edge).
- Where water main crosses existing or proposed sewer, 18" vertical separation is required between the two mains (measured edge to edge) and include a note that a full joint of water main is required to be centered at sewer main crossing so that both joints are as far away from the sewer as possible.

- Water and sewer plans bear the stamp of a professional registered in the State of Georgia as required by.
- City of Covington General Notes for Construction are located on plans.
- Utilities Protection Center detail is located on the plans.
- Existing water mains along existing roads shall be shown to be replaced with D.I.P. (if they are not already D.I.P.) beneath the proposed subdivision entrance and acceleration/deceleration lanes.

The following City of Covington Water System Construction General Notes shall be included on every plan set:

City of Covington
Water System Construction
General Notes

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

12. Locator wire shall be placed in the trench above the PVC water main before backfilling trench.

13. Flow Test Information:

Static Pressure: _____ psi at _____ ft.

Recorded Flow: _____ GPM with _____ psi residual pressure.

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

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

Size of water main at point of connection to project: _____ inches

Date of flow test: _____

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

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

2.1.3 Contractor Qualifications

Contractors performing water line installations must be licensed in accordance with State of Georgia law and local ordinances and approved by the City. They should be completely familiar with the procedures and contract requirements associated with this type project. Unsatisfactory work will cause a contractor not to be approved for future work.

2.1.4 Erosion And Sedimentation Control Plan

- A. The Georgia Soil and Water Conservation Commission has taken provisions of ACT 599 and published a **MANUAL FOR EROSION AND SEDIMENT CONTROL IN GEORGIA**, 1992 Edition (or any more current edition as they are published). Water construction plans and specifications shall include appropriate segments of this manual. Developers, Engineers, Design Professionals and Contractors performing work in City of Covington are responsible for acquiring a copy of this manual and using the best practical methods contained therein to control the erosion and sedimentation of the construction site in conformance with the intent of ACT 599. Copies may be purchased from the Georgia Soil And Water Conservation Commission, P.O. Box 8024, Athens, Georgia 30603. For additional information, call the Commission at 706-542-3065.
- B. Plan: An erosion and sediment control plan, meeting the requirements of applicable state regulations, shall be provided as part of the overall construction drawings.
- C. Erosion Control Details: Erosion Control Details and Symbols may be taken directly from the Manual For Erosion and Sediment Control In Georgia, 1992 referenced above.

2.1.5 Easement Acquisition And Utility Encroachment Permits

- A. It shall be the responsibility of the developer to obtain any off-site easements required to connect the project to the existing water or sewer system. Easements will be conveyed to the City of Covington for all facilities which are to be conveyed to the City. This process must be started early enough to allow construction of the water mains before any building construction is to begin. No building permits, water meter or sewer tap applications shall be issued until off-site water mains and sewers have been constructed and accepted. A sample utility easement agreement is included in Appendix F.
- B. All easements shall allow adequate room to construct the water main and appurtenances. Permanent easements shall be a minimum of 20 feet wide, 10 feet on each side of the line.
- C. Easement drawings shall be prepared for work outside the development prior to approval of the water or sewer system plans. The drawings shall be of a size suitable for legal recording and shall be prepared by a Registered Land Surveyor. The drawing will show property lines, the name of property owners with the length of line encroaching on each property owner, size of line, width of permanent and construction easement, scale of drawing, north arrow, land lot and district numbers, and a tie to the nearest land lot corner. Any streets or other existing easements shall also be shown. Easement agreements referencing these drawings shall be prepared and attached to the drawings, signed by the property owners, and recorded at the City of Covington Clerk of Superior Court's office. A copy of the recorded easement agreement shall be provided to the City prior to the construction of off-site facilities.
- D. The Designer shall furnish appropriate drawings for submittal to the owner of any state or federal highways, railroads, power lines, sewer lines, gas lines, petroleum lines, or any other utility lines on which the water construction will encroach. The drawing shall normally be 8-1/2" X 11" or 8-1/2" X 14" and shall show a plan view and profile view. The drawing will show the same information required for easement drawings. Also, the drawing will show the right-of-way of the existing street or utility, the owner's designation of the line, the name or number of the nearest intersection or mile post or tower number and the distance to that appurtenance. The clearance distance between the street surface, or the bottom of the rail, or the utility and the water main will be shown. The drawing will show the type of material to be used for the main and the method of construction to be used. The drawing will also contain any other special information required by the owner of the facility on which the water main is encroaching.

The Developer is responsible for obtaining all permits necessary to construct water mains to and on the site to be developed.

Three copies of the utility encroachment drawing will be furnished with the plans when they are submitted for approval. Construction permits will not be issued until

the utility encroachment permit has been obtained and until any special conditions such as insurance requirements have been complied with.

2.2 Design Criteria

2.2.1 General

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

2.2.2 Water Supply (All Water Supply Systems)

Residential water supply for domestic use shall be in accordance with information and should provide a working pressure of between 35 and 60 psi with a minimum pressure of twenty (20) psi. Pressures greater than 100 psi should not be delivered (unless requested) to the customer. Average daily demands are listed below:

Type of Establishment (The unit is per person unless otherwise stated)	Average Daily Use (gallons per day)
Airport (per passenger)	3-5
Assembly Halls (per seat)	2
Camps - Children, overnight, central facilities	40-50
- Construction	50
- Migrant Labor	35-50
- Day type, no meals served	15
Churches (per member)	1
Cottages, season occupancy	50
Clubs - Residential	100
- Non residential	25
Factories, sanitary uses, per shift	15-35
Food Service – Restaurants	7-10
- With bars	9-12
- Fast Food	2
Highway Rest Areas	5
Hotels (2 persons per room)	60
<i>Institutions – Hospitals (per bed)</i>	250-400
-Nursing Homes (per bed)	150-200
- Others	75-125
Office Buildings	15-30
Laundries, self service (per customer)	50
Motels (per bed)	60
<i>Parks – Day use (with flush toilets)</i>	5
- Mobile Homes (per unit)	200
Type of Establishment (The unit is per person unless otherwise stated)	Average Daily Use (gallons per day)

- Travel trailers (per unit)	90-100
Picnic Areas (with flush toilets)	5-10
Residential Communities	
Single Family Dwelling (per person)	100
- Single Family Dwelling (per house maximum)	400
- Multi-family (per bedroom)	120
- Rooming house/tourist home (per bedroom)	120
Resort Motels and Hotels	75-100
Retail Stores (per toilet room)	400
Schools – Day, no showers or cafeteria	15
- Day, with cafeteria	20
- Day, with showers and cafeteria	25
- Residential types	75-100
Shopping centers, per sq. ft. sales area	0.16
Swimming Pools and Beaches	10
Theaters – Drive-in (per car)	3-5
- Others (per seat)	3

A peaking of factor of 2.0 to 3.0 times the average daily demand shall be used for the design of the water system. Exceptions may be made when deemed necessary by the City. Demand for other than residential to be determined for each specific development.

2.2.3 Minimum Water Main Sizes and Fire Hydrant Requirements

- 1) Any system, whether served from an existing City water main or otherwise, shall have a minimum size of pipe size of 8 inches. Actual sizes may be larger depending on the size required to meet the demand of the proposed development. For short cul-de-sacs and permanent dead-ends where future growth is not feasible, a 6 inch pipe terminated with a fire hydrant assembly may be installed.
- 2) Where a water main extension from an existing City water main is required along an existing public right-of-way or future supply route, the size of pipe to be used will be either 8", the size required to meet the demand of the development, or a size equal to the existing City main, whichever is largest. The City may require a larger pipe size to be installed than is required by this standard, and the cost of this oversizing may be funded by the City.
- 3) Fire hydrants will be required as set forth in these specifications where a proposed system is to be served from an existing City water main or in any case where the City is to accept a new system for ownership and operation. An exception may be made by the City where a system is to be served by a well with inadequate supply for fire protection and is unlikely in the opinion of the City to be an integral (tied together) part of the overall City system within 10 years of its completion.

2.2.4 Water Main Extension Requirements

- 1) Developers are required to extend all mains along their entire property frontage if the existing main is adjacent to the proposed development. The size of the main will be set in accordance with Section 2.2.5.
- 2) If an existing main must be extended to serve the property, the developer may be required to pay all of the initial costs. If the main extension will serve other developments within a one year period, the City may negotiate with the initial developer for a pro rata share participation from future developers who wish to connect to the extension during the one year period.
- 3) In certain circumstances, the City may require a larger pipe size to be installed than is required by these standards, and the cost of this oversizing may be funded by the City. The developer may be required to pay all of the initial costs. If the oversized main will serve other developments within a one year period, the City may negotiate with the initial developer for a pro rata share participation from future developers who wish to connect to the extension during the one year period. If the purpose of the oversizing is to improve service to existing customers or part of the City's master plan for a network of large mains to transfer water around the County, the City may enter into negotiations with the Developer to provide funding for the betterment.

2.2.5 Fire Protection

- 1) Minimum flows in GPM with 20 psi residual pressure by type of development are recommended as follows where a system is to be served from an existing City Water Main.
 - a. Multi-family: 750 GPM for 30 minutes
 - b. Shopping Centers: 750 GPM for 30 minutes
 - c. Motels, Light Industry and Schools: 750 GPM for 30 minutes
 - d. Heavy Industry, Large/Tall Buildings (Warehouses, Office Buildings, Institutional): 1000 GPM for 45 minutes
 - e. Residential: 500 GPM for 30 minutes

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

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

5) Spacing of fire hydrants where required shall be as follows:

Fire hydrants, within residential developments or along existing County roads, are generally located every 400 feet, starting at the beginning of the project, or as dictated by existing fire hydrant locations. Hydrants can be spaced from a minimum of 350 feet to a maximum of 450 feet, and should be located on property lines where possible. For commercial developments, the fire hydrant spacing cannot exceed 300 feet.

6) Fire Main Size

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

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

2.2.6 Backflow Prevention

- 1) All water meters shall be provided with a backflow preventer and shall be installed by the Developer.
- 2) Fire lines shall be provided with a detector meter or a factory mutual fire meter, in accordance with the fire line requirements outlined in Section 2.8. Fire line meters and detector meters shall be designed to meet site-specific conditions.

- 3) Reduced pressure zone backflow preventers with relief vents are required for high risk situations as determined by the City's Cross-Connection Control Program Manager.
- 4) The type of backflow preventer required for each of the situations listed above is described in City's Cross-Connection Control Program Manual

2.2.7 Location of Water Lines and Fixtures

- 1) Existing Roads

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

- 2) New Streets

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

- 3) Surface water crossings

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

- a. At above water crossings, the pipe shall be adequately supported and anchored, protected from damage and freezing, and accessible for repairs or replacement.
- b. At underwater crossings, a minimum of two (2) feet of cover shall be provided over the pipe.
- c. The installation of ductile iron pipe with restrained push-on joints and encased in concrete, may be considered with the prior approval of the

Division. Otherwise, when crossing water courses which are greater than 15 feet in width, only pipes of special construction, having flexible, watertight joints shall be installed.

- d. Valves shall be provided at both ends of water crossings so that the section can be isolated for testing or repair (valves shall be easily accessible and not subject to flooding); the valve closest to the supply source shall be in a manhole;
- e. Sampling taps shall be installed at each end of the crossing, and permanent taps shall be made for testing and determining leaks.

4) Service Laterals

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

Any portion of service lateral located under pavement shall be encased in 1 1/2" diameter P.V.C. pipe, extending a minimum of 3' beyond the edge of pavement on both sides of the road. Copper tubing shall be used for all services. Compression joints shall be used. Splices of copper tubing are not allowed under any roadway pavement. A "W" shall be sawed into the curb where each service tap is made for permanent location.

5) Water Meter Boxes

Water meters will be furnished and installed by the City and set in vaults. The developer is to clearly mark the lot number inside of each meter box. No meter will be set until the meter set fee is paid and a building permit issued for the lot requesting service. Services shall be sized and located as shown in the Details.

6) Water Valves

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

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

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

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

7) Gate Valves and Line Plug

A gate valve and a minimum of 36 feet of ductile iron pipe shall be provided at the end of all lines for phased developments, and at locations where the water main may be extended in the future for water system improvements. The end of the line shall be provided with a M.J. plug and thrust collar. A 3/4" tap for chlorination / dechlorination purposes shall be provided. A valve marker will be placed directly above the plug.

8) Dead End Line

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

9) Ductile Iron Pipe

Ductile iron pipe shall be required for water mains:

- a. 12" in diameter or larger
- b. Crossing sanitary sewers
- c. Under all stream crossings and over or under all storm sewers
- d. Under all roads and intersections and inside casings
- e. At all locations with working pressure above 125 psi (generally below elevation 700 MSL)

f. At all other locations specified by the City

10) Air and Vacuum Relief Valve Assemblies

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

11) Polyethylene Encasement

Ductile iron pipe shall be provided with polyethylene encasement whenever the water main either crosses or is in close proximity to a steel gas main.

12) Easements

Water mains that are located off the right-of-way shall have a 20 foot wide permanent easement.

13) Ductile Iron Retainer Glands

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

14) Acceleration / Deceleration Lanes

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

15) Joint Restraint Inside Casing

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

16) Separation between Water Main and Sanitary/Storm Sewer

A horizontal separation of at least 10 feet is required between water mains and existing or proposed sanitary/storm sewer mains (measured edge to edge). Where water mains cross existing or proposed sewer lines, 18" vertical separation is required between the two mains (measured edge to edge). A full joint of D.I.P. water main is to be centered on the sewer main so that both joints are as far away

from the sewer line as possible.

2.2.8 Fire Line Metering Requirements

- 1) Persons making applications for new fire service connections with private fire hydrants, hand hose connections, or sprinkler heads will be required to have an underwriter approved detector meter or a factory mutual fire line meter installed as a part of the fire service system. If the normal usage of the development is such that the service meter required to serve the development is larger than 2", the City shall require that the Developer install a 6" or larger compound meter and vault to serve both the normal usage and the fire line needs of the development. If the normal usage of the development is such that a 2" meter or smaller can be used to serve the development, the Developer will be allowed to use a 2" or smaller meter for the normal usage and a detector meter assembly on the fire line.
- 2) When unauthorized water is used through a detector meter in three or more billing periods in one calendar year, it shall be replaced with a factory mutual fire line meter. Unauthorized use of water is defined as non-fire fighting water and/or water use without prior notification and approval of the City. The water that is measured by the detector meter will be billed at five times the normal water charge. If the services of legal counsel are required to collect bills, the cost of council shall be added to the billing.
- 3) All domestic water supply must be metered with a proper meter.
- 4) Installation of detector meters or factory mutual fire line meters as required will be the responsibility of the Developer under supervision of the City's inspectors.
- 5) The City shall have the right to cut off water service to buildings whose owners refuse to comply with these provisions upon proper notification of sixty (60) days.

2.2.9 Water Pump Stations

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

2.2.10 Water Mains on Private Roads

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

2.2.11 Water Sampling Stations

For the design of water systems in subdivisions, the City requires the installation of a water sampling station as included in the Standard Detail Section 4.0. This sampling station will typically be installed at a cul-de-sac or other location where water movement is deemed to be at a minimum. The City may specify such location, and the cost shall be incurred by the developer.

2.3 Materials

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

2.3.1 Water Main

1) Ductile Iron Pipe

Ductile iron pipe must be used on services 3" or greater; watermain installations 12" or larger in diameter; with working pressure above 125 psi (generally below elevation 700 MSL); and at all other locations outlined in the City of Covington Water System Construction General Notes. All pipes shall be designed in accordance with AWWA C150, latest revision. Minimum wall thickness for 6" - 16" diameter pipe shall be Pressure Class 350; minimum wall thickness for 18" - 20" diameter pipe shall be Pressure Class 300; minimum wall thickness for pipe larger than 20" in diameter shall be Pressure Class 250.

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

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

2) P.V.C. Pipe

All P.V.C. pressure pipe must meet the requirements of AWWA C-900, latest revision, "Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in. for Water Distribution" and ASTM Standard D 2241, latest revision, "Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)" and shall be furnished in ductile iron pipe equivalent outside diameters with rubber gasketed joints as listed C-900 standard. All plastic water mains must bear the National Sanitation Foundation (NSF) seal of approval for potable water use. All pipe shall have a minimum dimension ratio (DR) of 18, rated for 150 psi sustained working pressure. Certificates of conformance with the foregoing specifications shall be furnished with each lot of pipe supplied. Glued PVC fittings shall not be used.

3) Copper Tubing For Services

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

4) Casing Pipe

Casing pipe, where required under the street, shall be steel pipe conforming to A.S.T.M. Designation A-139, Grade B, electric fusion welded steel pipe. The pipe shall have a minimum tensile strength of 35,000 psi. The exterior and interior of the pipe shall have a coal tar varnish coating. Minimum wall thickness: 0.250".

5) Ductile Iron Pipe Fittings

Fittings shall be furnished in accordance with AWWA C110 or AWWA C153, latest revisions, and shall be a minimum of 250 psi pressure class rating. Joints shall be mechanical joint conforming to AWWA C111, latest revision. Cement mortar lining, conforming to AWWA C104, latest revision, shall be furnished for fittings. Solvent cemented joints shall not be used for buried pipes.

6) PVC Casing for Services

PVC casing pipe used for long-side services shall be schedule 40 and a minimum of 1 1/2" in diameter

2.3.2 Fire Hydrants

All fire hydrants shall comply in all respects with City Standards and shall be designed and manufactured to comply with the latest revision of AWWA C502. The hydrants shall be designed for 150 pounds working pressure, of simple design, easy to operate, effectively and positively drained and protected from damage by freezing, and convenient for repairing and replacing parts.

Hydrants shall be equipped with one 4-1/2" pumper nozzle and two 2-1/2" diameter hose connections, which shall have threads meeting the latest requirements of the State Fire Insurance Commission. Hydrants shall have a safety flange on the barrel and a safety coupling on the valve stem, to prevent damage to barrel and stem in case of traffic accident. Hydrants shall be M&H Valve and Fitting Co., Traffic Model Style 129, Mueller Co. Centurion A-421, or approved equal.

The connection at the base of the hydrant shall be mechanical joint with ductile iron retainer gland for 6" ductile iron pipe. The valve opening shall meet the requirements of the AWWA Specifications for a 4-1/2" hydrant. The valve, valve seat and inner working parts shall be easily accessible. The height from the surface of the ground to the bottom of the pumper nozzle shall be no less than 18".

Each hydrant shall be tested to 150 psi. The first test shall be made with the valve closed. The second test shall be made with the main valve open but all nozzles closed. While the test is being carried on, the hydrant shall be subjected to a hammer test. Any hydrant showing defects by leakage, sweating, or otherwise shall be rejected. The barrel and all parts shall withstand these tests. These tests shall be made in the field after the hydrants are installed.

Leads from the main line to the fire hydrant shall use 6" ductile iron pipe and shall have a 6" gate valve between the main line and fire hydrant. The valve shall be connected to the main line by using a locked hydrant tee, equal to American Pipe model A-10180. Retainer glands or steel rods must be used to insure adequate connection of fire hydrant to valve. When the hydrant is close enough to the valve to allow its use, the hydrant shall be connected to the valve by using a locked hydrant adapter, equal to American Pipe model A-10895.

2.3.3 Valves and Accessories

1) Gate Valves

Valves 16" and smaller shall be gate valves. The valves shall be of non-rising stem design, and have an iron body, bronze mounted, resilient seated, meeting all requirements of AWWA C509. Valves shall be designed for a minimum working pressure of 200 psi and shall have 2" square operating nuts, except in meter vaults where handwheels shall be installed. Valves shall open when turned counter-clockwise.

Valves sized 6" through 16" shall be Mueller Co. A-2370-20 with mechanical joints or approved equal. Mechanical joints shall be furnished with retainer glands as specified above. Where flange joints are used, flanges must meet the requirements of AWWA C115, latest revision.

2) Butterfly Valves

All butterfly valves shall be bubble-tight closing at the rated pressure with flow in either direction, and shall be satisfactory for applications involving throttling service and frequent operations or operations after long periods of inactivity. Valves shall meet the full requirements of AWWA C504, latest revision, for 150 psi working pressure and shall be suitable for above ground or buried service.

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

Butterfly valves installed underground shall come equipped with a manual operator. This manual operator shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering. Operators shall be equipped with mechanical stop-limiting devices to prevent over travel of the disc in the open and closed positions.

Valves shall open when turned counter-clockwise. Operators shall be fully enclosed and designed for buried operation.

3) Valve Boxes

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

4) Air Relief Valve Assemblies

Air relief valves shall be cast iron body and covers, with bronze trim, stainless steel float, Buna-N-seal, and shall be designed for a minimum working pressure of 150 psi. The valves shall be designed to exhaust large quantities of air during the filling period, and small quantities of air which collect in the line while operating under pressure. The valves shall be Empire No. 950 combination air release and vacuum relief valves or approved equal. Valves shall be a minimum of 1 inch.

Gate valves between water main and air release valve shall be bronze, solid wedge with screw connection equal to Jenkins Company Figure 370. Meter box shall be equal to the DFW Style D-1200 or approved equal.

5) Tapping Sleeves

Tapping sleeves shall be Mueller, mechanical joint, 200 psi, H-615 or approved equal.

6) Tapping Valves

Tapping valves shall be Mueller, mechanical joint, 200 psi, H-667, or approved equal.

7) Backflow Preventers

In accordance with the City's Cross Connection Control Program (CCCP), all water service customers are required to have a backflow prevention device selected on the basis of the customer's risk categorization as determined by the City's CCCP Manager. The Developer must contact the City's CCCP Manager to acquire the most current list of approved backflow preventers.

8) Pipe Connection Couplings

Pipe connections between new pipe and existing pipe shall be made with Dresser Style 90 long steel couplings for pipe sizes 2" and below; for pipe sizes above 2", M.J. solid sleeves (long style) shall be used. Spacer rings must be used at all solid sleeve locations. A spacer ring is defined as a short section of pipe cut to fit into the gap between the two plain ends of pipe at the sleeve location.

9) Curb Stops and Wyes

All metal parts of curb stops shall be made of bronze. The stops shall be Ford model B43-232W or approved equal. The cock shall be operated with a combined cap and tee and shall open when turned counter-clockwise. All curb stops shall have locking device.

Wyes shall be Ford model Wye 44 or approved equal.

10) Corporation Cocks

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

11) Electric Conductive Wire

Where plastic pipe is installed, electric conductive wire shall be placed in the trench one foot above the pipe. The tracer wire shall be 12 gauge, coated copper wire suitable for this purpose. Foil tape will not be acceptable.

12) Meter Boxes

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

13) Service Saddles

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

14) Meters

Water meters smaller than 2" shall be furnished and installed by the City. Meters 2" and larger shall be furnished and installed by the developer. All services shall be metered and must be capable of reading accurately at low flows. City approval shall be obtained prior to installation. All meters shall read in gallons. All meters shall come equipped with a touch-read or touchless sensor compatible with the City's meter reading equipment.

Water meters 3/4" - 1" shall be Sensus SR II or approved equal, and meters 2" - 4" shall be a Sensus SR compound meter or approved equal. For water meters requiring flows greater than 500 GPM, developers shall use Hersey MFM II / MCT II compound meters or approved equal.

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

15) Retainer Glands

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

16) Polyethylene Tubing For Ductile Iron Pipe

Polyethylene tubing shall be manufactured of virgin polyethylene material conforming to ASTM Standard Specification D-1248-78, Type I, Class A or C,

Grade E-1. The polyethylene film shall have a minimum thickness of 8 mm.

17) Pressure Reducing Valve

Pressure reducing valves shall be Watts Regulator 25 AUB or approved equal.

18) Valve Markers

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

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

19) Casing Spacers

Casing spacers shall be Model CCS stainless steel as manufactured by Cascade Waterworks Mfg. Co. of Yorkville, Illinois, or approved equal. Spacers shall be sized and spaced as recommended by the manufacturer.

20) Concrete for Thrust Blocks and Thrust Collars

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

21) Gaskets for Joint Restraint Inside Casings

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

22) Subgrade Stabilizer Stone

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

2.3.4 General Requirements

Any pipe, solder or flux used in the installation or repair of the water lines must be lead-free. Pipes and fittings must not contain more than 8.0% lead and solders and flux must not contain more than 0.2% lead.

2.4 Excavation and Construction

2.4.1 General

- 1) It shall be expressly understood that these specifications are for installation of all underground water mains and appurtenances.
- 2) All work shall conform to the applicable provisions of the AWWA Specifications of latest revision except as otherwise specified herein.
- 3) Compliance with applicable safety regulations is the responsibility of each company engaged in the work. The City assumes no responsibility for the actions of others on the job site. It is the responsibility of those installing water mains and appurtenances to conform to OSHA regulations.

2.4.2 Trench Excavation

- 1) Trenches shall have a minimum width of 12 inches plus the diameter of the outside of the bell of the water main and the depth thereof shall be such that there shall be a minimum of 48 inches of cover measured below the roadway surface, natural ground, or proposed grade to the top of the pipe. Maximum trench width at the top of the pipe shall not be more than the outside diameter of the bell plus two feet. In cases where water lines cross above sanitary sewers, there shall be a minimum of 18 inches vertical separation between the water and sewer mains. In cases where a sanitary sewer crosses above a water main, there shall be a minimum of 18 inches vertical separation, plus the sanitary sewer shall be encased in concrete. Both mains shall be D.I.P. At crossings, one full length of water pipe must be located so that both joints are as far from the sanitary sewer as possible. In cases where water mains parallel sewer mains there shall be a minimum of ten (10) feet horizontal separation maintained between the mains. These distances are measured edge to edge.

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

All changes in grade shall be made gradually. At points of interference with storm sewers and cross drains on D.O.T. right-of-way, the pipe will be run under the conflicting utility. Where the water main crosses beneath a storm sewer, there shall be a minimum of 12" clearance between the main and the storm sewer.

In laying pipe across water courses, railroad crossings, or depressions of any kind, the minimum depth here specified shall be maintained at the bottom of the

depression. Railroad crossings shall be installed according to American Railway Engineering Association requirements.

Where necessary, the line shall be lowered at valves so that the top of the valve stem is approximately one foot below the finished grade. The trench shall be deepened to provide a gradual approach to all low points of the line.

No excavation shall be made under highways, streets, alleys or private property until satisfactory arrangements have been made with the State, City, County or owners of the property to be crossed. All excavated material shall be placed so as to not interfere with public travel on the streets and highways along which the lines are laid. Not more than 100 feet of trench shall be opened on any line in advance of pipe laying.

When possible, all crossings of paved highways or driveways shall be made by boring or jacking the pipe under the pavement and shall be done in such manner as not to damage the pavement or subgrade, unless the casing or pipe is in solid rock, in which case the crossing shall be made by the open cut method or by tunneling. All pipe installed under a roadway crossing shall be ductile iron.

Wherever streets, roads, or driveways are cut, they shall be immediately backfilled and compacted after the pipe is laid and shall be maintained in first-class condition as passable at all times until repaved. Backfilling, compaction, dressing and clean-up shall be kept as close to the line laying crew as is practical, and negligence in this feature of the work will not be tolerated.

In excavation and backfilling and laying pipe, care must be taken not to remove or injure any water, sewer, gas or other pipes, conduits or other structures without an order from the Designer. When an obstruction is encountered, the Contractor shall notify the Designer who will have the Owners of the obstruction adjust same or make necessary changes in grade and/or alignment to avoid such obstruction. Any house connection, drains or other structures damaged by the Contractor shall be repaired or replaced immediately.

All excavation shall be placed on one side of the trench, unless permission is given by the City to place it on both sides. Excavation materials shall be so placed as not to endanger the work and so that free access may be had at all times to all parts of the trench and to all fire hydrants or water valve boxes, etc. All shade trees, shrubs, etc., shall be protected.

The Contractor shall furnish, install and maintain such sheathing, bracing, etc., as may be required to support the sides of the excavation and to prevent any movement that might injure the pipe, or cause sloughing of the street or trench, or otherwise injure or delay the work or interfere with adjoining structures.

- 2) All materials shall be considered as rock which cannot be excavated except by drilling, blasting or wedging. It shall consist of undecomposed stone in solid layers

or of boulders of not less than one-half cubic yard. Wherever rock is encountered in the excavation, it shall be removed by suitable means. If blasting is used for removal of rock, the contractor shall take all proper safety precautions. He shall comply with all rules and regulations for the protection of life and property that may be imposed by any public body having jurisdiction relative to the handling, storing and use of explosives. He is fully responsible for filing for and acquiring any blasting permits which may be required by those agencies with such jurisdiction. Before blasting, the Contractor shall cover the excavation with heavy timbers and mats in such a manner as to prevent damage to persons or the adjacent property. Rock excavation near existing pipelines or other structures shall be conducted with the utmost care to avoid damage. The Contractor shall be wholly responsible for any damage resulting from blasting, and any injury or damage to structures or property shall be promptly repaired by the Contractor to the satisfaction of the City and property owner.

- 3) Rock in trenches shall be excavated over the horizontal limits of excavation and to depths as follows:

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

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

2.4.3 Backfilling and Bedding

- 1) All D.I.P., Steel, or R.C.P. pipe shall have a minimum of Class "C" bedding. All PVC pipe shall have a minimum of Class "B" bedding. Wherever water or wet soil is encountered, Class "B" bedding shall be provided. If specifically designated on the plans, Class "A" or "B" bedding may be required. Typically the manufacturer's recommendations shall govern the bedding requirements of the various pipes at the varying depths; However, the City reserves the right to increase the bedding requirements for any sewer main where the City believes the manufacturer's recommendations are not sufficient.

- 2) After the pipe has been laid, backfilling shall be done in two (2) distinct operations. In general, all backfill beneath, around and to a depth of twelve (12") inches above the top of the pipe shall be placed by hand in four (4") inch layers for the full width of the trench and thoroughly compacted by hand with vibratory equipment. The remainder of the backfill shall be placed in 6" layers and compacted to the top of the trench, either by pneumatic hand tamps, hydro-tamps, or other approved methods. Care shall be taken so that the pipe is not laterally displaced during backfilling operations. The backfill lifts shall be placed by an approved method in accordance with that hereinafter specified. Backfill materials shall be the excavated materials without bricks, stone, foreign matter or corrosive materials, where not otherwise specified or indicated on the plans.
- 3) Backfill under permanent concrete or bituminous pavement and as elsewhere specified or indicated on the plans shall be approved bank-run sand or gravel or crushed stone free from large stones and containing not more than ten percent (10%) by weight of loam or clay. This backfill shall be compacted to one hundred percent (100%) as determined by the Modified Proctor test for the top two (2) feet of trench and ninety-five percent (95%) by the Modified Proctor test from pipe bedding to two (2) feet below trench top. Mechanical vibrating equipment shall be used to achieve the required compaction. Pavement shall be replaced immediately after the backfilling is completed.
- 4) Backfill under gravel or crushed stone surfaced roadways shall be the approved suitable excavated material placed in six (6) inch layers thoroughly compacted for the full depth and width of the trench, conforming to the compaction, density compaction method and materials as specified in "2" above.
- 5) Backfill in unpaved areas shall be compacted with mechanical vibrating equipment to ninety percent (90%) as determined by the Modified Proctor Test. Backfill material from pipe bedding to ground surface by shall be excavated earth free from large stones and other debris.
- 6) Contractor shall fully restore and replace all pavement, surface structures, etc., removed or disturbed as part of the work to a condition equal to that before the work began.
- 7) Where sheeting is used in connection with the work, it is in no case to be withdrawn before the trench is sufficiently filled to prevent damage to banks, road surfaces, adjacent pipes, adjacent structures or adjacent property, public or private.
- 8) All costs of compaction testing shall be the responsibility of the Developer.

2.4.4 Laying Pipe

- 1) All pipe shall be laid straight, true to line and grade. Bell and coupling holes shall be dug in the trench and the pipe shall have a continuous bearing with the trench bottom between bell or coupling holes. No shimming or blocking up of the pipe shall be allowed. When the work is not going on, all pipe openings shall be securely closed by the insertion of the proper size plug and caulking so that dirt and debris will not be washed into the pipe in case of rain.
- 2) In making the joints with ductile iron pipe, the spigot end of the pipe and the inside of the bell shall be thoroughly cleaned and the gasket inspected to see that it is properly placed; Lubricant shall be applied to the spigot end of the pipe and it shall be inserted into the bell of the adjoining pipe to the stop mark on the pipe.
- 3) Locator wire, as referenced in Section 2.3, shall be placed in the trench above PVC water mains.

2.4.5 Thrust Restraint for Pressure Lines

1) Reaction Blocking

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

2) Retainer Glands

Mechanical joint fittings and valves on Ductile Iron Pipe shall be installed with retainer glands where specified herein.

2.4.6 Setting Fire Hydrants

Fire hydrants shall be placed at the locations shown on the plans. Gate valves for fire hydrants shall be connected directly to the main by means of a "Locked Hydrant Tee".

All other connections between the main and the fire hydrant shall be mechanical joint with ductile iron retainer glands. Fittings shall be restrained by a "Locked Hydrant Adapter" whenever the fire hydrant is located close enough to the main to allow its use. Care shall be exercised that set screws and retainer glands are tightened sufficiently to secure the hydrants before pressure is put on the main. Not less than four cubic feet of No.5 or No.57 stone shall be placed around the base of the hydrants, as shown in the Standard Detail Drawings, Section 4.0. Before placing the hydrants, care shall be taken to see that all foreign material is removed from within the body. The stuffing boxes shall be tightened and the hydrant valve opened and closed to see that all parts are in first class working condition. All hydrant openings shall be kept capped, except when hydrant is being worked on.

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

FIRE HYDRANTS SHALL NOT BE OPERATED WITH ANY TOOL EXCEPT A SPECIFICALLY DESIGNED FIRE HYDRANT WRENCH. If the Contractor observes any other contractor or person operating a fire hydrant with an unapproved fire hydrant wrench, he shall report that fact to the City immediately. It is the Contractors responsibility to insure that all new facilities are maintained in new condition until final completion of the project and acceptance by the City. Fire hydrants with damaged operating nuts shall not be accepted.

2.4.7 Setting Valves and Fittings

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

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

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

2.4.8 Placing of Steel Casing Pipe

Casing pipe shall be installed at the locations shown on the plans. Unless directed otherwise, the installation procedure shall be the dry bore method. The hole is to be mechanically bored and cased through the soil by a cutting head on a continuous auger mounted inside the casing pipe. The installation of the casing and boring of the hole shall be done simultaneously by jacking. Lengths of pipe are to be full circumference butt-welded to the preceding section installed. Excavation material will be removed and placed at the top of the working pit. Backfill material and methods of backfilling and tamping shall be as required under Section 2.4.3. Carrier pipe shall be D.I.P. and inserted within the casing by use of stainless steel casing spacers. Intervals shall be as recommended by the manufacturer. Inside of casings, the water main joints shall be slip joint restrained by using U.S. Pipe "Field-Lok" gaskets or approved equal.

2.4.9 Marking Location of Valves

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

2.4.10 Dewatering Trenches

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

2.4.11 Bracing, Sheeting, and/or Shoring

Whenever the condition of the ground is such that it is necessary to protect the work, the street, the roadway or the workmen, the sides of the trench shall be supported with suitable bracing, sheeting and/or shoring to be furnished by the Contractor at his own expense.

2.4.12 Location and Protection of Existing Underground Utilities

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

2.4.13 Connection to the Existing City Water System

- 1) The developer's private contractor shall make all required connections and taps to the City's water system. The City's Inspector will supervise the tap and all associated work. The contractor shall give the City a minimum of 48 hours notice prior to any water system work.
- 2) The Contractor will provide proper traffic control devices and certified personnel to direct traffic if required.
- 3) All taps shall be wet taps (on pressurized water mains in service). All taps to be made with saddles or tapping sleeves.

2.4.14 Street Cuts

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

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

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

2.4.15 Standard Detailed Drawings

Installation of fire hydrants, water valves, valve boxes, meters, long side services water lines, etc. shall be made in accordance with the Standard Detailed Drawings in Section 4.0.

2.4.16 Clean-Up

- 1) The Contractor shall remove all unused material, excess rock and earth, and all other debris from the construction site as closely behind the work as practical. If the Contractor fails to maintain clean-up responsibilities as directed by the City's representative, the City may choose to use their own forces to do so, followed by an invoice to the Developer for the City's work.
- 2) All trenches shall be backfilled and tamped before the end of each days work. Prior to requesting the final inspection, the Contractor shall do the following:
 - a. Remove and dispose of in an acceptable manner all shipping timbers, shipping bands, spacers, excess materials, broken material, crates, boxes and any other material brought to the job site.
 - b. Repair or replace any work damaged by the water line construction.
 - c. Regrade and smooth all shoulder areas disturbed by the water line construction.

- d. Pour concrete collars around all valve boxes outside paved areas.
- e. Insure that all fire hydrants are set to grade and that all valves have been located and are fully open.
- f. All easement areas shall be cleared of trees, stumps and other debris and left in a condition such that the easement can be maintained by bush-hog equipment.
- g. All shoulders, ditches, culverts, and other areas impacted by the water main construction shall be at the proper grades and smooth in appearance.
- h. A uniform stand of grass or mulch for erosion protection, as defined in the **Manual For Erosion and Sediment Control In Georgia**, is required over all road shoulders and water main easements prior to the City's acceptance of the water main.
- i. If work is performed on a Georgia D.O.T. or City of Covington R/W, a letter from the governing agency is required to be submitted after construction is complete stating that grassing, clean-up, drainage, etc. is acceptable.

2.4.17 Interruption of Water Supply During Construction

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

2.4.18 Barricades

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

2.4.19 Grassing

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

Immediately after the initial watering of seeded areas, the contractor shall apply a mat of hay or rye, wheat or oat straw over the area at a uniform rate of not less than 1-1/2 ton of mat to the acre. The minimum depth of the straw shall be 2 inches and the maximum depth 3 inches. After placing mat or hay or straw, emulsified asphalt shall be sprayed over the mat at a uniform rate of 0.15 gallon per square yard. After the grass has shown a satisfactory growth (approximately 30 days after planting), nitrate of soda shall be applied at a uniform rate of 100 pounds per acre, followed by sufficient water to dissolve the fertilizer.

The Contractor shall do all maintenance work necessary to keep all planted areas in satisfactory condition until the work is finally accepted. This shall include mowing, repairing washes that occur, reseeding, and water as required to produce a healthy and growing stand of grass. Mowing will be required to remove tall and obnoxious weeds before they go to seed.

It is the intent of these specifications to produce a stand of grass that is alive and growing, without any bare spots larger than one square foot. The Contractor shall repeat all work, including plowing, fertilizing, watering, and seeding as necessary to produce a satisfactory stand.

2.5 Inspection and Test

2.5.1 General

- 1) All lines designed to operate under pressure shall be successfully tested. Tests of installed piping shall consist of a pressure and leakage test and a disinfection test.
- 2) All piping to be tested must satisfactorily comply with these tests before being eligible for acceptance. In general, tests shall be conducted in accordance with AWWA C600 and C651 except as otherwise herein specified.

2.5.2 Pressure and Leakage Testing

- 1) Pressure and leakage tests shall be performed in accordance with the latest edition of AWWA Standard C600.
- 2) Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants, blow-offs or air release valves are not available at the high places, the Contractor shall make the necessary taps at points of highest elevation before the test is made and insert plugs before the test has been completed.
- 3) Prior to the pressure test, pipe laid in trenches shall be backfilled adequately to secure the pipe during the test. Any observed leakage shall require corrective measures to pipe lines and/or joints to the satisfaction of the Inspector.
- 4) After all piping has been placed, each section between line valves shall be tested by the developer's contractor in the presence of the City's inspector and tests shall be

continued until all leaks have been made tight to the satisfaction of the Inspector. The Contractor shall furnish all necessary meters, pumps, gauges, bulkheads, and other materials and appliances necessary to conduct the test as herein required. Every precaution must be taken to valve-off or otherwise protect control equipment in or attached to the pipe line to prevent damage thereto.

- 5) The test pressure of the installed pipe is 200 psi, and this pressure must be held for at least two hours.
- 6) Allowable leakage shall be no greater than as calculated in $L=SD (P)^{1/2}/133,200$ where L is allowable leakage in gallons/hour, S is the length of pipe tested in feet, D is pipe diameter in inches and P is test pressure during the leakage test in pounds per square inch (psi).

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

2.5.3 Disinfection of Water Mains

- 1) All new water mains, as well as those taken out of service for inspection, repair or other activities that might lead to contamination of water shall be disinfected before they are placed in or returned to service.
- 2) Disinfection of the new mains and the disposal of the heavily chlorinated water, following the disinfection, shall be accomplished in accordance with the latest edition of AWWA Standard C651.
- 3) The “tablet method” of disinfection which consists of placing calcium hypochlorite granules or tablets in the water main as it is being installed and then filling the main with potable water when installation is complete is not allowed.
- 4) Before the main is chlorinated, it shall be filled to eliminate air pockets and shall be flushed to remove particulates. A flushing velocity of not less than 2.5 feet/second is usually maintained in pipe sizes less than 24 inches in diameter. For larger diameter mains, an alternative to flushing, such as broom-sweeping of the main, is acceptable prior to chlorinating the main.
- 5) During disinfection of the water mains, an appropriate cross-connection control device, consistent with the degree of hazard, shall be provided for backflow protection of the active distribution system.
- 6) The quality of the water used during the disinfection procedures shall meet the required drinking water standards.
- 7) The chlorine solution used for disinfection of water mains shall have a free

chlorine residual concentration not less than 25 mg/L. This heavily chlorinated water shall be retained in the main for at least 24 hours, during which time all valves and hydrants shall be operated to ensure disinfection of the appurtenances. At the end of the 24-hour period, the treated water in all portions of the main shall have a residual of not less than 10 mg/L free chlorine. Re-chlorinate if required results are not obtained on all samples.

- 8) After the applicable retention period, the heavily chlorinated water must not be disposed in a manner that will harm the environment. Neutralizing chemicals, such as Sulfur Dioxide, Sodium Bisulfite, Sodium Sulfite or Sodium Thiosulfate can be used to neutralize the chlorine residual remaining in the water to be wasted.
- 9) Flush all lines until residual is equal to existing system. After final flushing and before the water main is placed into service, water samples shall be collected from the main and tested for microbiological quality in accordance with the Georgia Rules for Safe Drinking Water, Chapter 391-3-5. The laboratory results must show the absence of coliform organisms in the water. Reflush and re-disinfect the lines, as necessary, until satisfactory bacteriological results are obtained.

2.5.4 When Cutting Into or Repairing Existing Mains

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

2.5.5 Amount of Chlorine Necessary for Disinfection

- 1) Chlorine required to produce 25 mg/L concentration in 100 feet of pipe by diameter is listed below:

Pipe Diameter (inches)	100% Chlorine		1% Chlorine Solution	
	(lbs)	(g)	(gal)	(L)
4	0.013	5.9	0.16	0.6
6	0.030	13.6	0.36	1.4
8	0.054	24.5	0.65	2.5

10	0.085	38.6	1.02	3.9
12	0.120	54.4	1.44	5.4
16	0.217	98.4	2.60	9.8

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

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

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

2.6 Other Requirements

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

SECTION 3.0 – SEWER SYSTEM SPECIFICATIONS

3.1 Preconstruction Requirements

3.1.1 Sanitary Sewer Hydraulic Analysis

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

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

Flow measurements can be field verified by City Personnel for the fees included in Appendix A.

3.1.2 Plan Requirements

All plans for public sanitary sewer facilities shall be prepared in accordance with the requirements outlined herein and as required in regulations promulgated by the Georgia Environmental Protection Division. The developer shall be responsible for submitting plans and other data to the City for required approvals.

Construction plans for proposed sanitary sewer construction shall consist of the following:

- A. Site Plan with the project name, site location map, land lots, district and north arrow, lot layout (if subdivision) or building location (multi-family, commercial, or industrial). Also show all existing and proposed streets and their names, all streams (100-year flood plain and wetland areas where applicable), water courses, storm drains, and discharge points for all drainage structures. The site plan shall show the topography with contour lines at two foot intervals as well as the sewer layout with existing and proposed lines, manhole numbers, line designation and direction of flow. Also, show the size of all lines, the location of proposed service laterals, and proposed and existing easements. The location and sizes of all sewer lines adjacent to the project including the point(s) of connection(s). Note if any other utilities are existing. Drawings shall be to no smaller scale than 1" = 100'. Sheet size shall be 22" x 34" or 24" x 36".
- B. The design of cross-country (undeveloped property) sanitary sewer lines and force mains shall be based on field-run surveys. The site plan for cross-country sanitary sewer lines and force mains need not show contour intervals, but the profiles shall be based on mean sea level elevation. Site plans for lift stations shall show existing and proposed contours. In the event the subdivision is developed in phases, the final construction plans for sanitary sewers may be submitted in phases or units. However, at the time the first phase is submitted, the design professional will submit

one copy of the preliminary layout of the entire sanitary sewer system. This layout will show all lines required to serve any lots to be developed and any surrounding property that may be served through the property. The site plans for each phase or unit shall contain a location drawing showing the relationship of the phase or unit to the total project and to the surrounding streets and sanitary sewer outfalls.

- C. Profiles should have a horizontal scale of not more than 1" = 50' and a vertical scale of not more than 1" = 10'. The plan view should be drawn to a corresponding horizontal scale. The plan view should normally be shown on the same sheet as the profile. In any case both the plan and profile view should have line designations, station numbers, manhole numbers and any other indexing necessary to easily correlate the plan and profile view.

The following items shall also be included, in addition to applicable specifications provided in Appendix A.

Sewer layout

- Site plan showing sewer layout (topography overlay required).
- Sewer layout should have manhole numbers, line designations, flow arrows, street names, and topography.
- Sewer layout showing proposed storm drain crossings.
- Detail tie-in of proposed lines with existing lines providing existing and proposed pipe sizes, invert elevations.
- Profile of proposed sewer lines with proposed grades.
- Where applicable normal pool elevations for water-body crossings are indicated on the profile
- Manhole numbers and locations on plan and profile.
- Outside drop-manhole designated on profile where invert "in" elevation is more than 2.0 feet above the invert "out" elevation.
- Percent grade and length on profile.
- Size of mains on profile.
- Lateral locations on plan. As-builts should have distances in feet from manhole to lateral as well as station numbers.
- Materials to be used. Ductile Iron Pipe where required such as fills, shallow cover, less than 2 feet of clearance, over 14' of fill, etc.

- Location in profile of streams and storm drains.
- Permanent easements are to be 20 feet wide for sanitary sewer and 30 feet wide for easements containing both sanitary sewer and storm drains.
- Easements for future sewer.
- Details:
 - A. Precast concrete manhole
 - B. 6" service connection
 - C. Sewer service location
 - D. Manhole frame and cover
 - E. Class A,B, C bedding
 - F. Pipe adapter - Joining different types of pipe
 - G. Cleanout Detail
- No acute angles between "in" lines and "out" line in manhole.
- Proper manhole spacing (maximum 400’).
- Sewers within minimum and maximum slope requirements for expected flow, pipe material and pipe size.
- In manholes where the pipe size increases, the crown of the smaller pipe must be at the same elevation or higher than the crown elevation of the larger pipe.
- Minimum cover of 7 feet in roadway where laterals are located to obtain 6 feet of cover over lateral at R/W limit, or D.I.P. laterals designated.
- Each set of construction plans shall include a reproduction of the following information from the Utilities Protection Center:



If You Dig Georgia...Call Us First!
 1-800-282-7411
 UTILITY LOCATION & COORDINATION COUNCIL
 UNIFORM COLOR CODE
 RED- ELECTRIC POWER LINES, CABLES, CONDUIT AND LIGHTING CABLES
 YELLOW- GAS, OIL, STEAM, PETROLEUM OR GASEOUS MATERIALS
 ORANGE- COMMUNICATION, ALARM OR SIGNAL LINES, CABLES OR CONDUIT
 BLUE- WATER, IRRIGATION AND SLURRY LINES
 GREEN- SEWERS AND DRAIN LINES
 WHITE- PROPOSED EXCAVATION

The General Notes for Sanitary Sewer System Construction shown on the following page shall be included in each set of plans.

City of Covington
Sanitary sewer system construction
General Notes

1. All sanitary sewer system construction must follow the current City of Covington Water & Sewer Standards and Specifications.
2. For D.I.P. sewer lines, the minimum wall thickness for 4" - 12" diameter pipe shall be Pressure Class 350; minimum wall thickness for 14" - 20" diameter pipe shall be Pressure Class 250; minimum wall thickness for 24" diameter pipe shall be Pressure Class 200; minimum wall thickness for pipe larger than 24" in diameter shall be Pressure Class 150. Wall thicknesses greater than the minimums called for above may be required due to greater depths or varying bedding requirements. Class C bedding is the minimum allowed.
3. All Polyvinyl Chloride (PVC) sewers 6" to 15" in diameter shall meet the requirements for minimum wall thickness as specified under SDR 35 in ASTM D3034, latest revision. PVC sewers that are 18" in diameter shall have a minimum wall thickness as specified under T-1 in ASTM F679, latest revision. PVC sewers with more than 12 feet of cover may require wall thicknesses greater than SDR 35 or T-1. PVC is not allowed for sewers greater than 18" in diameter or more than 14 feet of cover.
4. Ductile Iron Pipe is required for sanitary sewer lines:
 - a) Over or under all storm sewers
 - b) Crossing water mains
 - c) Under all stream crossings
 - d) With less than 4' of cover or over 14 feet of cover
 - e) With 15% or greater slope
 - f) Where velocities exceed 10 ft/sec
 - g) Inside casings
 - h) At all other locations specified by the City
5. Information regarding underground utilities on these plans is not guaranteed as to accuracy or completeness. Prior to beginning work, the Contractor shall request a field location through the utilities protection center and any utility owners thought to have facilities in the area. The Contractor shall promptly compare these field-marked locations with the project plans and then notify the designer of any anticipated problems or need for design changes. It is the Contractor's responsibility to excavate or cause the utility owner to excavate for the purpose of determining exact elevations or locations at utility crossings and other critical locations well in advance of the work under this contract. Damage to existing utilities resulting from the Contractor's negligence shall be repaired at the Contractor's expense.
6. All sewer service laterals shall have a minimum diameter of 6".
7. The Developer shall obtain a permit from the City and notify the sewer system inspector 48 hours before beginning construction.
8. This project is located in land lots _____, _____ district of Newton County, Georgia.
9. The existing land use is (describe current land use, such as agricultural, commercial, etc.).
10. The Developer is: (name, address, and telephone number).
11. 24-Hour local contact for erosion and sediment control is (name and 24 hour telephone numbers).
12. This project construction area is acres.

13. This project consists of: (describe sanitary sewer work to be done, including length of pipe and sizes and number of manholes).
14. Adjacent areas include (describe development style of area surrounding project).
15. The escape of sediment from the site shall be prevented by the installation of erosion control measures and practices prior to, or concurrent with, land disturbing activities and erosion control measures will be maintained at all times. If full implementation of the approved plan does not provide for effective erosion control, additional erosion and sediment control measures shall be implemented to control or treat the sediment source.
16. All erosion and sediment control measures will be checked daily and any deficiencies noted will be corrected by the end of the day.
17. This property (is / is not) located within a 100 year flood plain as shown on F.I.R.M. Community Panel Number , dated _____.
18. All fill slopes will have silt fence at the toe of the slopes.
19. A 25 to 35 foot undisturbed vegetative buffer adjacent to all running streams and creeks will be left and maintained.
20. Clearing will be kept to an absolute minimum. Vegetation and mulch will be applied to applicable areas immediately after grading is complete. Land disturbing will be scheduled to limit exposure of bare soils to erosive elements.
21. Construction activities will be performed in compliance with all applicable laws and regulations.
22. All marketable timber will be salvaged. Top soil will be salvaged, stock piled and spread on areas to be vegetated. Trees outside of the clearing line will be protected from damage by appropriate markings. Supplemental vegetation will be established.
23. Cleanout of sediment control structures will be accomplished in accordance with the sediment disposal accomplished by spreading on site. Sediment barriers will remain in place until sediment contributing areas are stabilized.
24. Contractor is responsible for staking the alignment of the proposed pipeline prior to pipe installation. If a conflict should arise the contractor shall notify the designer at that time.
25. All excavated dirt shall be placed on the high side of the trench away from any creeks.
26. Any fill dirt over the pipe shall be graded to prevent ponding.
27. The construction easement represents the limits of clearing for the complete job. The contractor shall not clear beyond this limit.
28. There shall be no change in preconstruction contours (excess material must be removed to an upland disposal area).
29. Bank stabilization (rip-rap) shall only be placed where necessary for erosion prevention. No rip-rap shall be placed in excess of the minimum needed for erosion protection.
30. No rip-rap shall be placed in any wetland area or in any location or manner so as to impair surface water flow into or out of any wetland area.

31. Discharges of dredged or fill materials into the creek shall be avoided or minimized through use of other practical alternatives.
32. Discharges of fill in spawning areas during spawning seasons shall be avoided.
33. Discharges of fill shall not restrict or impede the movement of aquatic species indigenous to the waters or the passage of normal or expected high flows or cause the relocation of the water (unless the primary purpose of the fill is to impound water).
34. Discharges of fill in wetland areas shall be avoided.
35. Heavy equipment in wetland areas shall be avoided.
36. Discharging fill into breeding areas for migratory waterfowl shall be avoided.
37. All temporary fills shall be removed in their entirety.
38. No person shall commence, perform, or engage in blasting or in excavating with mechanized excavating equipment on any tract or parcel of land in this county until the person planning the blasting or excavating has given 48 hours' notice by submitting a locate request to the utilities protection center, beginning the next business day after such notice is provided, excluding hours during days other than business days. Any locate request received by the utilities protection center after business hours shall be deemed to have been received by the utilities protection center the next business day.

3.1.2 Contractor Qualifications

Contractors performing sewer line installations must be licensed in accordance with State of Georgia law and local ordinances and approved by the City. They should be completely familiar with the procedures and contract requirements associated with this type of project. Unsatisfactory work will cause a contractor to not be approved for future work.

3.1.3 Erosion And Sedimentation Control Plan

- A. The Georgia Soil and Water Conservation Commission has taken provisions of ACT 599 and published a **MANUAL FOR EROSION AND SEDIMENT CONTROL IN GEORGIA**, 1992 Edition (or any more current edition as they are published). Water construction plans and specifications shall include appropriate segments of this manual. Developers, Engineers, Design Professionals and Contractors performing work in City of Covington are responsible for acquiring a copy of this manual and using the best practical methods contained therein to control the erosion and sedimentation of the construction site in conformance with the intent of ACT 599. Copies may be purchased from the Georgia Soil And Water Conservation Commission, P.O. Box 8024, Athens, Georgia 30603. For additional information, call the Commission at 706-542-3065.
- B. Plan: An erosion and sediment control plan, meeting the requirements of applicable state regulations, shall be provided as part of the overall construction drawings.
- C. Erosion Control Details: Erosion Control Details and Symbols may be taken directly from the Manual For Erosion and Sediment Control In Georgia, 1992 referenced above.

3.2 Design Criteria

3.2.1 General

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

3.2.2 Sanitary Sewers Separate From Storm Sewers

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

3.2.3 Sizing Factors

The sanitary sewer system should be designed for the estimated ultimate tributary population. Tributary population is considered to be all areas upstream of the discharge

point of the system being designed. Sewers will be designed and installed to the uppermost property line of the development being served. Consideration should be given to the maximum anticipated capacity of institutions, industrial parks, etc.

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

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

New sanitary sewer systems shall be designed on the basis of an average daily flow of sewage of not less than 400 gallons per household per day. Normally, all sanitary sewers shall be designed with a peaking factor of not less than 2.5, and this may be increased as required by the City. Peak factors will be higher for smaller basins. Sanitary sewers less than 15 inches diameter should be designed to flow at a maximum of half full, and sanitary sewers greater than 15 inches diameter should be designed to flow at a maximum of three quarters full. When deviation from the foregoing per capita rates are demonstrated, a description of the procedure used for design shall be included.

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

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

3.2.4 Depth Requirements

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

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

3.2.5 Slope

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

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

- 2) Maximum slopes shall not exceed 15% without of the approval of the Engineering Department.
- 3) When approved by the Engineering Department, DIP may be used with slopes of 15% to 25% with the addition of concrete anchors (deadman) spaced at 36 feet on center. The minimum size of the concrete deadman shall be:

Height	3x pipe diameter
Length (along pipe)	3x pipe diameter
Width (perpendicular to pipe)	2x trench width

- 4) Whenever possible, designs for jack and bore installations should include a drop in the upstream manhole of not less than 6 inches and should allow a slope through the bore three times as steep as the recommended minimum slope for that size pipe.

3.2.6 Increasing Size

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

3.2.7 Ductile Iron Pipe

Ductile iron pipe shall be required for sanitary sewer mains:

- 1) Over or under all storm sewers
- 2) Crossing water mains
- 3) Under all stream crossings
- 4) With less than 4' of cover or over 14 feet of cover
- 5) With 15% or greater slope
- 6) Where velocities exceed 10 ft/sec

- 7) Inside casings
- 8) At all other locations specified by the City

3.2.8 Sanitary Sewer Pipe Material Requirements

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

3.2.9 Subgrade and Pipe Bedding

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

3.2.10 Manholes

Manholes shall be installed at the end of each line; all changes in grade, size, or alignment; at all intersections; and at distances not greater than 400 feet. In no circumstance will a spacing of greater than 300 feet be allowed when the slope exceeds 10 percent. Cleanouts may be used only for service laterals and special conditions and shall not be substituted for manholes. Manholes in cross-country areas shall be elevated so that the top is 18 inches above ground. A drop pipe shall be provided for a sewer entering a manhole at an elevation of more than two feet above the manhole invert. Drop manholes shall be constructed in accordance with the Standard Details. The drop pipe shall be of ductile iron materials with mechanical joints. Also, at least one piece of ductile iron pipe shall be used on the incoming line to reach a solid, unexcavated foundation. All outside 90 degree elbows shall have thrust block poured below the elbow. Outside drop manholes will be noted on the construction plans. Where the difference in elevation between the incoming sanitary sewer and the manhole invert is less than two feet, the invert shall be sloped from invert to invert to prevent solids deposition.

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

3.2.11 Protection of Water Supply

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

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

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

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

3.2.12 Service Laterals

A sewer service shall be provided for every existing or proposed lot or building. All services shall be shown on the construction drawings. All service laterals shall be a minimum of 6" in diameter. A common service shall not be allowed for two or more buildings. The service shall extend to 5' inside the property line of the lot being served and normally be within 10 feet of the lower corner of the lot. The builder shall install a cleanout at the right-of-way and extend the PVC cleanout to a height of 3' above the finished grade. The Contractor shall also place a 2" PVC pipe above the end of the service lateral to enable the builder to locate the service. All service laterals shall have 6' of cover at the right-of-way. Where 6' of cover cannot be achieved, services shall be ductile iron. 6" services shall be laid at a minimum grade of 1%. Service laterals tied directly to manholes shall enter the manholes through cored holes and shall be provided with a pre-molded rubber boot as described in Section 3.3.4. Laterals shall enter the manhole no higher than 6" above the table and shall be provided with a concrete flume to slope the flow into the manhole invert.

The developer shall be responsible for serving all lots developed. On any lot where the service cannot be found, the developer shall be responsible for payment of the cost of installation of another service lateral. Also, unless noted on the final plat, the service shall be low enough to serve the first floor elevation at the building line. The builder shall be responsible for the location of the services prior to the pouring of the foundation, driveway or other appurtenance. The City will not be responsible for any house built too low to be served nor for any service covered by construction.

No plumber or contractor will be allowed to connect to the sewerage system except to the end of the service provided for this connection, when proper permit is issued. After the service is run from the end of the lateral provided by the sewer line contractor to the

house plumbing, the cleanout at the right-of-way may be cut down to a level six inches below the finished grade. The cleanout shall be provided with a cast iron ferrule with a brass screw plug to enable the cleanout to be located with a metal detector. Plastic plugs are not allowed.

3.2.13 Provisions for Future Extensions

Where the developer does not contemplate installation of sewers to the most upstream property line of drainage basins running through the development, a 20 feet wide permanent easement and 60 feet wide construction easement will be required for future use of the City. These easements must be shown and recorded on the final development plat and recorded at the Court House in the appropriate records section.

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

3.2.14 Sanitary Sewer Line Extension Requirements

- 1) If an existing trunk line must be extended to serve the property, the developer may be required to pay all of the initial costs. If the line extension would serve other developments within a one year period, the City may negotiate with the initial developer for a pro rata share participation from future developers who wish to connect to the extension during the one year period. This one year period would begin upon final acceptance of the line by the City, at the end of the one year developer maintenance period.
- 2) Sewer line extensions shall be sized in accordance with the requirements of Section 3.2.3. If the size of the trunk main extension required is larger than the minimum size required to serve the development, the Developer may be able to recapture some of the initial costs through negotiations with the City for the cost of the betterment in accordance with Section 302.14.1 above.

3.2.15 Air and Vacuum Relief Valve Assemblies

A&V assemblies shall be located along sewer force mains where appropriate as determined by a design professional in responsible charge of the sanitary sewer system design. All A&V assembly locations are subject to the approval of the City. Concrete valve markers are required at each A&V Assembly.

3.2.16 Polyethylene Encasement

Ductile iron pipe shall be provided with polyethylene encasement whenever the sewer line either crosses or is in close proximity to a steel gas main.

3.2.17 Easements

- 1) Permanent sanitary sewer easements of 20 feet in width shall be provided for all sanitary sewer lines not located within the right-of-way. Permanent easements shall be reserved adjacent to the right-of-way for sewer lines located within 10 feet inside of the right-of-way, thereby giving the City 10 feet of accessible property on each

side of the sewer line. If sanitary sewer lines are excessively deep, wider easements may be required to maintain a 1:1 open cut slope.

- 2) Easements for sanitary sewer lines and drainage purposes may be combined, but must be a minimum of 30 feet wide if designed for combination.
- 3) Sewer easements off the street right-of-way shall be clearly defined on the plat of the individual property owner and said property owner will be required to keep the easement free of all obstructions.
- 4) All easements shall be cleared of debris, excess dirt and other materials. The ground shall be smoothed down and grassed within 10 days of completing construction work. The use of sediment control measures will be required to protect the area until a vegetative cover is obtained.
- 5) Where the developer does not contemplate installation of sewers to the most upstream property line of drainage basins running through the development, a 20 feet wide permanent easement and 60 feet wide construction easement will be required for future use of the City. These easements must be shown and recorded on the final development plat.

3.2.18 Joint Restraint Inside Casing

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

3.2.19 Wastewater Lift Stations

Lift station design shall be done by a registered professional engineer licensed in the State of Georgia. The following minimum requirements apply to wastewater lift stations. Refer to Appendix D for the City of Covington Stipulations for Lift Stations.

- 1) General
 - a. Lift stations having less than 500 gpm capacity (per pump) shall utilize two submersible or self priming centrifugal pumps each having a capacity equal to the design flow.
 - b. Lift stations having a capacity of 500 gpm or more shall be reviewed on an individual basis and may have requirements differing from those outlined herein.
 - c. Grinder type centrifugal pumps will typically be used for a design flow of less than 100 gpm. Force mains shall be sized to provide a velocity of at least 2 feet per second.
 - d. The design shall allow for easy removal of any pump or equipment item without the need of shut-down of the entire lift station. A lift assembly shall be provided for pump or equipment removal.

- e. The design engineer should consult the City after preliminary design data has been developed for information on approved pump manufacturers. The City reserves the right to review each application on an individual basis and to reject the use of non-approved manufacturers.

2) Submittals

- a. Submittal of construction plans shall include the following lift station information:
 - i. Capacity calculations. Use 1 gpm capacity per house on residential developments of less than 200 units, except that the minimum pump capacity shall be 30 gpm.
 - ii. System head calculations; tabulated and plotted on the pump curve. Include a plot of force main velocity.
 - iii. Construction drawings, details and specifications in sufficient detail to ascertain compliance with these regulations.
 - iv. Cycle time. Calculations showing determination of wet well volume and cycle time at design conditions. Wet well volume should be sufficient to provide a cycle time of no less than 5 minutes from a pump "on" to the next pump "on" time unless recommended otherwise by the manufacturer.
 - v. Storage Volume. Calculations showing volume of storage available in the event of a power outage. The storage zone shall be delineated on plan and profile drawings of the sanitary sewer system. (See subsection "Standby Power" below.)
 - vi. Buoyancy computations showing that structures are protected against flotation.
- b. Shop Drawings. After construction plan approval but before purchasing any lift station equipment, shop drawings shall be submitted including the following information:
 - i. Manufacturer's catalog sheets, performance curves, installation drawings, specifications and list of options for the specific pump that is offered for approval.
 - ii. Similar catalog data for controls, valves, hatches, yard hydrants, precast wet well and other manufactured items.
 - iii. Certification. After installation and before placing the system into full operation, the work must be inspected by the Developer's Engineer who must then issue a certification to the City verifying that all work has been completed in accordance with approved plans. This certification shall include all construction of the lift station and force main. After acceptance of the work by the Engineer, a factory representative shall inspect and start up the

system certifying rotation, capacity, amperage draw, lack of vibration and other standard check points. This certification shall state the beginning date of the warranty and include a copy of the warranty.

- iv. O & M Manuals. On or before the date of start-up, five sets of factory O & M Manuals shall be delivered to the City. These shall include the name of the purchaser, the serial numbers of pumps, detailed wiring schematics, telephone number and address for purchase of parts.
- v. After construction is complete as-built drawings shall be furnished including 1 set of mylar sepias plus 4 sets of prints.

3) Spare Parts - per manufacturer's recommendations

Lift stations with pumps of 5 HP or smaller shall be supplied with a spare complete pump. Lift stations with pumps above 5 HP shall be supplied with an extra impeller and set of bearings plus a complete set of manufacturer's recommended spare parts.

4) Standby Power

Where required, emergency power will be supplied by an on-site emergency generator. The generator shall be diesel or natural gas powered with an automatic transfer switch, receptacle, and provisions for an automatic exercise cycle. Electrical components shall comply with the NFPA 70 National Electrical Code; UL 1008 – AC Transfer Switch Equipment; and the NETA ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems. Specifications for the generator shall be submitted to the City for approval. Refer to Appendix D for additional stipulations.

5) Site Requirements

- a. Flooding. Lift stations shall remain fully operational and accessible during the 25-year flood. All electrical controls shall be above the 100-year flood level. All motors and mechanical equipment shall be protected against physical damage from the 100-year flood.
- b. Access Road. Access roads shall be paved with a 12-foot wide surface of either concrete (6" thick with wire mesh) or asphalt (6" Graded Aggregate Base plus 2" Type E asphalt). Maximum grade shall be 20%. Where access road lengths exceed 350 feet, 6 inches Graded Aggregate Base (GAB) may be used in lieu of a paved driveway. In cases where gravel driveways are utilized, the maximum grade shall be 10%.
- c. Ownership. Both the lift station site and the access road right-of-way shall have fee simple ownership dedicated to the City, and this shall be indicated on the subdivision plat. The dedicated space for the lift station shall include sufficient space for parking of two trucks, plus turn-around, plus slope maintenance. The dedicated width on road right-of-way shall be 40' minimum.

- d. Fencing. Lift station sites shall be fenced with a minimum of 6 foot high chain link fencing topped with 3 strands of barbed wire. Access gates shall be a minimum of 15 feet in width. The space inside the fencing shall be large enough to facilitate service vehicle access to the pumping station wet well and other facilities. A paved turn around area shall be provided whenever the access road length exceeds 200 feet or when the road grade exceeds 10 percent.
- e. Water Supply. A metered water supply line (1" minimum size) shall be installed to the site, with the meter placed outside of the fencing. Inside the fence, in an insulated, vented, above-ground enclosure, a pressure reducing valve shall be placed in the water main, followed by a reduced pressure zone back flow preventer with bypass. Beyond the enclosure, a freeze-proof yard hydrant (Murdock BFHM-100 or approved equal) shall be installed near the wet well. The hydrant shall be equipped with a suitable backflow preventer (Watts No. NF8 or approved equal).
- f. Lighting. One pole-mounted, photo cell controlled, 150 watt mercury vapor security light shall be installed. It shall be equipped with a manual on/off switch (located in the main control panel) to override the photo cell control.
- g. Screening. Where natural screening is not present to screen the site from view of residences, special plantings shall be installed to screen the site.
- h. Ground Covers. All unpaved ground areas inside the fence and extending four feet beyond the fence shall be treated with a herbicide and covered with a geotextile fabric, followed with a 4-inch thick layer of no. 57 stone. The geotextile fabric shall be a non-woven polypropylene weighing 8 oz./S.Y. with a minimum burst strength of 250 psi, such as Amoco type 4553 or equal.

6) Design Features

- a. Wet Well Volume. The wet well volume shall be sized to limit pump cycles to no more than 6 cycles per hour under worst conditions time unless recommended otherwise by the manufacturer.
- b. Ventilation. For wet wells, the minimum requirement shall be two gravity vent pipes designed for natural ventilation. Vents shall be elevated to a minimum of two feet above the 100 year flood plain. Where conditions are conducive to formation of hazardous conditions (in the design engineer's opinion) then mechanical ventilation shall be provided. For dry wells, mechanical ventilation shall be required.
- c. Riser sections in precast units shall be sealed watertight using butyl rubber sealant or other approved sealant. Mastic shall not be used. Structures shall be adequately reinforced for all loading conditions normally encountered

during shipping, construction and service. All openings (for pipes, hatch, conduits) shall be either cast in place or cored. Sanitary sewer pipe connections shall utilize rubber boot connectors, and be watertight. The wet well shall be equipped with an aluminum ladder.

- d. Accessories. Wetwells, receiving manholes, and valve pits shall be coated with a two part epoxy to prevent corrosion. Mechanical equipment requiring ferrous metals shall have a coal tar epoxy coating. Guide rails for pumps shall be stainless steel. Miscellaneous metals including fasteners shall be aluminum or stainless steel; anchor bolts shall be stainless steel. All conduit entering the pump station should be sealed air tight.
- e. Pressure gauge. A pressure gauge shall be installed on the force main downstream of the gate valves, inside the valve pit and visible from ground level. A corporation stop shall be installed on the tap to allow removal of the gauge.
- f. Valves. The discharge pipe of each pump shall have a slow-closing check valve followed by a gate valve before the two pipes join into a common force main.
- g. Surge control valves. The pumping system shall be checked to determine if a surge control valve is required. If a valve is required, it shall be located within the valve pit on the common force main and a drain line installed to drain to the wet well.

7) Pumps shall have the following features:

- a. Non-clog impeller.
- b. Be capable of passing a 3" sphere (except grinder pumps).
- c. A minimum suction pipe diameter of 4" is required for all self priming pumps (above ground).
- c. Be capable of dry operation without overheating.
- d. Have dual mechanical seals with seal leak indicator light in the control panel.
- e. Pump and motor casings shall be cast iron, and all fasteners shall be stainless steel.
- f. Motor shall be selected to be non-overloading under all operating conditions.
- g. Motor winding shall have a heat sensor with auto reset to prevent overheating; three-phase motors shall have two sensors.

- h. Operating speed of the pump shall not exceed 1800 rpm without special approval.
- i. Motor shall have upper and lower roller bearings.
- j. The pump shall be automatically connected to the discharge connection elbow when lowered into place, and shall be easily removed for inspection or service. There shall be no need for personnel to enter pump well. Sealing of the pumping unit to the discharge connection elbow shall be accomplished by a simple linear downward motion of the pump. Each pump shall be equipped with a chain (of aluminum or other non-corrosive material) for easy removal.
- k. Pumps shall be manufactured by Flygt, Gorman Rupp or approved equal.
- l. Motors shall be capable of 10 starts per hour.

8) Force Main

- a. The force main shall be sized for a minimum velocity of 2 feet per second with one pump operating.
- b. Force mains of 4 inch diameter or larger shall be Class 51 or equivalent Pressure Class ductile iron pipe (except for temporary installations where PVC pipe, SDR-21, may be allowed for force mains up through 6 inch diameter). Smaller force mains may be used only with grinder pumps and shall be PVC pipe, SDR-21 with gasket joints. PVC pipe shall not be exposed to sunlight or freezing temperatures.
- c. The force main profile shall slope continuously upward where practical. If high points occur where air could be trapped in the pipe, then a combination air release and vacuum relief valve (of the type made for sewage applications) will be installed at the high points.
- d. The minimum depth of cover over force mains shall be four (4) feet.

9) Electrical

- a. Lift station controls and electrical components shall be factory-wired in completely weather proof stainless steel metal cabinets (NEMA 4X stainless steel). The cabinet shall be provided with condensate heaters. Spare fuses of each type that is used in the electrical/control system shall be furnished.
- b. A main circuit breaker shall be installed to disconnect power to the entire station.
- c. Three phase power will be provided for all motors exceeding 5 HP. Phase converters will not be allowed.
- d. Protection against voltage surge and loss of a phase shall be provided.

- e. The factory-wired panel shall be equipped with a ground bus and neutral bus. Terminal shall be suitable for either aluminum or copper wire. All internal panel wiring shall be copper.
- f. Motors shall be suitable for either 230 volt or 460 volt operation. Design engineer shall consult with the local electric utility department to verify specifics pertaining to electrical power availability.
- g. Wet well level shall be controlled by four sealed mercury tube float switches. All floats shall be provided with 25' of Type SJO flexible cord and shall be attached to a bracket mounted at the top of the wet well. Float functions shall be as follows:
 - Float no. 1 Low Level (Pumps Off)
 - Float no. 2 High Level (Lead Pump On)
 - Float no. 3 Extra High Level (Lag Pump On)
 - Float no. 4 Surge Level (Alarm Activated)
- h. The pump control system shall include the following features:
 - i. Lead pump/lag pump alternator.
 - ii. Alarm light and horn to indicate high water level.
 - iii. Seal failure indicating light.
 - iv. Pump failure indicating light.
 - v. Condensate heater.
 - vi. Lead pump selector switch.
 - vii. H-O-A switch and run light for each pump.
 - viii. Control voltage shall be 120V.
 - ix. Wiring shall be neatly tied and number coded to facilitate maintenance. A schematic diagram shall be furnished with the panel.
 - x. A 120 V GFCI type electrical receptacle shall be located at the control panel.
 - xi. Pump stations will be equipped with a remote transmitting unit and telemetering circuitry connecting to the City's SCADA system. The design engineer should consult with the City for specific requirements at the beginning of design.

A red alarm light, for each emergency event, shall be located on the control panel. The light shall be 7/8" diameter and have an engraved aluminum nameplate stating the emergency condition, e.g., "High Water", "Seal Failure, ect. The alarm light shall have

a bright glow during the emergency condition. The alarm light will go out when the emergency condition has been addressed and corrected.

An audible alarm horn shall be provided to indicate a high water emergency condition. The horn shall be energized by either the alarm float switch or the alarm test switch and operate in conjunction with the alarm light. The horn shall be weatherproof and be rated for 103dB at 10 feet.

10) Warranty

In accordance with the one year maintenance period detailed in Section 1.7, and regardless of the manufacturer's warranty terms, the Developer will be responsible for all repairs necessary within one year from the date the station is completed and approved by the City. The Developer will be required to furnish such assurances to the City as deemed appropriate by the City to ensure prompt action.

3.3 Materials

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

3.3.1 Sanitary Sewer Pipe

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

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

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

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

2) Polyvinyl Chloride (PVC) Sewer Pipe

- a. Pipe and Fittings: All PVC pipe and fittings through 15" shall meet the requirements as specified under ASTM D3034. PVC pipe 18" in diameter shall meet the requirements of ASTM F679. All pipe and fittings shall be suitable for use as a sanitary sewer conduit. Bell joints shall consist of an integral wall section with elastomeric gasket joint which provides a water tight seal. Standard laying lengths shall be 13.0 - 18.0 feet (\pm 1 inch). The pipe shall be capable of passing all test which are detailed in this specification. Minimum wall thickness for pipe through 15" in diameter shall be as specified under SDR 35 in ASTM D3034. Minimum wall thickness for 18" diameter pipe shall be as specified under T-1 in ASTM F679. PVC sewers with more than 12 feet of cover may require wall thicknesses greater than SDR 35 or T-1. PVC is not allowed for sewers greater than 18" in diameter or more than 14 feet of cover.

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

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

- b. Electric Conductive Wire: Where plastic pipe is installed, electric conductive wire shall be placed in the trench one foot above the pipe. The tracer wire shall be 12 gauge, coated copper wire suitable for this purpose. Foil tape will not be acceptable
- c. Pipe and Fittings Tests: All shipments of pipe and/or fittings shall be tested and certified to by an approved independent testing laboratory. Up to 0.5 percent of the number of pipe of each size furnished shall be tested, except that in no case shall less than two specimens be tested. The contractor shall be responsible for providing three (3) certified copies of the test results obtained by the testing laboratory under provisions for testing in the applicable test procedures listed below. Testing shall be done at the contractor's expense, and no pipe shall be installed until the test results are approved by the City.
- d. Pipe Stiffness: Minimum "pipe stiffness" (F/Y) at 5 percent deflection shall be 46 psi for all sizes, when tested in accordance with ASTM Standard Method of Test D2412, to determine the "External Loading Properties of Plastic Pipe by Parallel Plate Loading". There shall be no evidence of splitting, cracking, or breaking at a deflection of up to 30 percent of the original diameter.

- e. Extrusion Quality: There shall be no evidence of flaking, swelling, of disintegration when the pipe material is tested in accordance with ASTM D2152, "Quality of Extruded Poly (Vinyl Chloride) Pipe and Molded Fittings by Acetone Immersion".
- f. Joint Tightness: Pipe and fitting joints shall comply with ASTM D3212 for "Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals". Joint assemblies shall not leak when subjected to both an internal and external hydrostatic test at equivalent pressures of 10.8 psi gauge for a period of one hour. Pipes shall be tested in straight alignment, axially deflected position, and by shear load test as otherwise defined in paragraphs 7.2, 7.3, and 7.4 of ASTM D3212.
- g. Impact Resistance: Pipe shall comply with impact resistance test conducted in accordance with ASTM D2444, "Test for Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)."
- h. Installation: PVC pipe will be installed in accordance with ASTM D2321 (Latest Revision). Class "B" bedding is the minimum bedding requirement for PVC pipe. In any area where the pipe is below existing ground water level or below the 100 year flood plain level, the contractor will embed PVC pipe in sand or graded gravel.
- i. Deflection Limit: Vertical deflection of installed pipe shall not exceed 5 percent of the undeflected diameter as defined in Table X1.1 of ASTM D3034.

3) Reinforced Concrete Pipe (R.C.P.)

- a. General: The use of reinforced concrete pipe for sanitary sewers will be subject to approval on a case-by-case basis depending upon size of the sanitary sewer and site conditions. When approved for use, concrete gravity sanitary sewer pipe shall meet all materials and testing requirements of ASTM C-76, ASTM C-443, and ASTM C-497 (except where modified herein).
- b. Quality Assurance: The Contractor must submit to the City the concrete pipe manufacturer's evidence of a working Quality Control Program for approval, prior to any pipe being manufactured. The program and standards of manufacturing must be established and well defined. The program must include the minimum following requirements:
 - i. A full time Quality Control Technician.
 - ii. A complete and working Quality Control Laboratory capable of testing and recording the requirements set forth in these Specifications for concrete pipe.

iii. A zero defect program for daily material testing and finished product testing to assure quality control as the pipe is being manufactured and shipped for this particular project.

c. Material:

- i. All concrete pipe and fittings 12 inches in diameter and larger shall be reinforced concrete sanitary sewer pipe conforming to the latest requirements of ASTM C-76 with the following modifications: All concrete pipe with 0-14 feet of fill shall be a minimum of Class III with 4500 psi concrete. All pipe with 14-24 feet of fill shall be Class IV with 4500 psi concrete. All pipe with 24 feet of fill and over shall be Class V with 5500 psi concrete.
- ii. Pipe shall have circumferential reinforcement as required for the particular class of pipe furnished. The bell and spigot of the joint shall contain circumferential and longitudinal reinforcement. Reinforced concrete pipe shall be centrifugally cast or vibrated, horizontally or vertically cast or made on a Packerhead machine and shall be furnished in lengths not more than 20 feet and not less than 8 feet, except where short lengths are required for construction conditions. Reinforced concrete pipe shall have bell and spigot joints suitable for the use of a rubber gasket to be provided as a part of this item.
- iii. Concrete pipe for sanitary sewers shall have bell and spigot joints consisting of self-centering steel joint rings securely attached to the pipe reinforcing steel. The steel joint rings shall be suitable for use with a rubber O-ring type gasket to be provided as part of this item.
- iv. Bell and spigot joints consisting of self-centering steel joint rings shall have the joint rings securely attached to the pipe reinforcing steel. The rings which form the joint shall be made so that they will join with a close, sliding fit. The joint surfaces shall be such that the rubber gasket shall be confined on all sides and shall not support the weight of the pipe.

The spigot ring shall have an external groove accurately sized to receive the gasket. Special section steel for spigot rings shall conform to ASTM A-283, Grade A, or ASTM A-306, Grade 50.

The bell ring shall be flared to permit gradual deformation of the shall be 3/16 inch. Bell rings 1/4 inch or thicker shall conform to ASTM A-283, Grade A, or ASTM A-306, Grade 50. Bells less than 1/4 inch thick shall conform to ASTM A-570, Grade A.

Each ring shall be precisely sized by expansion beyond the elastic limit of the steel and then gauged on an accurate template. All exposed surfaces of both rings shall be protected by a corrosion-resistant coating of zinc applied by an approved metalizing process after proper cleaning.

- v. Lining: The pipe interior shall be Polybond, Polyline, polyurethane

or Protection 401 ceramic epoxy lined with a minimum thickness of 40 mm.

4) Steel Pipe

Steel pipe shall meet the requirements of ASTM A-139, Grade B, and shall have a wall thickness of 0.500". Both the inside and the outside of the pipe shall have two coats, 5 mm DFT per coat, of Epoxy-Polyamide Coating (TNENEC Series 66 Epoxy-Line, or Mobil 78 Series, or approved equal). Pipe shall be sand-blasted to near-white metal (SSPC-SP10) prior to coating.

Flanges shall be steel welding neck style, ring joint type (with recessed groove and special ring gaskets), with Class 300 rating conforming to ANSI B16.5 / ASTM A105. Bolts, nuts and washers shall be A304 stainless steel.

3.3.2 Casing Pipe

Steel casing pipe shall be schedule 40 thickness with a minimum yield strength of 35,000 psi and shall conform to the requirements of ASTM A139. It shall be fully coated on the exterior and interior with a coal tar epoxy coating. The casing pipe diameter shall be six to eight inches greater than the "bell" diameter of the carrier pipe.

Wherever steel casing is required, the carrier pipe shall be ductile iron pipe with push-on joints. Approved spacers shall be used to secure the pipe on grade during grouting operations. A manhole shall be placed at each end of the cased section at a distance of 5 to 10 feet beyond the end of the casing. Ductile iron pipe shall be continuous from manhole to manhole.

3.3.3 Wyes and Bends

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

3.3.4 Manholes

1) Precast Manholes

Precast manholes shall be constructed of Portland Cement concrete with a compressive strength of not less than 4,000 pounds per square inch at an age of 28 days. The minimum inside diameter of the manhole shall be as required by Standard Detail. The wall thickness shall not be less than 5 inches. Manholes over 12' deep shall be placed on a reinforced slab as shown on the detail sheets. Joints in the wall shall be tongue and groove type; Sections shall be joined using O-ring rubber gaskets, flexible plastic gaskets conforming to the applicable provisions of ASTM Standard Specification, Serial Designation C443, or an approved bitumastic joint material. Precast concrete manholes shall consist of precast reinforced concrete sections with eccentric, (or flat slab for shallow manholes) top section and a base section conforming with the typical manhole details as shown on the Standard Detail. Flat top manholes will be approved only if a need for such can be demonstrated by the design professional.

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

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

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

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

2) Manhole Steps

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

3) Manhole Cover and Frame

Manhole covers shall be cast iron with a coat of asphaltic paint applied at the foundry. The frame and cover shall be as shown on the detail drawings. All covers shall have "Sewer" printed on them. Manhole frame and covers shall be as manufactured by Neenah R-1765 (365 lbs.) in paved roads, parking lots and driveways, and Neenah R-1779 (300 lbs.) for non-traffic areas, or approved equal. Manhole frames shall be cast in the cone if located in non-traffic areas. Once in place, manhole frames shall be

temporarily fixed to the manhole, with at least two bolts, during all subsequent phases of construction.

4) Waterproof Manhole Frame and Cover

Waterproof manhole covers shall be cast iron with a coat of asphaltic paint applied at the foundry as shown on the drawings with a "bolted-down" lid. All covers shall have "Sewer" printed on them. Manhole frame and covers shall be as manufactured by Neenah Foundry Company R-1915-F2 (435 lbs.) or approved equal. Manhole frames shall be cast in the cone if located in non-traffic areas.

5) Manhole Foundation

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

6) Brick

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

3.3.5 Concrete and Mortar

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

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

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

3.3.6 Reinforcing Steel

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

3.3.7 Brick

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

3.3.8 Subgrade Stabilizer Stone

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

3.3.9 Polyethylene Tubing For Ductile Iron Pipe

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

3.3.10 Casing Spacers

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

3.3.11 Concrete for Thrust Blocks and Thrust Collars

Concrete for thrust blocks and thrust collars shall have a minimum compressive strength of 3000 PSI at 28 days.

3.3.12 Gaskets for Joint Restraint Inside Casings

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

3.4 Excavation and Construction

3.4.1 General

- 1) It shall be expressly understood that these specifications are for installation of all sanitary sewer mains and appurtenances.

- 2) All work shall conform to the applicable provisions of specifications prepared by the AWWA, ANSI and ASTM of latest revision except as otherwise specified herein.
- 3) Compliance with applicable safety regulations is the responsibility of each company engaged in the work. The City assumes no responsibility for the actions of others on the job site. It is the responsibility of those installing sanitary sewer lines and appurtenances to conform to OSHA regulations. The Developer shall pay particular attention to Safety & Health Regulations Part 1926, subpart P "Excavations, Trenching & Shoring" as described in OSHA publication 2226.

3.4.2 Trench and Manhole Excavation

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

Trenches shall have a minimum width of twelve (12) inches plus the diameter of the outside of the bell of the sewer main and the maximum trench width at the centerline of the pipe shall not be more than the nominal diameter of the pipe plus two feet. In unpaved areas, the trenches may have a greater width than this, beginning at one foot above the top of the pipe and extending to the ground surface, if such width is necessary or desirable. However, in paved areas, the width of the trench from top to bottom shall not exceed the nominal diameter of the pipe plus two feet.

In cases where water mains cross above sanitary sewers, there shall be a minimum clearance of 18 inches vertical separation between the water and sewer mains. In cases where a sanitary sewer crosses above a water main, there shall be a minimum clearance of 18 inches vertical separation between the mains, plus the sanitary sewer main shall be encased in concrete. Both mains shall be D.I.P. At crossings, one full length of sewer pipe must be located so that both joints are as far from the water main as possible. In cases where sanitary sewer mains parallel water mains, there shall be a minimum of ten (10) feet horizontal separation maintained between the mains. These distances are measured edge to edge.

No excavation shall be made under highways, streets, alleys or private property until satisfactory arrangements have been made with the State, City, County or owners of the property to be crossed. All excavated material shall be placed so as to not interfere with public travel on the streets and highways along which the lines are laid. Not more than 100 feet of trench shall be opened on any line in advance of pipe laying.

When possible, all crossings of paved highways or driveways by pipe line shall be made by boring or jacking the pipe under the pavement and shall be done in such manner as not to damage the pavement or foundation, unless the casing or pipe is in

solid rock, in which case the crossing shall be made by the open cut method or by tunneling.

Wherever streets, roads, or driveways are cut, they shall be immediately backfilled and compacted after the pipe is laid and shall be maintained in first-class condition as passable at all times until repaved.

Backfilling, compaction, dressing and clean-up shall be kept as close to the line laying crew as is practical, and negligence in this feature of the work will not be tolerated.

In excavation and backfilling and laying pipe, care must be taken not to remove or injure any water, sewer, gas or other pipes, conduits or other structures without an order from the Designer. When an obstruction is encountered, the Contractor shall notify the Designer who will have the Owners of the obstruction adjust same or make necessary changes in grade and/or alignment to avoid such obstruction. Any house connection, drains or other structures damaged by the Contractor shall be repaired or replaced immediately.

All excavation shall be placed on one side of the trench, unless permission is given by the City to place it on both sides. Excavation materials shall be so placed as not to endanger the work and so that free access may be had at all times to all parts of the trench and to all fire hydrants or water valve boxes, etc. All shade trees, shrubs, etc., shall be protected.

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

The Contractor shall furnish, install and maintain such sheathing, bracing, etc., as may be required to support the sides of the excavation and to prevent any movement that might injure the pipe, or cause sloughing of the street or trench, or otherwise injure or delay the work or interfere with adjoining structures. Construction occurring around active sanitary sewerage systems shall be done in such a way so as to prevent the spillage of sewage; bypassing of raw wastewater onto the ground or into a receiving stream is prohibited.

- 2) All materials shall be considered as rock which cannot be excavated except by drilling, blasting or wedging. It shall consist of undecomposed stone in solid layers or of boulders of not less than one-half cubic yard. Wherever rock is encountered in the excavation, it shall be removed by suitable means. If blasting is used for removal of rock, the contractor shall take all proper safety precautions. He shall comply with all rules and regulations for the protection of life and property that may be imposed by any public body having jurisdiction relative to the handling, storing and use of explosives. He is fully responsible for filing for and acquiring any blasting permits which may be required by those agencies with such jurisdiction. Before blasting, the Contractor shall cover the excavation with heavy timbers and mats in such a manner as to prevent damage to persons or the adjacent property. Rock excavation near existing pipelines or other structures shall be conducted with

the utmost care to avoid damage. The Contractor shall be wholly responsible for any damage resulting from blasting, and any injury or damage to structures or property shall be promptly repaired by the Contractor to the satisfaction of the City and property owner.

- 3) Rock in trenches shall be excavated over the horizontal limits of excavation and to depths as follows:

Size of Pipeline Depth of Excavation Below (inches)	Bottom of Pipe, (inches)
4 to 6	6
8 to 18	8
18 to 30	10
Over 30	12

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

In rock excavation, the backfill from the bottom of the trench to one foot above the top of the pipe shall be finely pulverized soil, free from rocks and stones. The rest of the backfill shall not contain over 75% broken stone, and the maximum sized stone placed in the trench shall not weigh over 50 pounds. Excess rock and fragments of rock weighing more than 50 pounds shall be loaded and hauled to disposal. If it is necessary, in order to comply with these specifications, selected backfill shall be borrowed and hauled to the trenches in rock excavation.

Sides of the trench shall be trimmed of projecting rock that will interfere with backfilling operations. Rock excavation by blasting shall be at least 75 feet in advance of pipe laying.

3.4.3 Bracing and Sheeting

When required by regulations or to prevent damage to adjoining structures, roadways, pavements, utilities, trees, or private property which are specifically required to remain, provide bracing and sheeting.

1. Timber: Timber for shoring, sheeting, or bracing shall be sound and free of large or loose knots and in good condition. Size and spacing shall be in accordance with OSHA regulations. Remove bracing and sheeting in units when backfill reaches the point necessary to protect the pipe and adjacent property. Leave sheeting in place when in the opinion of the City it cannot be safely removed. Cut off sheeting left in place at least 2 feet below the surface.

2. **Steel Sheet Piling:** Continuous lockjoint steel sheet piling may be substituted for timber sheeting when approved by the City. Steel piling may be removed, without cutting, provided the rate of removal keeps pace with the tamping and backfilling operations to assure complete filling of the void created by the withdrawal of the piling. Complete withdrawal of the piling in advance of the tamping and backfilling will not be permitted. Piling, where ordered to be left in place by the City for reasons of safety, will be cut off where directed.
3. **Trench Shield:** A trench shield or box may be used to support the trench walls. The use of a trench shield does not necessarily preclude the additional use of bracing and sheeting. When trench shields are used, care must be taken to avoid disturbing the alignment and grade of the pipe or disrupting the bedding of the pipe as the shield is moved. When the bottom of the trench shield extends below the top of the pipe, the trench shield will be raised in 6-inch increments with specified backfilling occurring simultaneously. At no time shall the trench shield be "dragged" with the bottom of the shield extending below the top of the pipe.

3.4.4 Installation of Sanitary Sewer

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

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

All pipe and specials shall be of the dimensions and laid to the line and grade as shown on the plans and as established by the design professional and as approved by the City. Wyes and/or service connections and stubs from manholes shall be placed where shown on plans and as approved by the City. All such connections shall be blanked off with suitable stopper and made watertight with jute and cement mortar.

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

Sanitary sewer pipes shall be joined by "push-on" joints using elastomeric gaskets to affect the pressure seal. The ends of pipe to be joined and the gaskets shall be cleaned

immediately before assembly, and the assembly shall be made as recommended by the pipe manufacturer. Lubricant used must be non-toxic and supplied or approved for use by the pipe manufacturer. Sanitary sewer pipes shall be laid in the uphill direction with the bells pointing upgrade. Any variation from this procedure shall require approval from the City.

Bell holes shall be provided of sufficient size to allow ample room for making the pipe joints without putting any load on the bell of the pipe. The bottom of the trench between bell holes shall be carefully graded so that the pipe barrel will rest on a solid foundation for its entire length as shown on the plans. Pipe shall be laid with joints close and even, butting all around, so that it will form a close concentric joint with adjoining pipe with no sagging at the hub and so that a true surface is given to the invert throughout the entire length of the sewers. After the pipe is laid, backfilling shall be completed as directed in Section 3.4.7.

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

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

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

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

3.4.5 Making of Joints

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

3.4.6 Subgrade and Pipe Bedding

All D.I.P. or R.C.P. pipe shall have a minimum of Class "C" bedding. All PVC pipe shall have a minimum bedding of Class "B" as described below and shown in Section 4.0 Standard Details. Wherever water or wet soil is encountered, Class "B" bedding shall be provided for D.I.P. or R.C.P. If specifically designated on the plans, Class "A" or "B" bedding may be required.

A description of Class "A", "B", and "C" bedding is as follows:

1) Class "A" Bedding

Class "A" bedding refers to bedding with concrete cradle, arch or encasement. The Contractor shall conform to details shown in the detailed drawings when Class "A" bedding is required.

2) Class "B" Bedding

The pipe shall be bedded in crushed granite material, conforming to Section 3.3.7, "Subgrade Stabilizer Stone", or other suitable materials approved by the City. The bedding shall be placed on a flat trench bottom, with a minimum thickness as indicated on the detail, and sliced under the haunches of the pipe with a shovel or other suitable tool to a height of one-half the outside pipe diameter, or to the horizontal centerline. The initial backfill shall be hand placed to a level of 18" over the top of the pipe and shall consist of finely divided materials free from debris, organic material, and large rocks or stones.

3) Class "C" Bedding

The pipe shall be bedded in subgrade stabilizer stone placed on a flat trench bottom. The bedding material shall have a minimum thickness beneath the pipe of 8" for pipes with I.D.s less than or equal to 21" and 12" for pipes with I.D.s greater than or equal to 24". The bedding material shall be sliced under the haunches of the pipe with a shovel or other suitable tool to a height of one-quarter of the outside diameter of the pipe. The initial backfill shall be hand placed to a level of 18" over the top of the pipe and shall consist of finely divided materials free from debris, organic material, and large rocks or stones. Bedding materials shall be as described in Section 3.3.7.

3.4.7 Dewatering Trenches

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

3.4.8 Backfilling

- 1) After the pipe has been laid, backfilling shall be done in two (2) distinct operations. In general, all backfill beneath, around and to a depth of twelve (12") inches above

the top of the pipe shall be placed by hand in four (4") inch layers for the full width of the trench and thoroughly compacted by hand with vibratory equipment. The remainder of the backfill shall be placed in 6" layers and compacted to the top of the trench, either by pneumatic hand tamps, hydro-tamps, or other approved methods. Care shall be taken so that the pipe is not laterally displaced during backfilling operations. The backfill lifts shall be placed by an approved method in accordance with that hereinafter specified. Backfill materials shall be the excavated materials without bricks, stone, foreign matter or corrosive materials, where not otherwise specified or indicated on the plans.

- 2) Backfill under permanent concrete or bituminous pavement and as elsewhere specified or indicated on the plans shall be approved bank-run sand or gravel or crushed stone free from large stones and containing not more than ten percent (10%) by weight of loam or clay. This backfill shall be compacted to one hundred percent (100%) as determined by the Modified Proctor Test (ASTM D 1557) for the top two (2) feet of trench and ninety-five percent (95%) by the Modified Proctor test from pipe bedding to two (2) feet below trench top. Mechanical vibrating equipment shall be used to achieve the required compaction. Pavement shall be replaced immediately after the backfilling is completed.
- 3) Backfill under gravel or crushed stone surfaced roadways shall be the approved suitable excavated material placed in six (6) inch layers thoroughly compacted for the full depth and width of the trench, conforming to the compaction, density compaction method and materials as specified in "2" above.
- 4) Backfill in unpaved areas shall be compacted with mechanical vibrating equipment to ninety percent (90%) as determined by the Modified Proctor Test. Backfill material from pipe bedding to ground surface by shall be excavated earth free from large stones and other debris.
- 5) Contractor shall fully restore and replace all pavement, sidewalks, landscapes, surface structures, etc., removed or disturbed as part of the work to a condition equal to or better than before the work began to the satisfaction of the City.
- 6) Where sheeting is used in connection with the work, it is in no case to be withdrawn before the trench is sufficiently filled to prevent damage to banks, road surfaces, adjacent pipes, adjacent structures or adjacent property, public or private.

3.4.9 Stream Crossings

The preferred method of crossing a river, stream, creek, impoundments, or wet weather ditch is with a minimum of two feet of cover between the lowest point in the stream and the top of outside diameter of the pipe. Ductile iron pipe is required for all stream crossings and shall extend a minimum of ten feet (10') beyond the top of bank on each side. Concrete collars or encasement must be provided at all joints for ductile iron pipe with less than three feet (3') of cover.

The stream bed and banks at the crossing site shall be protected from erosion with the use of rip-rap, as defined and sized in the **Manual For Erosion and Sediment Control In Georgia**, Appendix C - Construction Materials, 1992 or most current edition.

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

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

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

- a. Silt fencing, types A, B, and/or C
- b. Erosion control checkdams
- c. Channel diversion through temporary storm drain pipe.
- d. Rock filter dams

The construction and installation of these various structures are detailed in the **Manual For Erosion And Sedimentation Control In Georgia** or the Georgia Department of Transportation Standards and Construction Details, both of which are available for purchase by the Contractor.

3.4.10 Casing for Sanitary Sewers

Where pipe is required to be installed under railroads, highways, streets or other facilities by jacking or boring methods, construction shall be done in a manner that will not interfere with the operation of the utility, and shall not weaken the roadbed or structure.

Casing pipe shall be installed at the locations shown on the plans. Unless directed otherwise, the installation procedure shall be the dry bore method. The hole is to be mechanically bored and cased through the soil by a cutting head on a continuous auger mounted inside the casing pipe. The installation of the casing and boring of the hole shall be done simultaneously by jacking. The diameter of the bore shall conform to the outside diameter and circumference of the casing pipe as closely as practicable. Any voids which develop during the installation operation shall be pressure grouted. Each segment of the casing pipe shall be welded (full circumference butt weld) to the adjoining segment. The completed casing shall have no sags or crowns which cause the grade for any segment to be less than the minimum slope for the size pipe being installed.

Excavation material will be removed and placed at the top of the working pit. Backfill material and methods of backfilling and tamping shall be as required under Section 304.07. Carrier pipe shall be D.I.P. and shall be inserted within the casing by use of approved casing spacers. Inside of casings, the sewer main joints shall be slip joint restrained by using U.S. Pipe "Field-Lok" gaskets or approved equal.

The annular space between the carrier pipe and the casing shall be pressure grouted after the carrier pipe is sufficiently secured on grade to prevent floating during grouting. The carrier pipe should be filled with water prior to grouting to aid in the prevention of floating. At each end of the casing pipe, the void between the carrier pipe and casing shall be sealed with brick and mortar.

3.4.11 Sewer Service Laterals

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

6" services shall be laid at a minimum grade of 1%. Service laterals tied directly to manholes shall enter the manholes through cored holes and shall be provided with a pre-molded rubber boot as described in Section 3.3.4. Laterals shall enter the manhole

no higher than 6" above the table and shall be provided with a concrete flume to slope the flow into the manhole invert.

The developer shall be responsible for serving all lots developed. On any lot where the service cannot be found, the developer shall be responsible for payment of the cost of installation of another service lateral. Also, unless noted on the final plat, the service shall be low enough to serve the first floor elevation at the building line.

The builder shall be responsible for the location of the services prior to the pouring of the foundation, driveway or other appurtenance. The City will not be responsible for any house built too low to be served nor for any service covered by construction.

No plumber or contractor will be allowed to connect to the sewerage system except to the end of the service provided for this connection, when proper permit is issued. After the service is run from the end of the lateral provided by the sewer line contractor to the house plumbing, the cleanout at the right-of-way may be cut down to a level six inches below the finished grade. The cleanout shall be provided with a cast iron ferrule with a brass screw plug to enable the cleanout to be located with a metal detector. Plastic plugs are not allowed.

3.4.12 Setting Fittings on Force Mains

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

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

3.4.13 Bracing, Sheeting, and/or Shoring

Whenever the condition of the ground is such that it is necessary to protect the work, the street, the roadway or the workmen, the sides of the trench shall be supported with suitable bracing, sheeting and/or shoring to be furnished by the Contractor at his own expense. All construction shall comply with the Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1926, Subpart P, latest revision.

3.4.14 Location and Protection of Existing Underground Utilities

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

3.4.15 Connection to the Existing City Sanitary Sewer System

- 1) The developer's private contractor shall make all required connections to the City's sewer system. The City's Inspector will supervise the connection and all associated work. The contractor shall give the City a minimum of 48 hours notice prior to any sewer system work.
- 2) The Contractor will provide proper traffic control devices and certified personnel to direct traffic if required.
- 3) All connections to existing manholes shall be properly cored with a coring machine; "Knocking-out" of a hole in the manhole for a connection is not permitted.
- 4) The timing of the Developer's connection to the City's system shall be pre-arranged with the City.

3.4.16 Street Cuts

- 1) All paved roads will be bored and cased. A bore must be attempted before consideration will be given to cutting the street.
- 2) Existing roadways shall not be open cut unless permission is granted by the Georgia D.O.T., the City Street Department, or the Newton County Road Department (NCRD). Submittal of an authorization letter from the D.O.T. or the NCRD is required.
- 3) One lane of traffic shall be maintained open at all times. Construction work shall be limited to time between 9 A.M. and 4 P.M.
- 4) The Contractor shall furnish traffic control devices and certified personnel to direct traffic, if required.
- 5) The above requirements may be altered with the written approval of the City in extenuating circumstances.
- 6) Assuming that a road bore has been attempted and failed, and that the Developer has received permission to open cut a road, pavement replacement shall adhere to the following guidelines:
 - a. Removing and replacing pavement shall consist of removing the type of pavement and base encountered, and replacing same to its original shape, appearance and riding quality, in accordance with the detailed plans. Where

possible, all pipe under existing paved driveways will be either free bored or installed in casing. Free bores under driveways will be made with D.I.P. Casing will be required where the installation is under any roadway. Carrier pipe shall be D.I.P.

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

3.4.17 Standard Detailed Drawings

Installation of sewer mains, service laterals, manholes, casings, cleanouts, etc. shall be made in accordance with Section 4.0 Standard Detailed Drawings.

3.4.18 Clean-Up

- 1) The Contractor shall remove all unused material, excess rock and earth, and all other debris from the construction site as closely behind the work as practical. All trenches shall be backfilled and tamped before the end of each days work.
- 2) Prior to requesting the final inspection, the Contractor shall do the following:
 - a. Remove and dispose of in an acceptable manner all shipping timbers, shipping bands, excess materials, broken material, crates, boxes and any other material brought to the job site.
 - b. Repair or replace any work damaged by the sewer line construction.
 - c. Regrade and smooth all shoulder areas disturbed by the sewer line construction.
 - d. All easement areas shall be cleared of trees, stumps and other debris and left in a condition such that the easement can be maintained by bush-hog equipment.

- e. All shoulders, ditches, culverts, and other areas impacted by the sanitary sewer construction shall be at the proper grades and smooth in appearance.
- f. All manhole covers shall be brought to grade.
- g. A uniform stand of grass or mulch for erosion protection, as defined in the Manual For Erosion and Sediment Control In Georgia, is required over all construction easements and sanitary sewer easements prior to the City's acceptance of the sanitary sewer.

3.4.19 Barricades

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

3.4.20 Grassing

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

Immediately after the initial watering of seeded areas, the contractor shall apply a mat of hay or rye, wheat or oat straw over the area at a uniform rate of not less than 1-1/2 ton of mat to the acre. The minimum depth of the straw shall be 2 inches and the maximum depth 3 inches. After placing mat or hay or straw, emulsified asphalt shall be sprayed over the mat at a uniform rate of 0.15 gallon per square yard. After the grass has shown a satisfactory growth (98% of the total area has no bare spots exceeding one square foot and ground surface is fully stabilized against erosion), nitrate of soda shall be applied at a uniform rate of 100 pounds per acre, followed by sufficient water to dissolve the fertilizer.

The Contractor shall do all maintenance work necessary to keep all planted areas in satisfactory condition until the work is finally accepted. This shall include mowing, repairing washes that occur, reseeding, and water as required to produce a healthy and growing stand of grass. Mowing will be required to remove tall and obnoxious weeds before they go to seed.

It is the intent of these specifications to produce a stand of grass that is alive and growing, without any bare spots larger than one square foot. The Contractor shall

repeat all work, including plowing, fertilizing, watering, and seeding as necessary to produce a satisfactory stand.

3.5 Inspection and Tests

3.5.1 General

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

3.5.2 Concealed Work

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

3.5.3 Minimum Tests

All new gravity sewer lines constructed will be tested for infiltration, exfiltration, and deflection. All sewer lines will be televised and may be subjected to the Mandrel Test and before final acceptance. Flexible pipe sewers (PVC) shall be subjected to the Mandrel Test. Force mains will be subjected to a pressure / leakage test. Slopes of sewer mains that are close to minimum grade will be checked to ensure cleansing velocity. The City may require manholes to be subjected to a vacuum test to check potential infiltration. The backfill in the trench above the pipeline will be subjected to compaction tests as detailed below. Any defects located during testing must be corrected before construction of the project may be proceed. All costs associated with testing will be paid by the Developer. Tests will be performed as follows:

1) Measurement of Infiltration

The contractor shall furnish an adequate number of plugs of the proper size and acceptable weirs to measure infiltration into the system. Measurements of flow shall be performed on any lines with a visible flow of water.

In no case will an infiltration rate greater than 25 GPD per inch diameter per mile of pipe be allowed. Also, any visible or audible leak must be dug up and repaired. Any increase in flow between two adjacent manholes must be corrected.

2) Exfiltration Test (Low Air Pressure Test)

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

- a. Temporarily plug line segment between two manholes using plugs having air tight fittings through which low pressure air can be introduced into the pipe segment being tested.
- b. Introduce low pressure air into the test pipe segment until the internal air pressure reaches 4.5 psig above ground water pressure, if any.
- c. Wait at least two minutes for air temperature in the test segment to stabilize while internal air pressure remains no less than 3.5 psig above ground water pressure.
- d. Bleed internal air pressure to exactly 3.5 psig above ground water pressure.
- e. Accurately determine the elapsed time for internal pressure to drop to 2.5 psig above ground water pressure.
- f. The air test is acceptable if elapsed time is less than minimum specified time required for a 1.0 psig pressure drop for size and length of pipe indicated for $q=0.0015$ cu. ft./min./sq.ft of internal pipe surface no less than shown by the following:

Pipe Diameter (inches)	Minimum Time (min:sec)	Maximum Length Corresponding To Minimum Time (ft)	Time for Longer Length (sec)
4	3:46	597	0.380L
6	5:40	398	0.854L
8	7:34	298	1.520L
10	9:26	239	2.374L
12	11:20	199	3.418L
15	14:10	159	5.342L
18	17:00	133	7.692L
21	19:50	114	10.470L
24	22:40	99	13.674L

Air leakage time is based on pipe being damp. If pipe and joints are dry, dampen line if helpful in meeting air test time requirement.

Permanently correct excessive leakage determined by air testing, and repeat operations until the inspector witnesses a successful test on each line segment.

NOTE: Upon request, the City may allow substitution of a water exfiltration test in lieu of the low air pressure test. If used, the exfiltration test will be

conducted with a minimum water head of two feet above the groundwater table and the allowable exfiltration will be limited to 25 GPD per inch diameter per mile of pipe.

3) Deflection Test

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

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

4) Mandrel Test for Flexible Pipe (PVC)

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

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

5) T. V. Inspection

In the event that the inspector cannot see through the line properly or conditions cause him to suspect that the line may be settled or broken or that the joints may not be made properly, he may direct that a T.V. camera be passed through the line. A video tape of the inspection will be made. Any discrepancies noted such as sagged pipes, broken pipes, bad joints, etc., will be dug up and will be corrected. Internal grouting to repair new lines will not be allowed. After correction of the discrepancies, the line will be reinspected.

6) Force Main Pressure Testing

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

The Developer will furnish the necessary water for testing the force main. The force main must be flushed and tested to the design working pressure of the pipe for two (2) hours. If a leak is discovered, it should be repaired and retested. This should continue until there are no pressure drops.

7) Cleansing Velocity / Slope Test

In areas where the design call for minimum grade, or the Inspector suspects a line has been installed close to minimum grade, the Inspector shall work with the Contractor to survey the inverts to check the grade of the sewer mains. If the minimum grade required to provide cleansing velocity, the line shall be dug up and relaid at the proper grade.

8) Manhole Construction

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

9) Compaction Testing

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

The City may require additional compaction tests be conducted in any other areas where the City's inspector suspects the backfill has not been compacted in accordance with Section 3.4.7 of these specifications. If any of these tests show failing results,

then the failing backfill will be removed, re-compacted and re-tested, and one additional area will be tested as well.

Compaction tests shall be conducted by an independent laboratory at the Developer's expense.

3.5.4 Timing of Service Connections

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

3.6 Pre-Treatment Requirements for Industrial Wastewater

Some industrial and other developments may be required to pre-treat sewage prior to discharge into the City's collection system. Requirements for pre-treatment will be determined on a case by case basis.

3.7 Other Requirements

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

SECTION 4.0 – STANDARD DETAILS

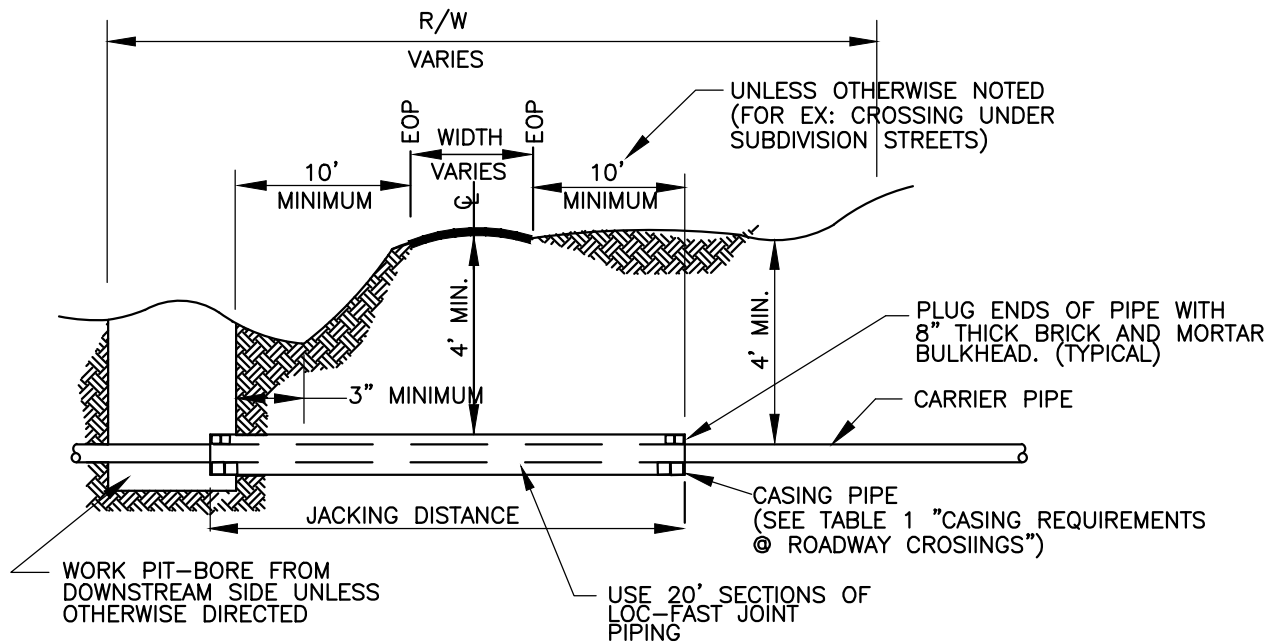


TABLE 1							
CASING REQUIREMENTS @ ROADWAY CROSSINGS							
CARRIER LINE	MATL.	O.D.	MAX. O.D. @ JOINTS	MIN. CASING SIZE	MATL.	I.D.	MAX. JT. O.D.
3/4"	CT	0.88"	N/A	1-1/4"	PVC	1.36"	2.00"±
1"	CT	1.13"	N/A	1-1/2"	PVC	1.59"	2.25"±
1-1/2"	CT	1.63"	**1.70"±	2"	PVC	2.05"	2.75"±
2"	CT	2.13"	**2.20"±	2-1/2"	PVC	2.24"	3.50"±
3"	DI	3.96"	6.08"	8"	STL	8.00"	8.63"
4"	DI	4.80"	7.00"	8"	STL	8.00"	8.63"
6"	DI	6.90"	9.13"	12"	STL	12.00"	12.75"
8"	DI	9.05"	11.50"	16"	STL	15.50"	16.00"
10"	DI	11.10"	13.63"	16"	STL	15.50"	16.00"
12"	DI	13.20"	15.75"	18"	STL	17.50"	18.00"

N/A : NOT APPLICABLE
 ** : SOLDER COUPLING

CT: COPPER TUBING
 DI: DUCTILE IRON
 STL: STEEL

CITY OF COVINGTON

WATER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

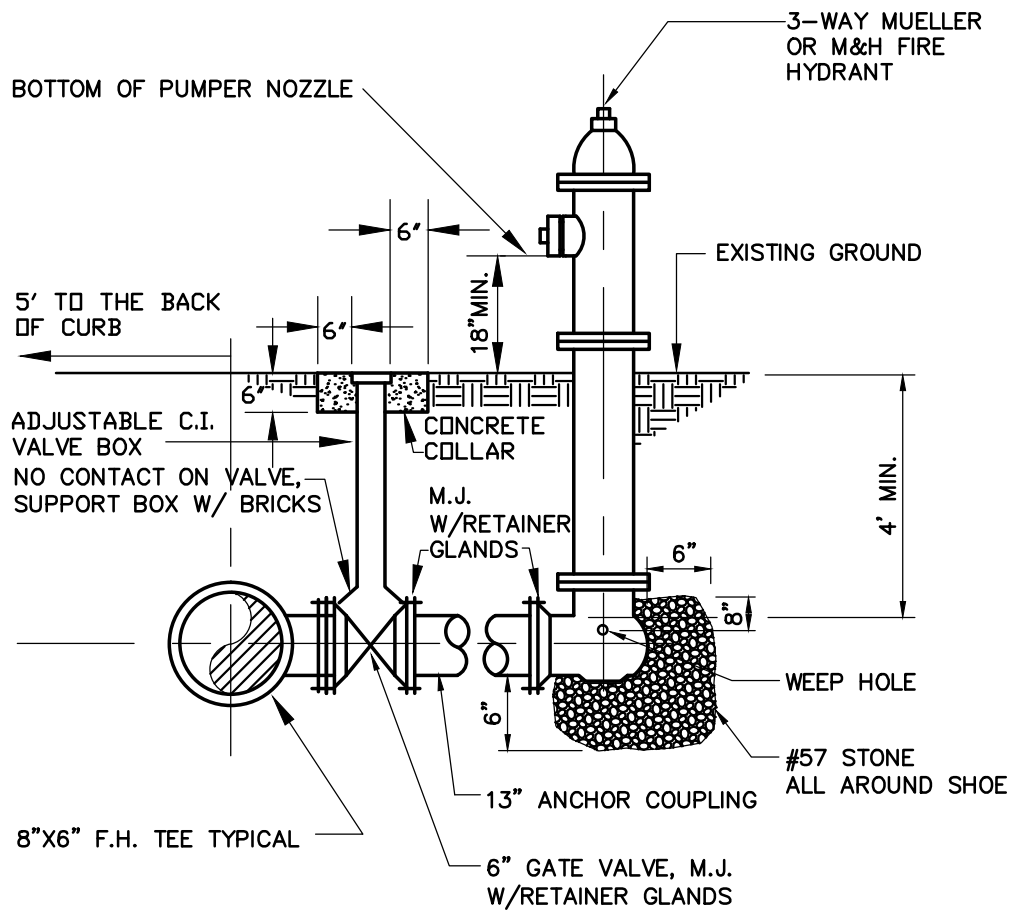
JACK & BORE CROSSING

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON

WATER SYSTEM DETAIL

FIRE HYDRANT
ASSEMBLY FOR
SUBDIVISIONS



City of Covington

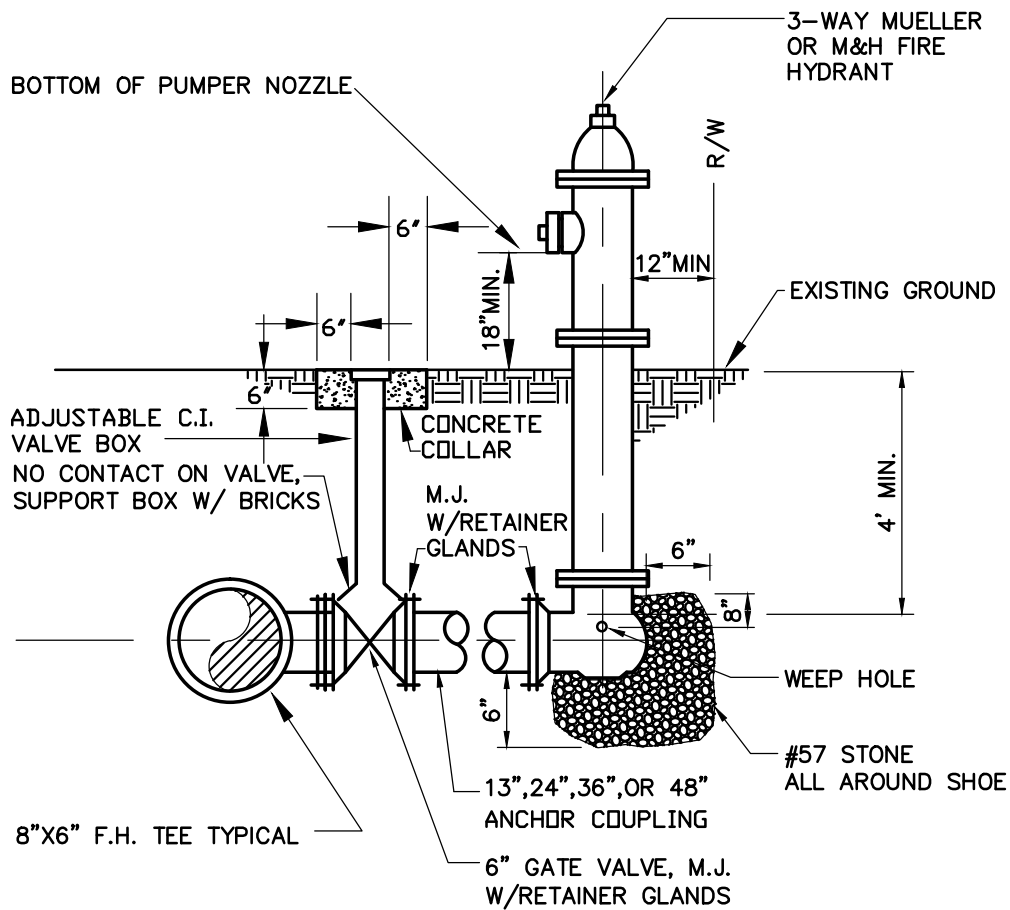
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



NOTES: FOR MAIN SIZES 16-INCH AND LARGER,
 6-INCH GV MAY BE CONNECTED TO MAIN
 BY TAPPING SADDLE AND ANCHOR
 COUPLING IN LIEU OF HYDRANT TEE

CITY OF COVINGTON

WATER SYSTEM DETAIL

FIRE HYDRANT
 ASSEMBLY FOR ROADS
 AND HIGHWAYS



City of Covington

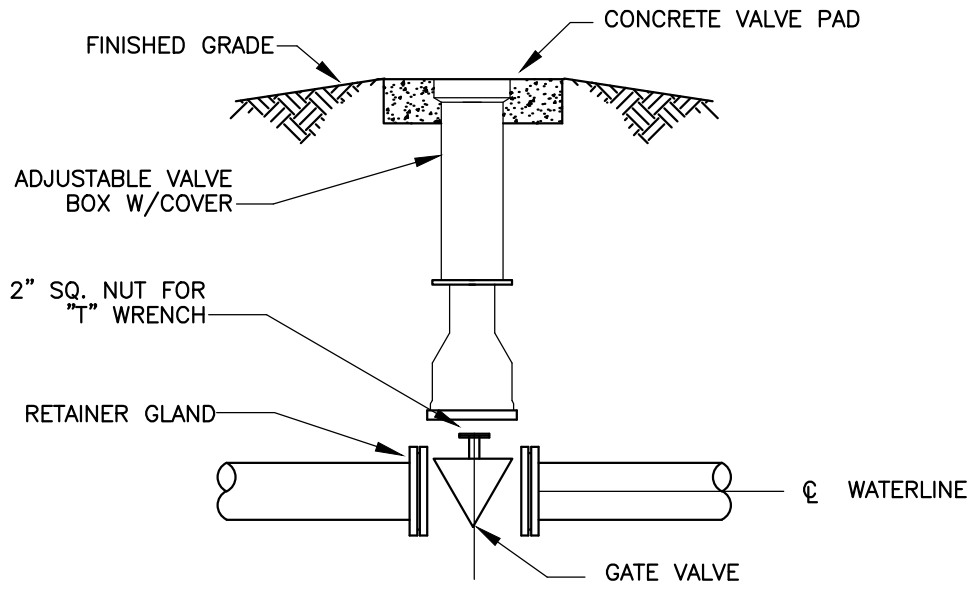
Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

DRAWN BY: EFT

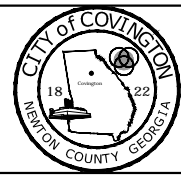
CHECKED BY:

DATE: 6/02

REVISED: 4/11



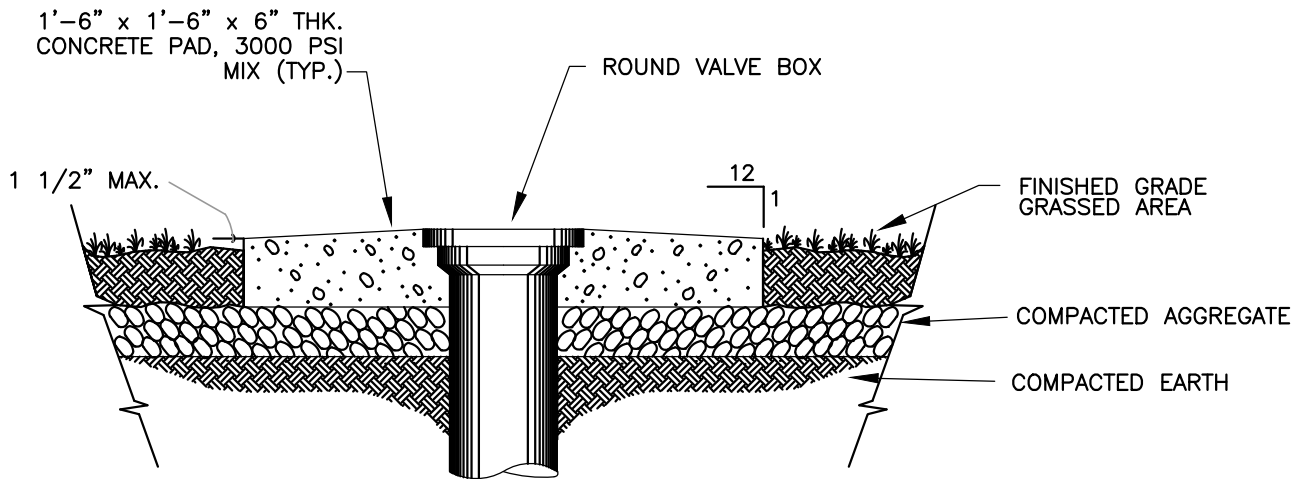
CITY OF COVINGTON
 WATER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

ISOLATION GATE
 VALVE

DRAWN BY: EFT
CHECKED BY:
DATE: 6/02
REVISED: 4/11



TYPICAL VALVE PAD

DETAIL 6
NTS 1 | 21

CITY OF COVINGTON
WATER SYSTEM DETAIL



City of Covington
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

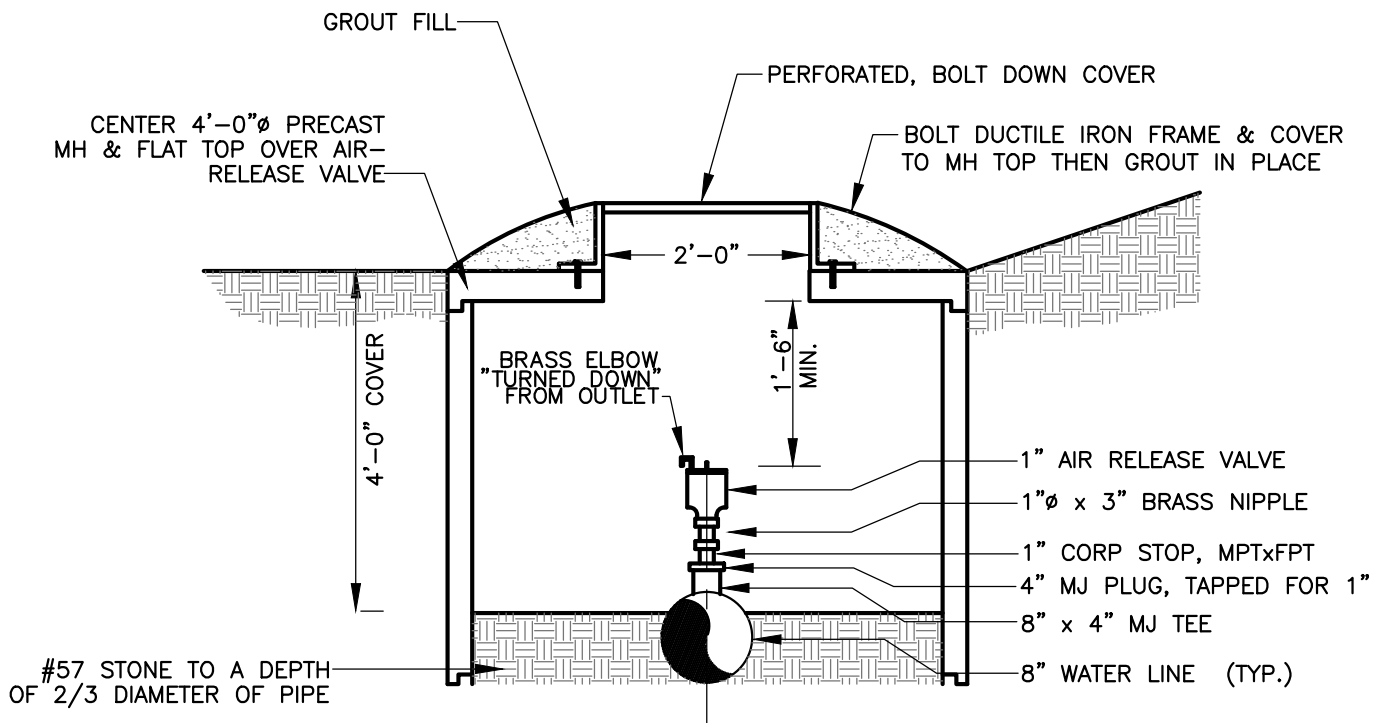
VALVE PAD

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON
WATER SYSTEM DETAIL



City of Covington
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

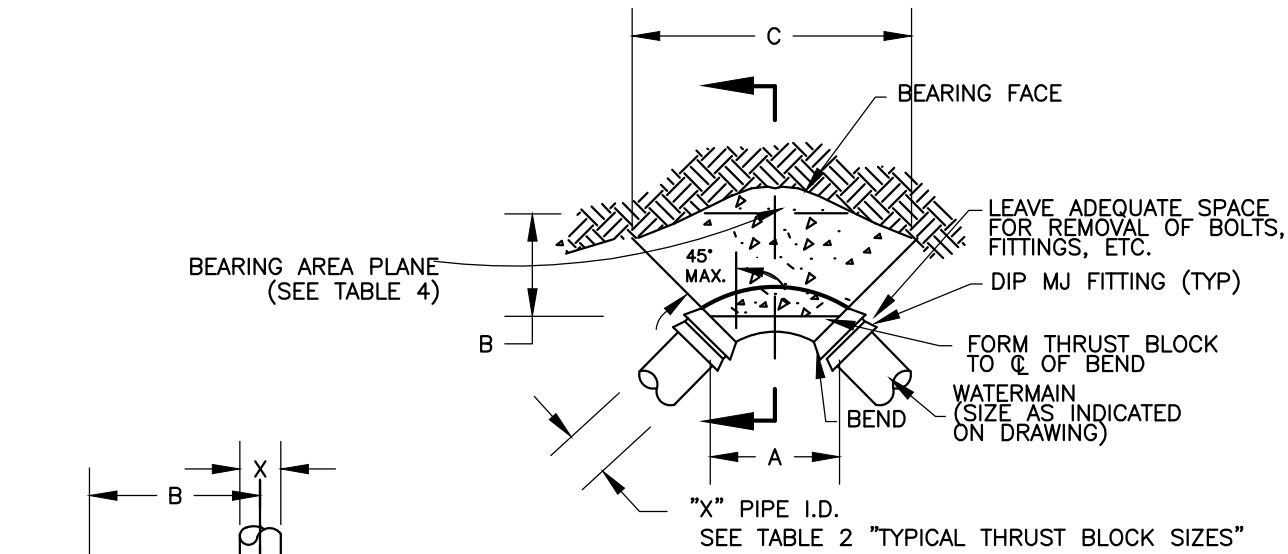
AIR RELEASE VALVE
ASSEMBLY

DRAWN BY: EFT

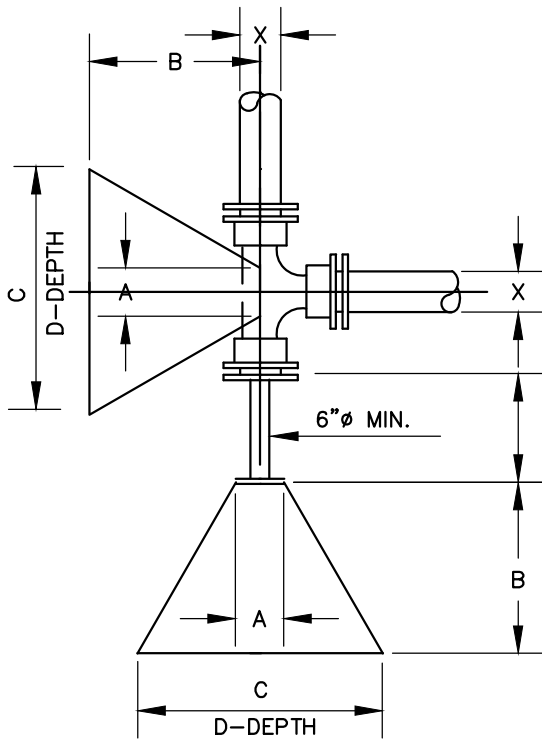
CHECKED BY:

DATE: 6/02

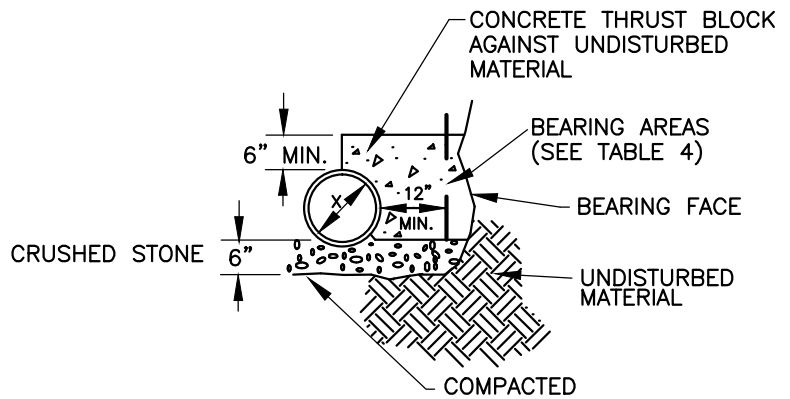
REVISED: 4/11



BEND PLAN



TEE PLAN



SECTION

NOTES:

1. ALL WATERMAIN BENDS SHALL BE BACKED UP WITH A CONCRETE THRUST BLOCK BETWEEN THE PIPE AND UNDISTURBED MATERIAL.
2. BEARING AREA REQUIRED ON VERTICAL PLANE 90° TO RADIUS PLANE PASSING THROUGH MIDPOINT OF BEND
3. FOR BEARING AREA REQUIREMENTS SEE TABLE 4 " BEARING AREAS (SF) AGAINST UNDISTURBED MATERIAL FOR WATERLINE FITTING."

CITY OF COVINGTON

WATER SYSTEM DETAIL

WATERLINE THRUST
BLOCK



City of Covington

Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11

TABLE 2						
TYPICAL BLOCK THRUST SIZES						
DEADEND & TEES	X	A	B	C	D	
	12"	1'-0"	3'-0"	3'-6"	3'-6"	
	10"	1'-0"	2'-6"	4'-9"	2'-6"	
	8"	0'-10"	2'-0"	4'-0"	2'-6"	
	6"	0'-8"	1'-6"	2'-9"	1'-9"	
BENDS	90°	12"	1'-0"	4'-0"	6'-9"	4'-3"
		10"	1'-0"	3'-0"	5'-9"	3'-6"
		8"	0'-10"	2'-6"	4'-9"	3'-0"
		6"	0'-8"	1'-6"	3'-6"	2'-9"
	45°	12"	1'-0"	2'-3"	5'-3"	3'-3"
		10"	1'-0"	2'-3"	4'-6"	2'-9"
		8"	0'-10"	1'-6"	3'-6"	2'-3"
		6"	0'-8"	1'-3"	2'-6"	1'-6"
	22-1/2°	12"	1'-0"	1'-6"	3'-6"	2'-3"
		10"	1'-0"	1'-3"	3'-0"	2'-0"
		8"	0'-10"	1'-0"	2'-6"	1'-6"
		6"	0'-8"	1'-0"	1'-9"	1'-3"
	11-1/4°	12"	1'-0"	1'-6"	2'-6"	1'-6"
		10"	1'-0"	1'-3"	2'-3"	1'-3"
		8"	0'-10"	1'-0"	1'-9"	1'-0"
		6"	0'-8"	1'-0"	1'-6"	0'-4"

NOTE: MECHANICAL JOINT FITTINGS 4" I.D. AND LESS SHALL BE RESTRAINED WITH RETAINER GLANDS
 X = DIAMETER OF PIPE TO BE BLOCKED 250 PSI TEST PRESSURE AND 2000 PSF SOIL BEARING

TABLE 3				
DIMENSIONS AND REINFORCING FOR GRAVITY THRUST BLOCK CONSTRUCTION				
FITTING (DIA. IN.)	W (MIN)	X (MIN)	MAIN REINF.	
			M-BARS EA SIDE	M-BARS TOTAL
6 TO 10	3'-0"	10"	2-#5	4-#5
12 TO 14	3'-6"	1'-4"	4-#5	8-#5
16	3'-6"	1'-6"	3-#6	6-#6

* TABLE APPLIES TO ONLY VERTICAL BENDS AT TOP.

CITY OF COVINGTON
 WATER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

THRUST BLOCK
 DIMENSIONS

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11

TABLE 4				
BEARING AREAS (SQ. FT.) AGAINST UNDISTURBED MATERIAL FOR WATER LINE FITTINGS				
SIZE OF MAIN (IN.)	90° BENDS	45° BENDS	22 1/2° BENDS	TEES & PLUGS
12 (2)	34	19	9.4	24
10 (2)	25	13	7	18
8 (2)	16	9	5	12
6 (2)	10	5	3	7

NOTES:

1. FOR FITTINGS WITH LESS THAN 22 1/2° DEFLECTION USED BEARING AREAS FOR 22 1/2° BEND.
2. BEARING AREAS ARE BASED ON A HYDRSTATIC TEST PRESSURE OF 200 PSIG. JOINTS SHALL NOT BE ENCASED IN CONCRETE.
3. CONTRACTOR SHALL SUBMIT WORKING DRAWINGS FOR EACH THRUST BLOCK FOR APPROVAL TWO WEEKS PRIOR TO INSTALLATION.
4. THESE BEARING AREAS APPLY TO VERTICAL FITTINGS AT BOTTOM OR HORIZONTAL FITTINGS.
5. THRUST BLOCK AT TEES ARE SIZED BASED ON THE SIZE OF THE BRANCH.
6. TYPE OF SOIL IS LOOSE GRANULAR, 9 OR MORE BLOWS/FOOT. SOIL CONDITIONS OTHER THAN THOSE GIVEN WILL REQUIRE LARGER BEARING AREAS.

CITY OF COVINGTON

WATER SYSTEM DETAIL

THRUST BLOCK
BEARING AREAS



City of Covington

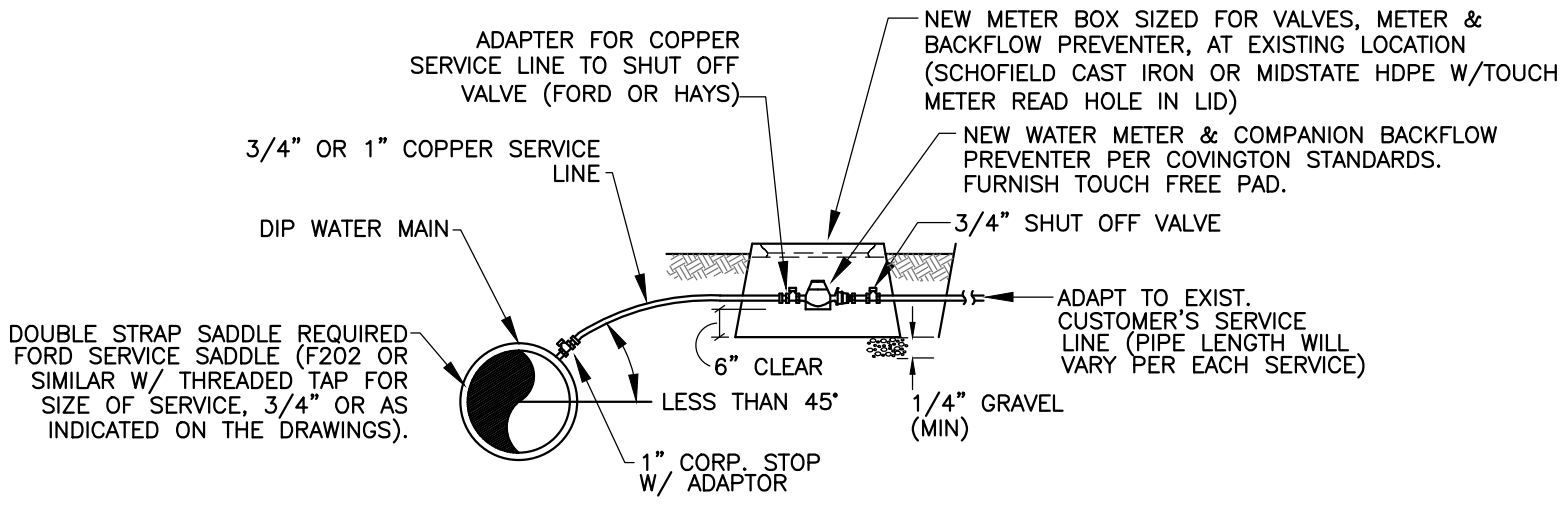
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

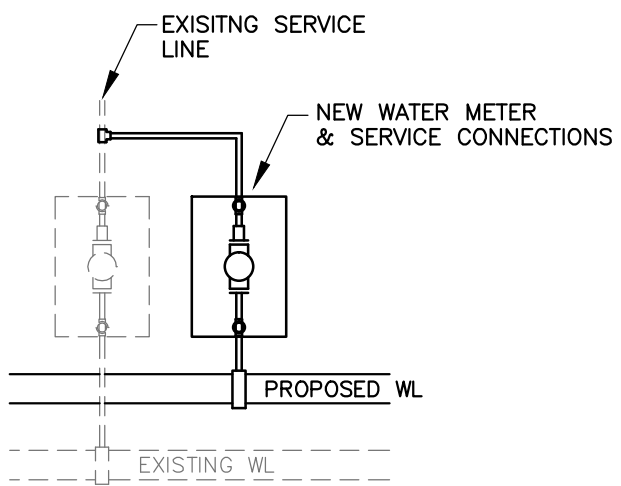
CHECKED BY:

DATE: 6/02

REVISED: 4/11



DOUBLE STRAP SADDLE REQUIRED FOR FORD SERVICE SADDLE (F202 OR SIMILAR W/ THREADED TAP FOR SIZE OF SERVICE, 3/4" OR AS INDICATED ON THE DRAWINGS).



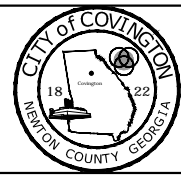
NOTES:

- 1) TYPICALLY, THE CITY INSTALLS THE WATER TAPS AND SETS THE METERS, SWIVEL, & BOX. THE BACKFLOW PREVENTER SHALL BE INSTALLED BY THE BUILDER/DEVELOPER OR HIS/HER REPRESENTATIVE AND SHALL BE CONNECTED TO THE SWIVEL. IF THE METER AND BACKFLOW PREVENTER WILL NOT FIT IN ONE BOX, WHEN INCORPORATING THE SWIVEL, THEN A SEPARATE BOX FOR THE BACKFLOW PREVENTER MUST BE USED. THIS BACKFLOW PREVENTER BOX MUST BE THE SAME MAKE, MODEL, AND COLOR AS WATER METER BOX. IF THE SWIVEL IS BYPASSED, THE C.O. FOR THAT PARTICULAR HOME OR BUSINESS WILL BE HELD UNTIL THE BACKFLOW PREVENTER IS PROPERLY INSTALLED.
- 2) ONCE THE CITY INSTALLS THE METER AND APPURTENANCES, THE BOX LID IS CLOSED. MANY TIMES DURING THE CONSTRUCTION OF THE HOUSE, THE LIDS ARE TOSSED TO THE SIDE. THIS CAN CAUSE THE METER TO FREEZE AND BREAK DURING THE WINTER MONTHS. IF THIS HAPPENS, THE BUILDER/DEVELOPER WILL BE CHARGED FOR A NEW METER AND INSTALLATION COST.
- 3) AT THE REQUEST OF THE BUILDER/DEVELOPER AND AFTER PAYMENT FOR THE WATER TAP, THE METER AND APPURTENANCES ARE SET BY THE CITY. IT IS THE RESPONSIBILITY OF THE BUILDER/DEVELOPER TO ENSURE THAT THE BOXES REMAIN INTACT AND UNDISTURBED. IF GRADE CHANGES OR MATERIAL DELIVERY RESULTS IN ALTERED OR BROKEN BOXES, THE BUILDER

CITY OF COVINGTON

WATER SYSTEM DETAIL

WATER SERVICE CONNECTION



City of Covington

Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT
CHECKED BY:
DATE: 6/02
REVISED: 4/11

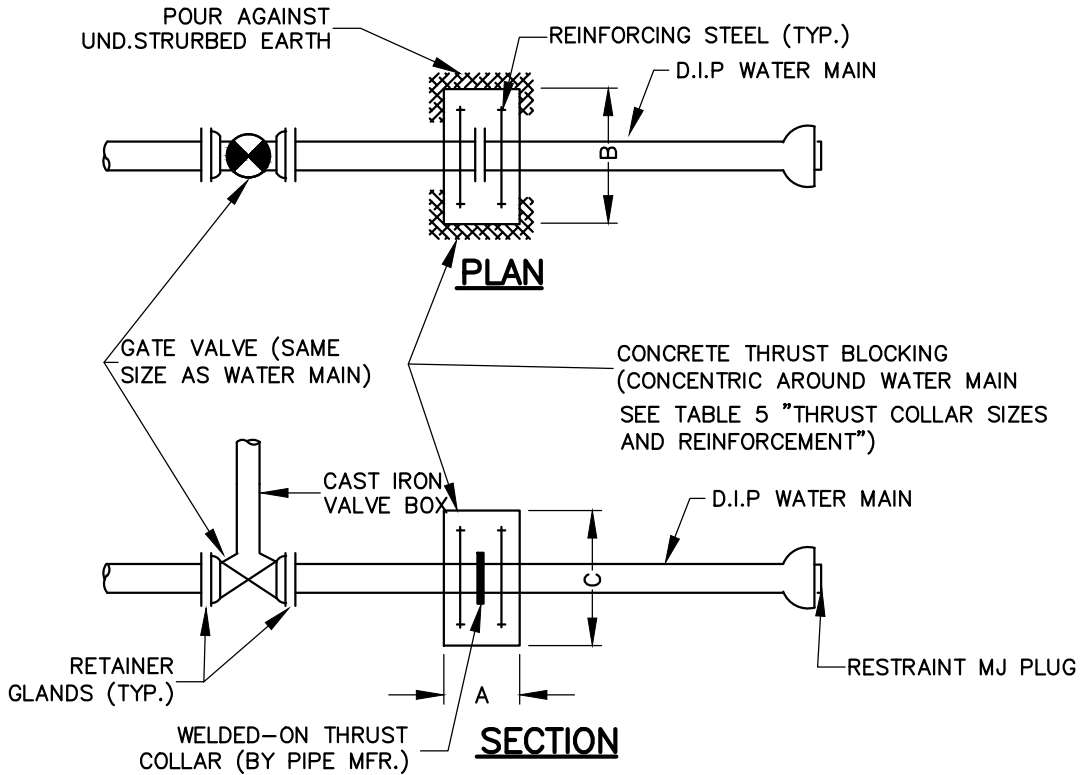


TABLE 5				
THRUST COLLAR SIZES & REINFORCEMENT				
WATER MAIN DIAM.	CONC. COLLAR DIAM.			STEEL REINFORCING
	A	B	C	
14"-16"	1'-3"	6'-6"	6'-6"	#8 @ 12" O.C. E.W.E.F.
10"-12"	1'-2"	5'-3"	5'-3"	#7 @ 12' O.C. E.W.E.F.
8" & BELOW	1'-0"	4'-0"	4'-0"	#6 @ 12" O.C. E.W.E.F.

NOTES: TEST PRESSURE: 200 PSI
 SOIL BEARING PRESSURE: 3000 PSF
 2" CLEAR OF REINFORCING STEEL

CITY OF COVINGTON
 WATER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

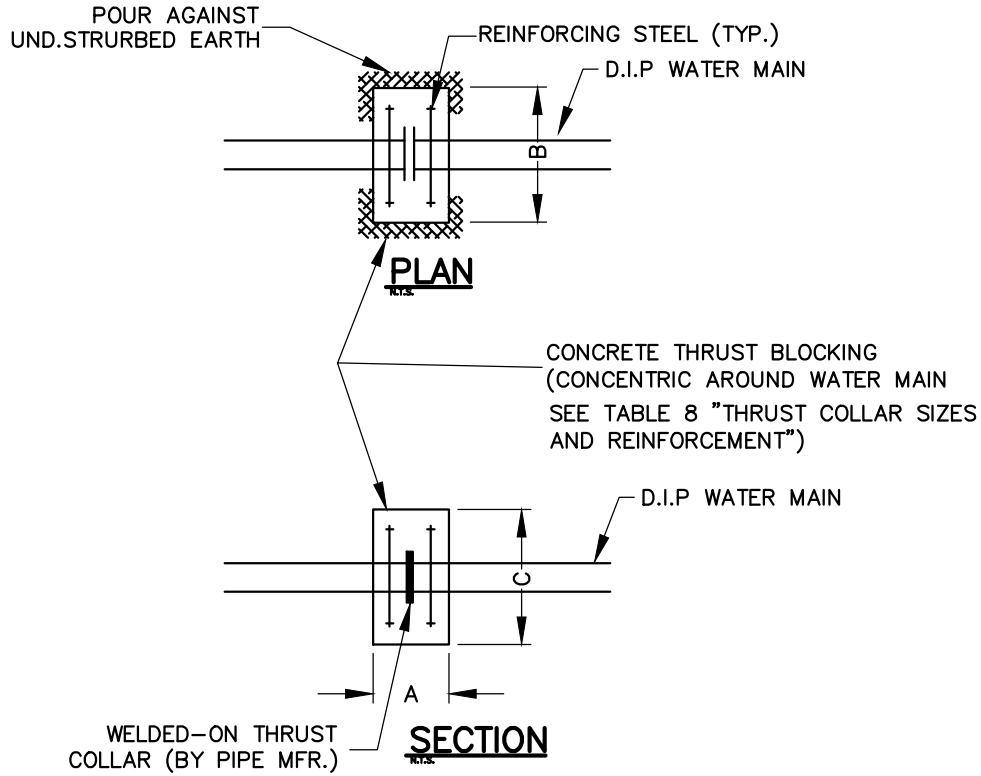
DEAD MAN

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON
WATER SYSTEM DETAIL

THRUST COLLAR



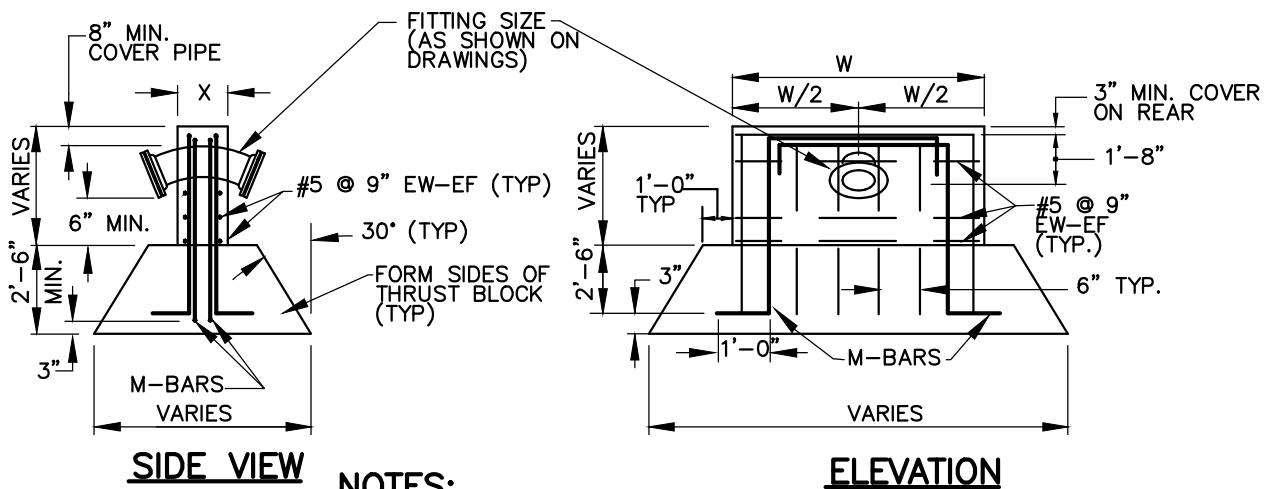
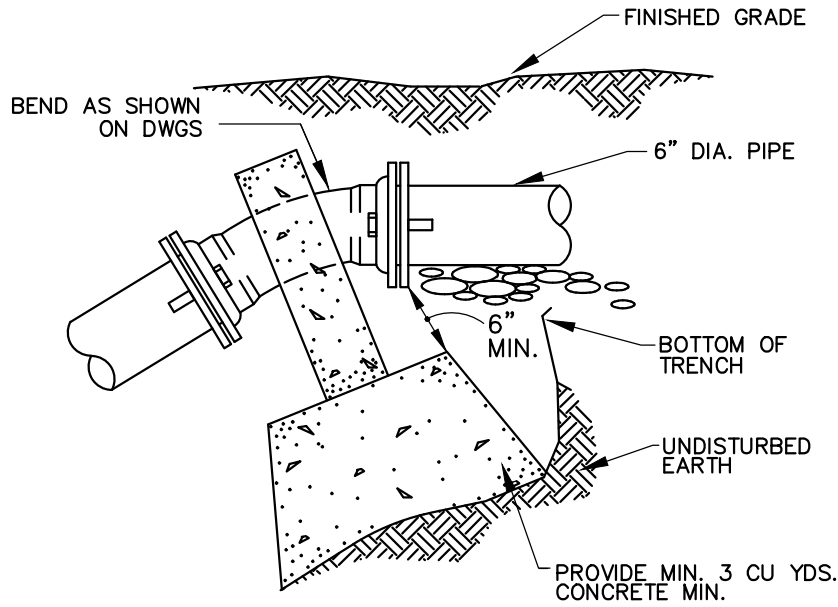
City of Covington
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



NOTES:

1. SEE TABLE 6 "DIMENSIONS AND REINFORCING FOR GRAVITY THRUST BLOCK CONSTRUCTIONS".

TABLE 6				
DIMENSIONS AND REINFORCING FOR GRAVITY THRUST BLOCK CONSTRUCTION				
FITTING (DIA. IN.)	W (MIN)	X (MIN)	MAIN REINF.	
			M-BARS EA SIDE	M-BARS TOTAL
6 TO 10	3'-0"	10"	2-#5	4-#5
12 TO 14	3'-6"	1'-4"	4-#5	8-#5
16	3'-6"	1'-6"	3-#6	6-#6

* TABLE APPLIES TO ONLY VERTICAL BENDS AT TOP.

CITY OF COVINGTON

WATER SYSTEM DETAIL

GRAVITY THRUST
BLOCK
CONSTRUCTION



City of Covington

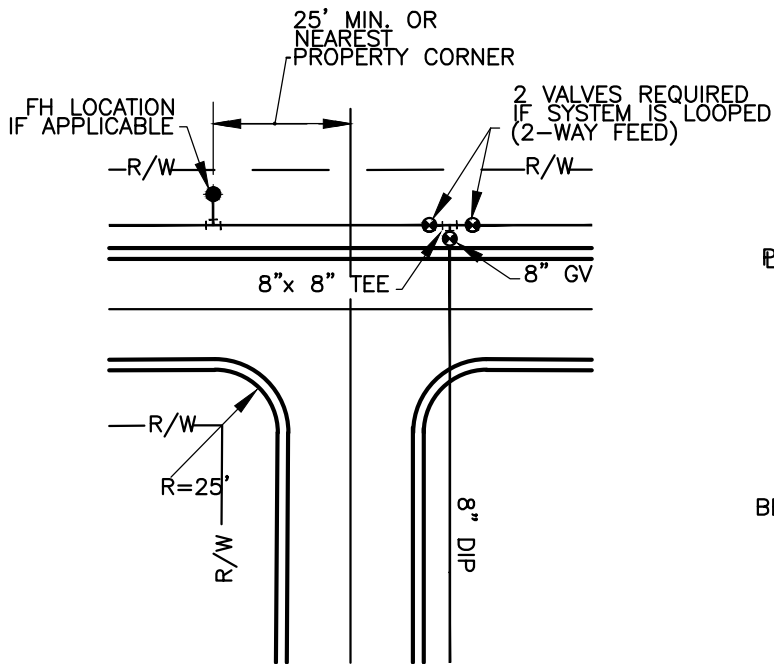
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

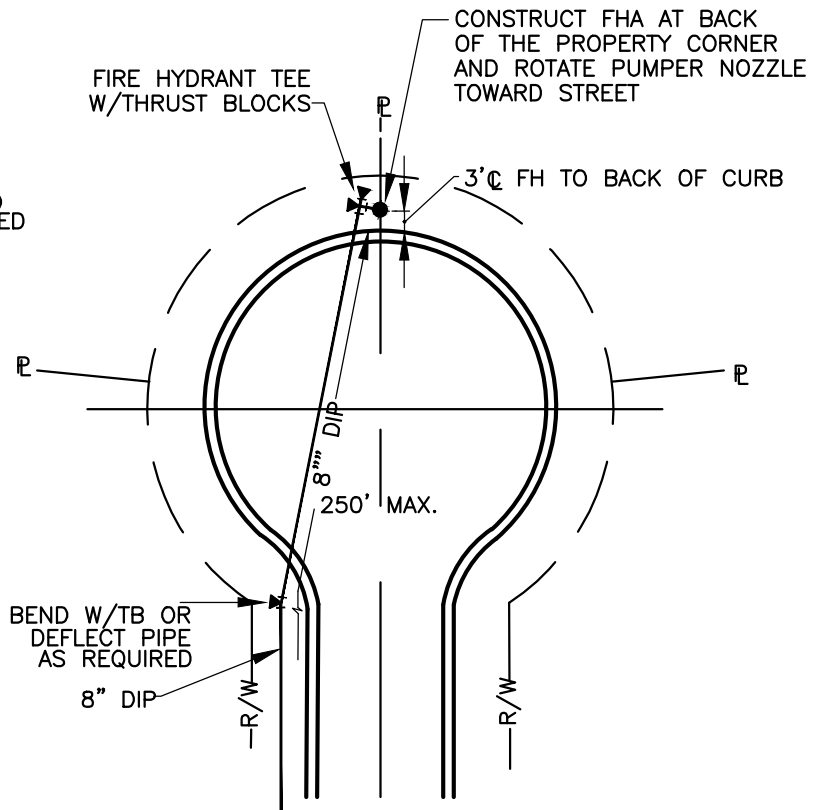
CHECKED BY:

DATE: 6/02

REVISED: 4/11



TEE INTERSECTION



CUL-DE-SAC

CITY OF COVINGTON

WATER SYSTEM DETAIL

TYPICAL WATER MAIN
LAYOUT FOR
SUBDIVISION STREET



City of Covington

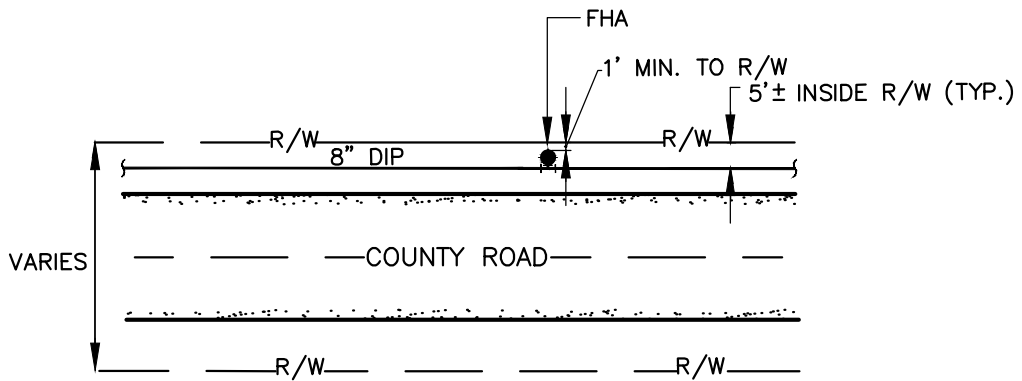
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON

WATER SYSTEM DETAIL

TYPICAL WATER MAIN
LAYOUT FOR COUNTY
ROAD



City of Covington

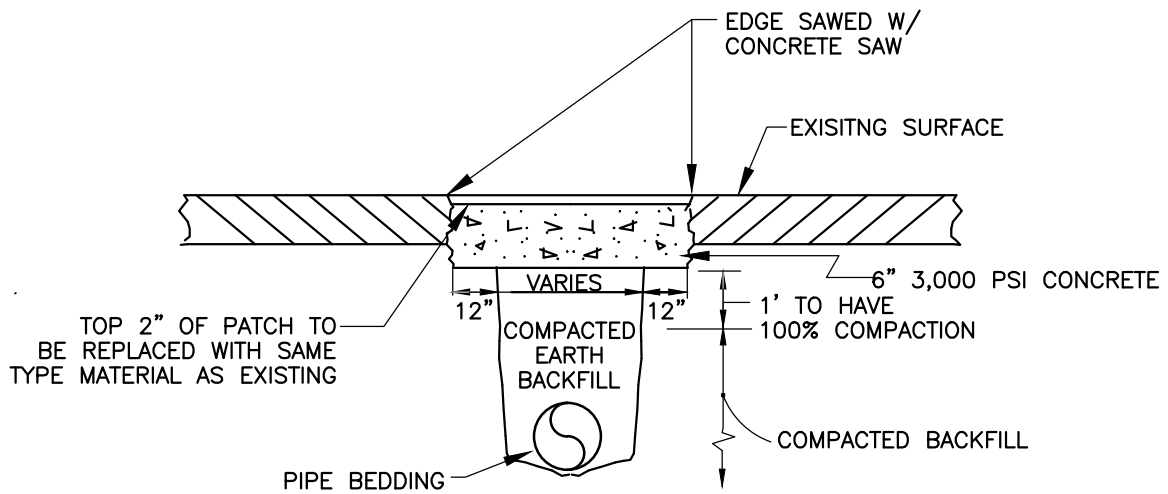
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON
WATER SYSTEM DETAIL



City of Covington
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

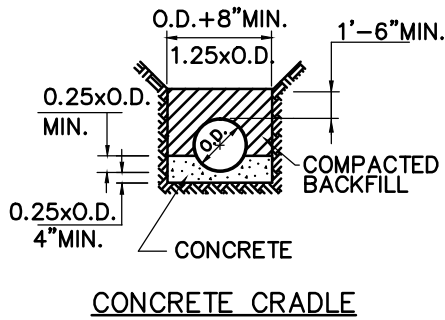
PAVEMENT
REPLACEMENT

DRAWN BY: EFT

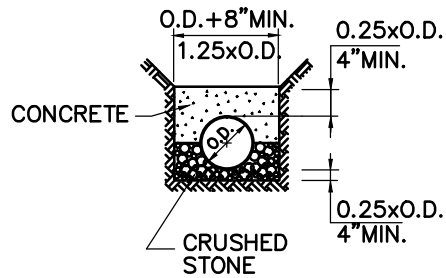
CHECKED BY:

DATE: 6/02

REVISED: 4/11

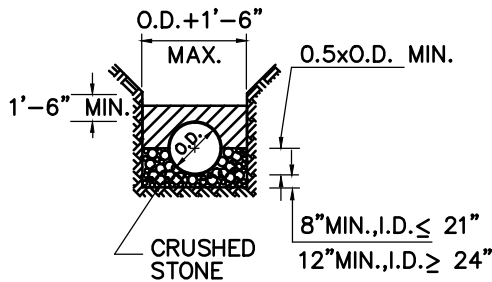


CONCRETE CRADLE

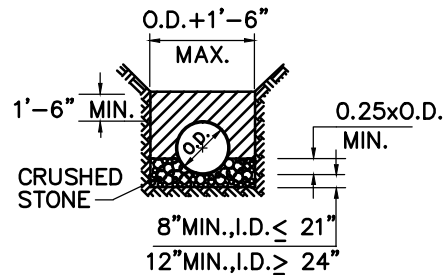


CONCRETE ARCH.

CLASS "A"



CLASS "B"



CLASS "C"

CITY OF COVINGTON

WATER SYSTEM DETAIL

BEDDING CLASSES



City of Covington

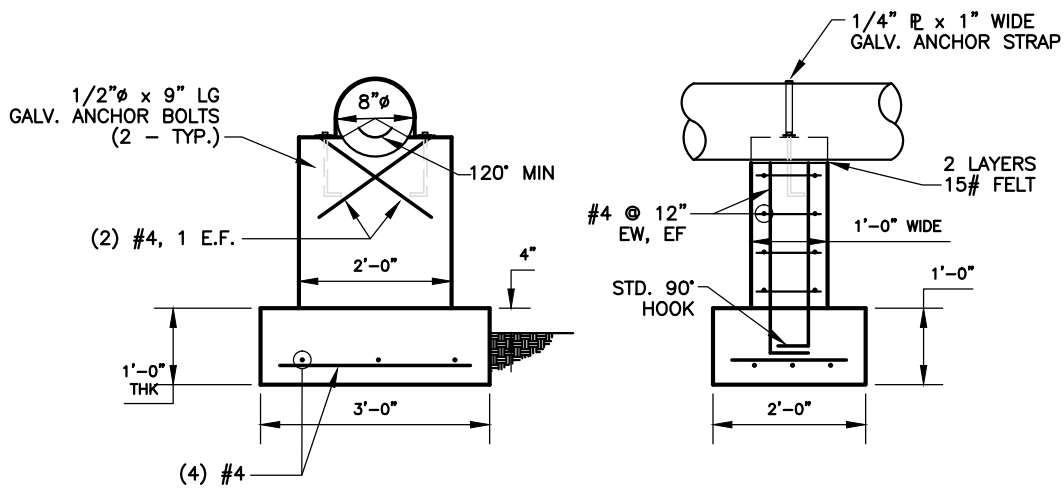
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON
WATER SYSTEM DETAIL



City of Covington
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

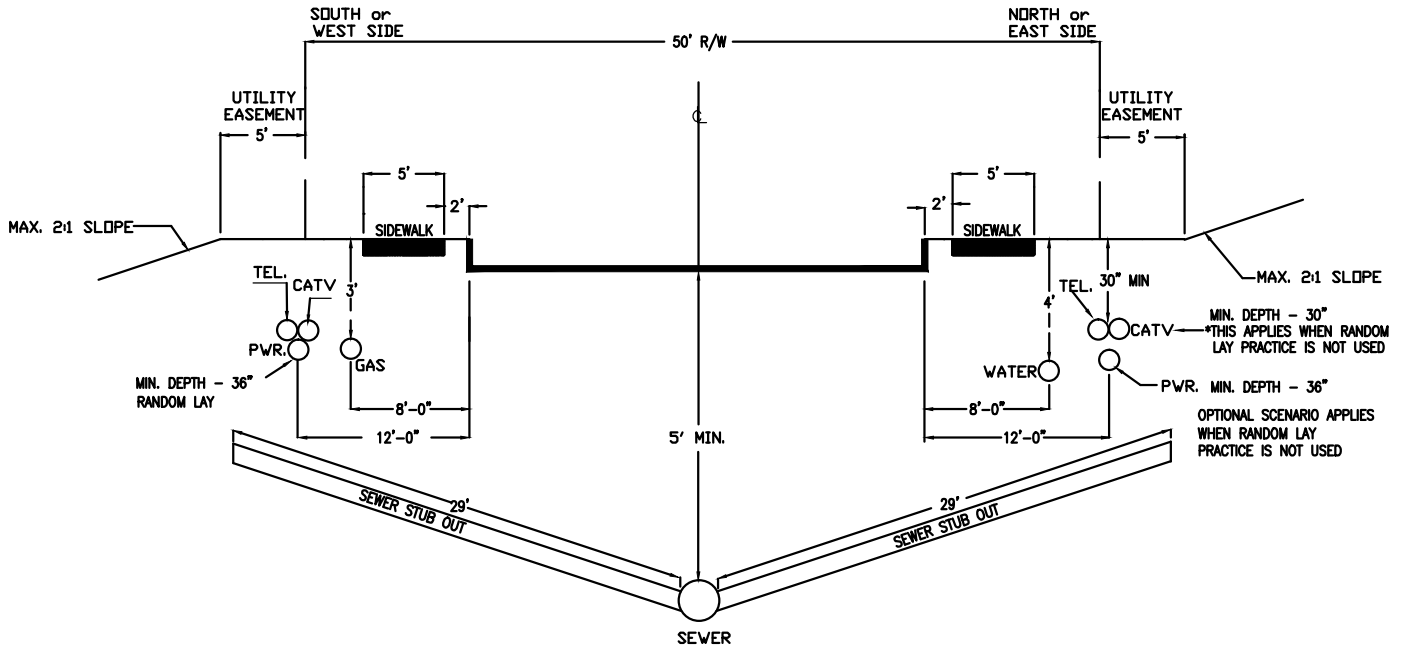
CONCRETE PIPE
SUPPORT

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



NOTES:

- 1) NO TREES OR FENCES ALLOWED WITHIN THE ROAD R/W OR UTILITY EASEMENT EXCEPT WHERE REQUIRED BY CITY, COUNTY, OR OTHER GOVERNMENT ORDINANCE.
- 2) ALL TREES SHALL BE CLEARED & SHOULDERS GRADED TO WITHIN 6" OF FINAL GRADE PRIOR TO THE INSTALLATION OF ANY UTILITIES EXCEPT WATER & SEWER.
- 3) UTILITY PLACEMENT SHALL REMAIN CONSISTENT FROM BACK OF CURB OR EDGE-OF-PAVEMENT THROUGHOUT THE PROJECT REGARDLESS OF ANY INCONSISTENCIES IN ROAD CONSTRUCTION, EXAMPLE: STORM SEWERS, CULVERTS, CULDESACS, ETC.....
- 4) AFTER VERIFICATION OF FINAL GRADE, UTILITIES SHOULD BE INSTALLED AS FOLLOWS: ELECTRIC, GAS, TELEPHONE, CATV
- 5) TOTAL CLEARED AND GRADED WIDTH TO BE 60'
- 6) PROPERTY CORNER REFERENCE SHALL BE PLACED ON CURB & GUTTER AND OFFSET STATED.
- 7) UTILITY EASEMENT SHALL BE SHOWN & RECORDED WITH THE FINAL PLAT
- 8) WATER, SEWER (WHEN APPLICABLE GAS) SERVICE TAPS SHALL BE STUBBED OUT AT 4' BACK R/W (ON UTILITY EASEMENT) NO LESS THAN 5' HORIZONTALLY AWAY FROM P/L AND MAINTAIN A MIN. DEPTH OF 4'.
- 9) WATER LATERALS SHALL BE MARKED WITH BLUE "W" ON CURB AS SOON AS POSSIBLE AFTER CURB HAS BEEN INSTALLED
- 10) DEPTH REQUIREMENTS INDICATE MINIMUM DEPTH AT TIME OF INSTALLATION
- 11) THE DITCH FOR JOINT USE SHALL BE WHEN PRACTICAL, THE NORMAL, STANDARD LOCATION OF THE PARTICIPATING UTILITY WHICH IS THE NEAREST TO THE BACK OF THE ROAD RIGHT-OF-WAY
- 12) ALL DITCH LINES TO BE BACKFILLED, GRADED, MULCHED OR GRASSED DAILY IN COMPLIANCE TO THE BEST MANAGEMENT PRACTICES (BMP'S) OF THE STATE LAW.

CITY OF COVINGTON

WATER SYSTEM DETAIL

JOINT UTILITY
PLACEMENT STANDARD



City of Covington

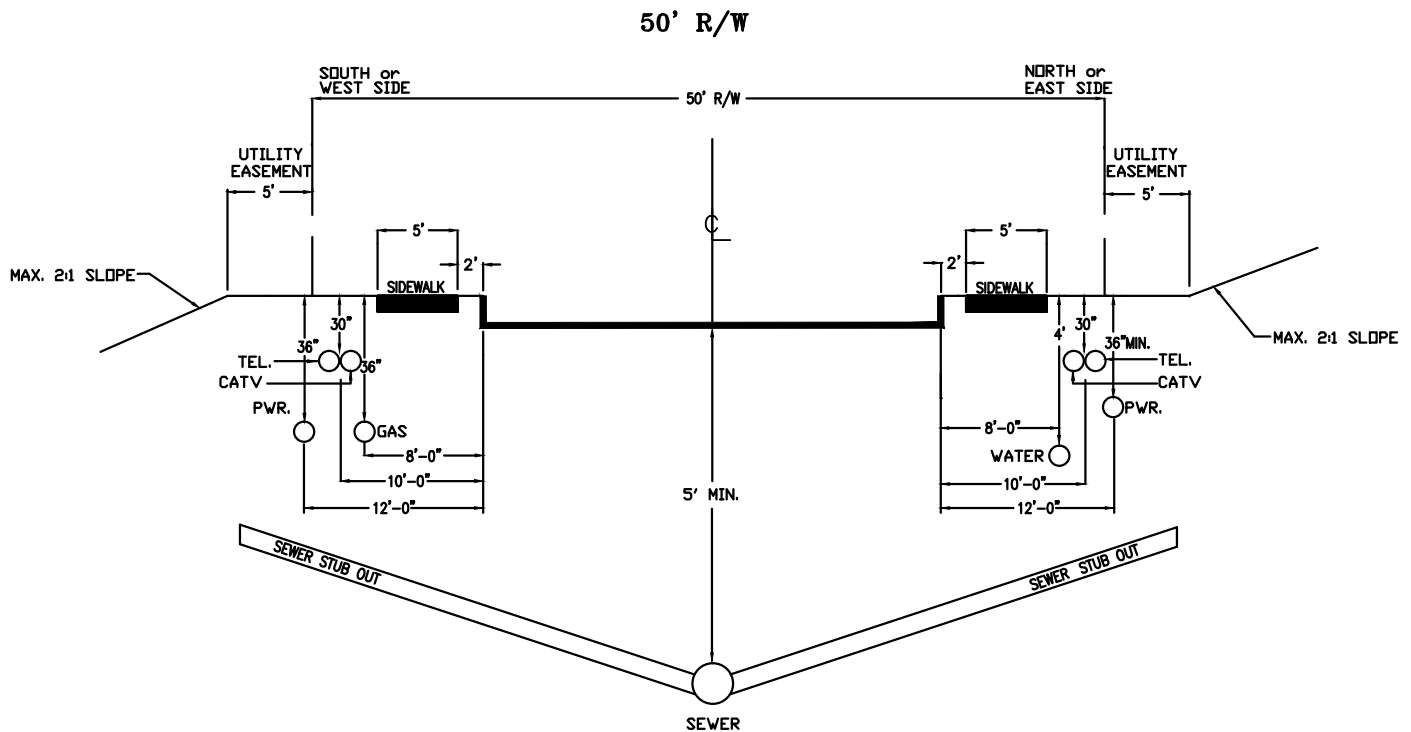
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



NOTES:

- 1) NO TREES OR FENCES ALLOWED WITHIN THE ROAD R/W OR UTILITY EASEMENT EXCEPT WHERE REQUIRED BY CITY, COUNTY, OR OTHER GOVERNMENT ORDINANCE.
- 2) ALL TREES SHALL BE CLEARED & SHOULDERS GRADED TO WITHIN 6" OF FINAL GRADE PRIOR TO THE INSTALLATION OF ANY UTILITIES EXCEPT WATER & SEWER.
- 3) UTILITY PLACEMENT SHALL REMAIN CONSISTENT FROM BACK OF CURB OR EDGE-OF-PAVEMENT THROUGHOUT THE PROJECT REGARDLESS OF ANY INCONSISTENCIES IN ROAD CONSTRUCTION, EXAMPLE: STORM SEWERS, CULVERTS, CULDESACS, ETC.....
- 4) AFTER VERIFICATION OF FINAL GRADE, UTILITIES SHOULD BE INSTALLED AS FOLLOWS: ELECTRIC, GAS, TELEPHONE, CATV
- 5) TOTAL CLEARED AND GRADED WIDTH TO BE 60'
- 6) PROPERTY CORNER REFERENCE SHALL BE PLACED ON CURB & GUTTER AND OFFSET STATED.
- 7) UTILITY EASEMENT SHALL BE SHOWN & RECORDED WITH THE FINAL PLAT
- 8) WATER, SEWER (WHEN APPLICABLE GAS) SERVICE TAPS SHALL BE STUBBED OUT AT 4' BACK R/W (ON UTILITY EASEMENT) NO LESS THAN 5' HORIZONTALLY AWAY FROM P/L AND MAINTAIN A MIN. DEPTH OF 4'.
- 9) WATER LATERALS SHALL BE MARKED WITH BLUE "W" ON CURB AS SOON AS POSSIBLE AFTER CURB HAS BEEN INSTALLED
- 10) DEPTH REQUIREMENTS INDICATE MINIMUM DEPTH AT TIME OF INSTALLATION
- 11) THE DITCH FOR JOINT USE SHALL BE WHEN PRACTICAL, THE NORMAL, STANDARD LOCATION OF THE PARTICIPATING UTILITY WHICH IS THE NEAREST TO THE BACK OF THE ROAD RIGHT-OF-WAY
- 12) ALL DITCH LINES TO BE BACKFILLED, GRADED, MULCHED OR GRASSED DAILY IN COMPLIANCE TO THE BEST MANAGEMENT PRACTICES (BMP'S) OF THE STATE LAW.

CITY OF COVINGTON

WATER SYSTEM DETAIL

STANDARD UTILITY PLACEMENT
W/CURBING & SIDEWALK



City of Covington

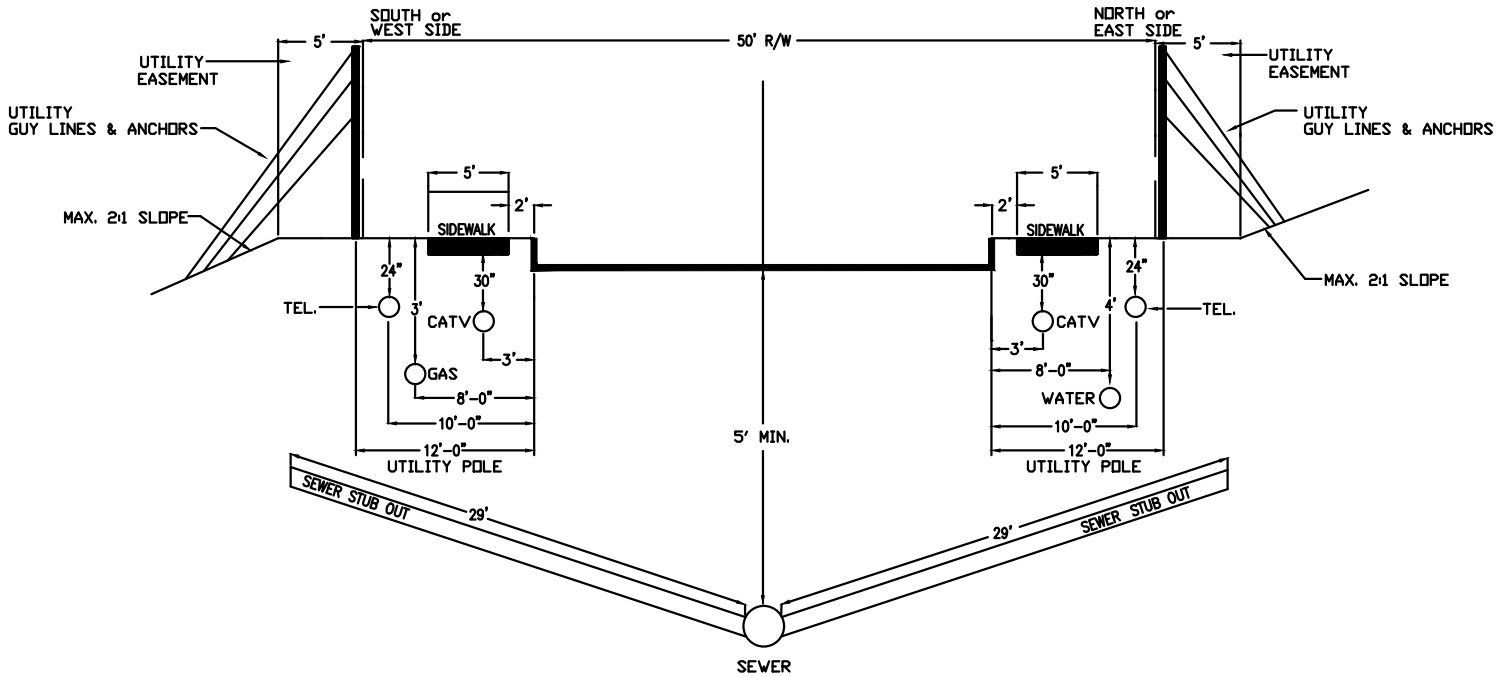
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



NOTES:

- 1) THE OVERHEAD UTILITIES STANDARD MAY BE COMBINED WITH JOINT USE STANDARDS (OVERHEAD OR UNDERGROUND) (OVERHEAD OR UNDERGROUND).
- 2) ALL CLEARANCES AND SEPARATION OF UTILITIES SHALL BE IN COMPLIANCE WITH THE NATIONAL ELECTRIC SAFETY CODE.
- 4) GUYS AND ANCHORS, WHEN NEEDED WILL EXTEND BEYOND THE UTILITY EASEMENT.
- 5) NO TREES SHALL BE WITHIN 15' OF OVERHEAD UTILITY FACILITIES.
- 6) UTILITY LINES MAY CROSS BACK AND FORTH ACROSS STREETS AND ROADS ACCORDING TO THE FEASIBILITY OF CONSTRUCTION.
- 7) ANY UTILITY NOT ATTACHED TO OVERHEAD POLES SHALL BE PLACED IN ACCORDANCE WITH 50' R/W WITH SIDEWALK SCENARIO.
- 8) NO UTILITY SHALL BE REQUIRED TO ATTACH TO OVERHEAD POLE.

CITY OF COVINGTON

WATER SYSTEM DETAIL

OVERHEAD UTILITY
PLACEMENT STANDARD



City of Covington

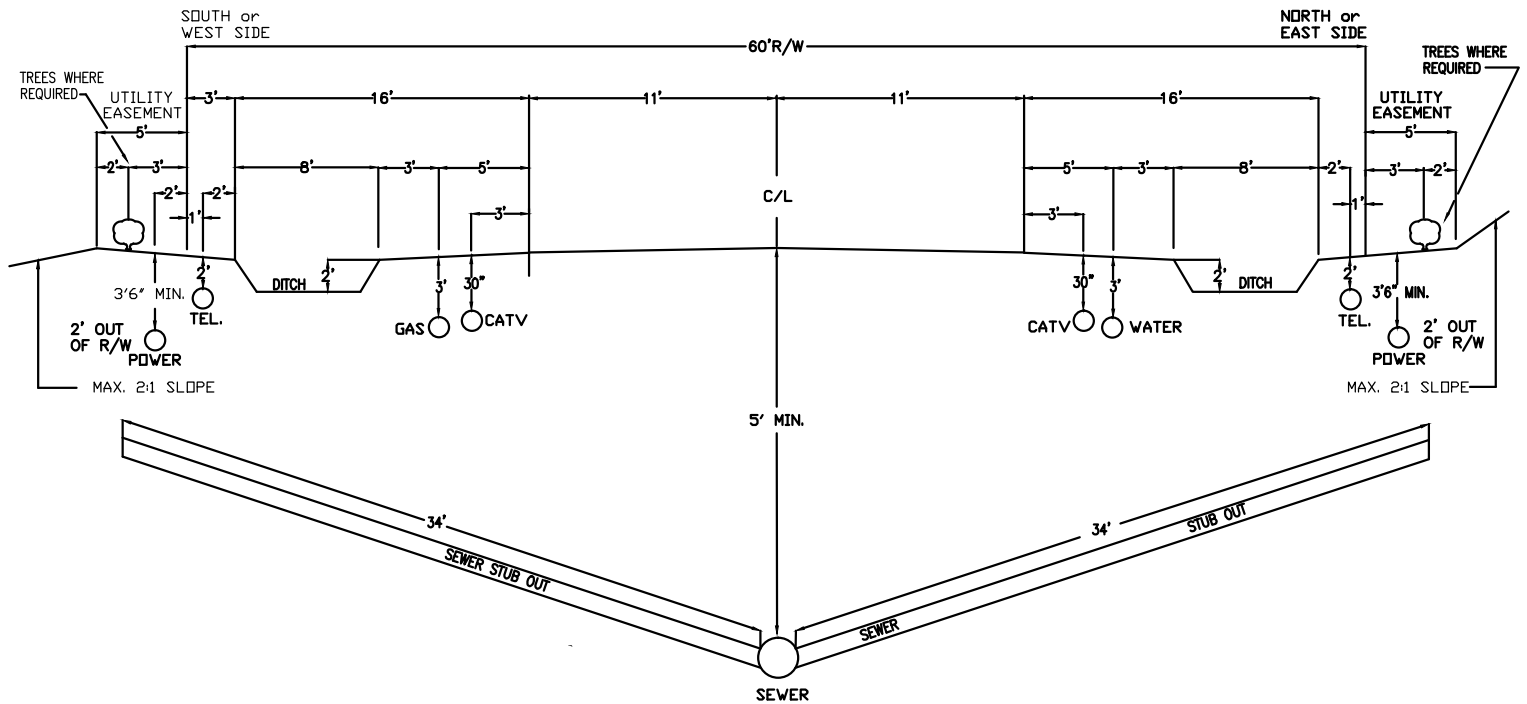
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



NOTES:

- 1) NO TREES OR FENCES ALLOWED WITHIN THE ROAD R/W OR UTILITY EASEMENT EXCEPT WHERE REQUIRED BY CITY, COUNTY, OR OTHER GOVERNMENT ORDINANCE.
- 2) ALL TREES SHALL BE CLEARED & SHOULDERS GRADED BEFORE THE INSTALLATION OF ANY UTILITIES.
- 3) UTILITY PLACEMENT SHALL REMAIN CONSISTENT FROM BACK OF CURB OR EDGE-OF-PAVEMENT THROUGHOUT THE PROJECT REGARDLESS OF ANY INCONSISTENCIES IN ROAD CONSTRUCTION, EXAMPLE: STORM SEWERS, CULVERTS, CUL-DE-SACS, ETC...
- 4) AFTER VERIFICATION OF FINAL GRADE, UTILITIES SHOULD BE INSTALLED AS FOLLOWS: SEWER, WATER, ELECTRIC, GAS, TELEPHONE, CATV.
- 5) TOTAL CLEARED & GRADED WIDTH TO BE 70'
- 6) UTILITY EASEMENT SHALL BE SHOWN & RECORDED WITH THE FINAL PLAT
- 7) WATER & SEWER TAPS SHALL BE STUBBED OUT AT 4' BACK OF R/W (ON UTILITY EASEMENT) AND MAINTAIN A MIN. DEPTH OF 4'.
- 8) PROPERTY CORNER REFERENCE SHALL BE ON 10' OFFSET STAKE.

CITY OF COVINGTON

WATER SYSTEM DETAIL

UTILITY PLACEMENT
STANDARD W/DITCH



City of Covington

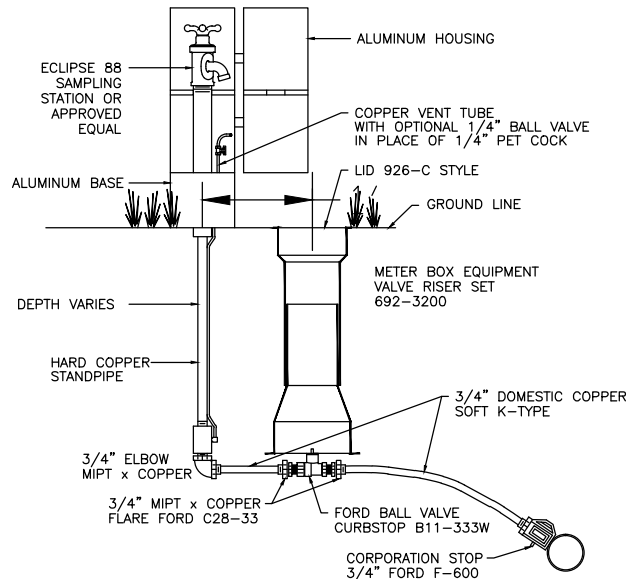
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



Sampling Stations shall be buried with a 3/4" FIP inlet, and a (3/4" hose or unthreaded) nozzle.

All stations shall be enclosed in a lockable, nonremovable, aluminum-cast housing.

When opened, the station shall require no key for operation, and the water will flow in an all brass waterway.

All working parts will also be of brass and be removable from above ground with no digging. Exterior piping shall be galvanized steel (brass pipe also available).

A copper vent tube will enable each station to be pumped free of standing water to prevent freezing and to minimize bacteria growth.

The sampling station shall be an Eclipse No. 88 or approved equal.

CITY OF COVINGTON WATER SYSTEM DETAIL



City of Covington
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

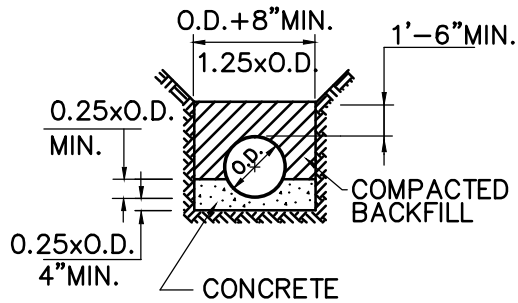
SAMPLING STATION

DRAWN BY: EFT

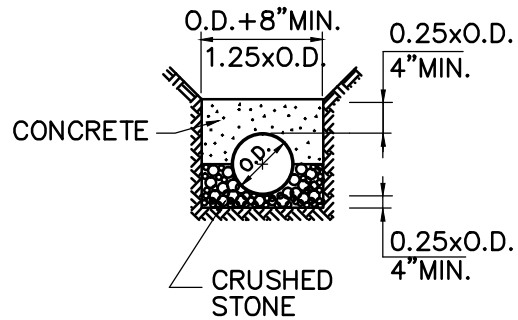
CHECKED BY:

DATE: 6/02

REVISED: 4/11

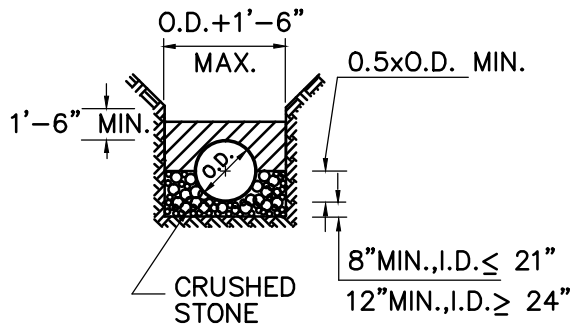


CONCRETE CRADLE

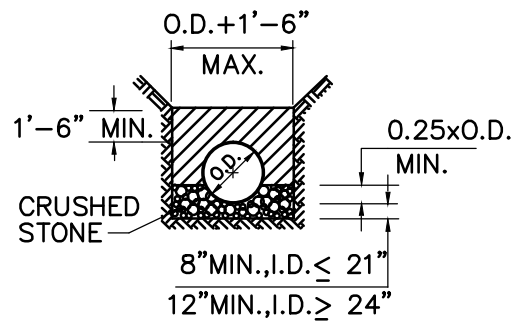


CONCRETE ARCH.

CLASS "A"



CLASS "B"



CLASS "C"

CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL



City of Covington

Engineering Department
2116 Stallings Street
Covington, Georgia 30015

BEDDING CLASSES

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11

PIPE CLASS	TRENCH WIDTH	TRENCH DEPTH CLASS 'B' BEDDING	TRENCH DEPTH CLASS 'C' BEDDING
8" PVC AND TRUSS	ALL	16'	—
10" PVC AND TRUSS	UP TO 30" 30" TO 36" ABOVE 36"	16'	—
		14'	—
		10'	—
12" PVC AND TRUSS	UP TO 30" 30" TO 36" ABOVE 36"	14'	—
		12'	—
		11'	—
15" PVC AND TRUSS	UP TO 30" 30" TO 36" ABOVE 36"	16'	—
		14'	—
		10'	—
15" D.I.P. CLASS	ALL	35'	20'
		40'	25'
		50'	35'
8" D.I.P. CLASS	ALL	60'	40'
		70'	50'
		80'	60'
10" D.I.P. CLASS	ALL	45'	30'
		55'	40'
		70'	50'
12" D.I.P. CLASS	ALL	40'	25'
		50'	35'
		60'	45'
15" D.I.P. CLASS	ALL	35'	20'
		40'	25'
		50'	35'

CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

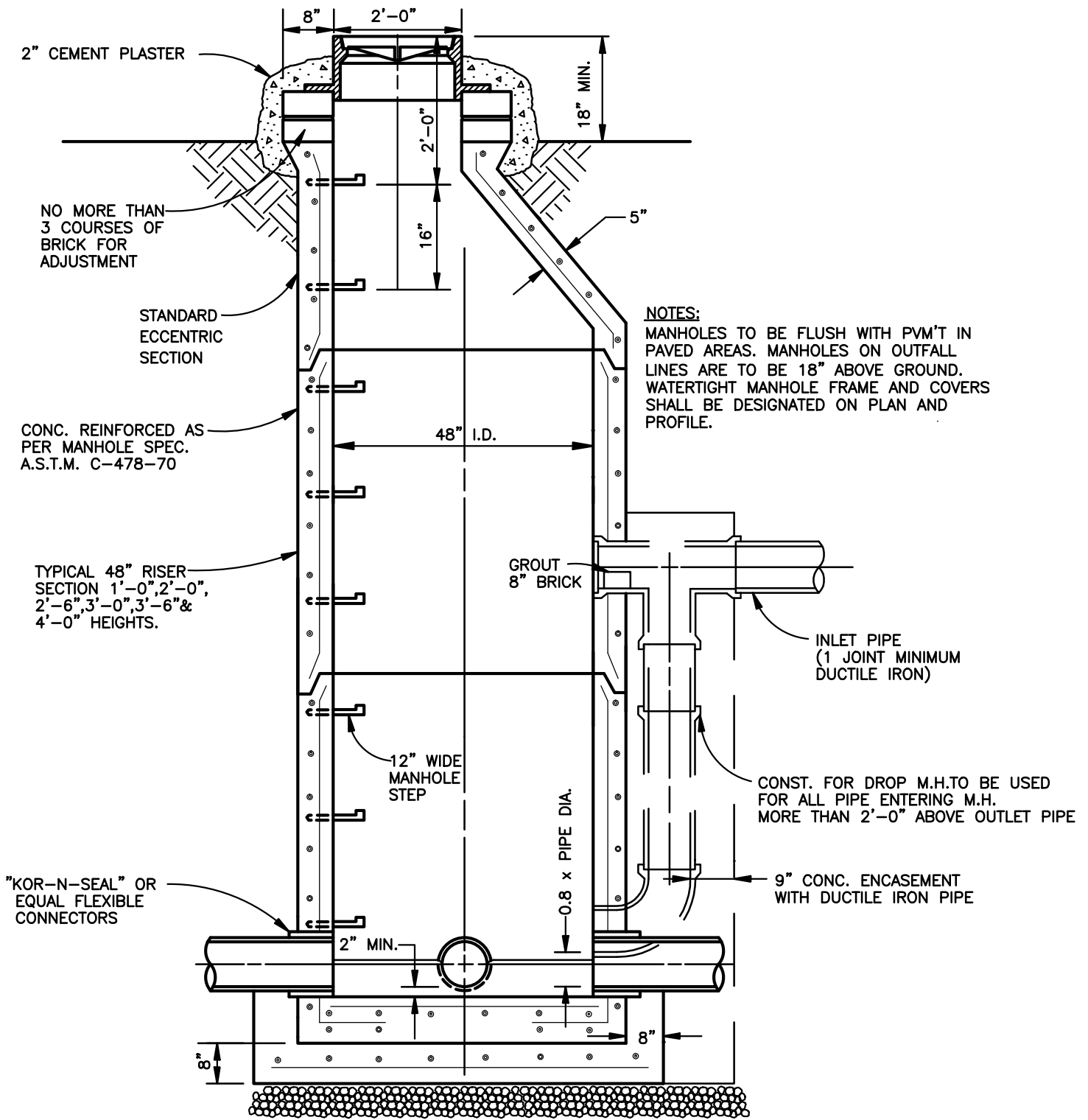
MAXIMUM TRENCH DEPTHS

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



8" FOOTING REQUIRED ON DEPTHS OF 12 FEET AND OVER WITH NO.4 BARS AT 12" O.C.E.W. ON A 8" GRANULAR FOUNDATION.

CITY OF COVINGTON
 SANITARY SEWER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

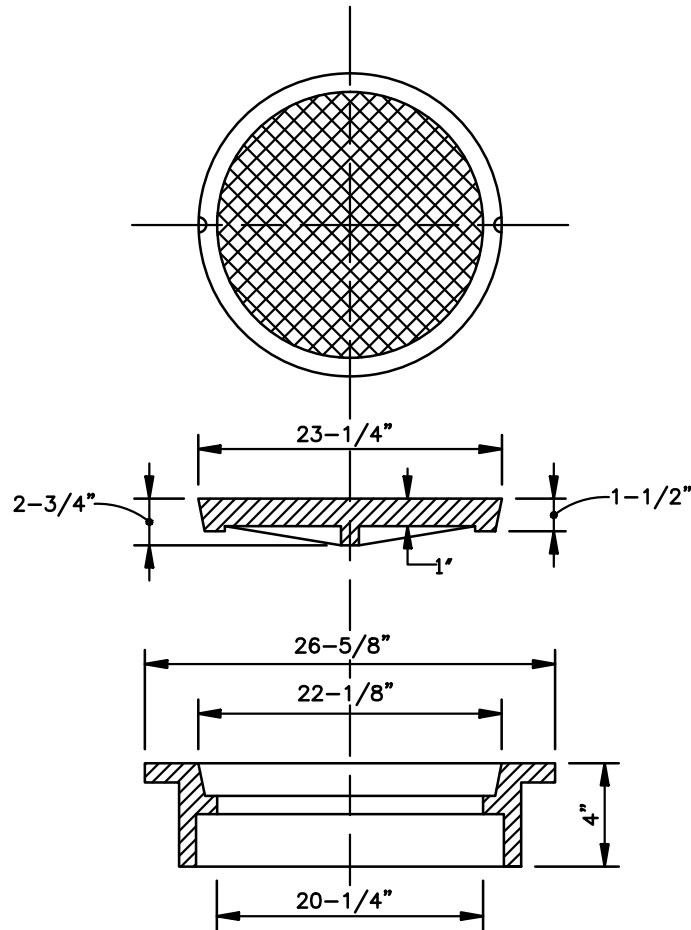
STANDARD MANHOLE

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL

TRAFFIC FRAME &
COVER



City of Covington

Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

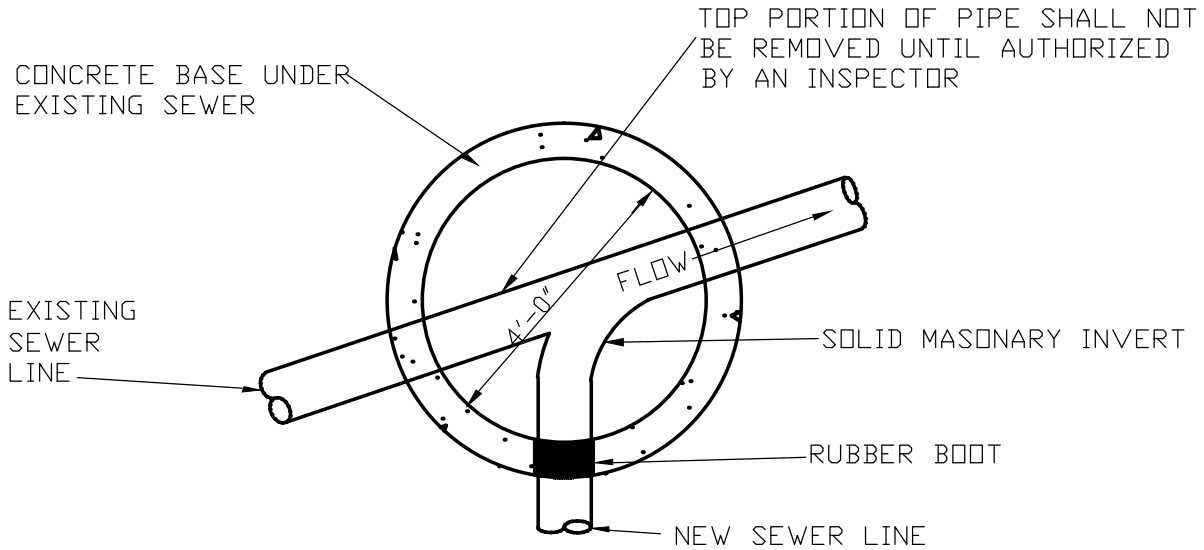
CHECKED BY:

DATE: 6/02

REVISED: 4/11

NOTE:

DOGHOUSE MANHOLES TO BE INSTALLED ONLY WHEN AUTHORIZED BY AN INSPECTOR.

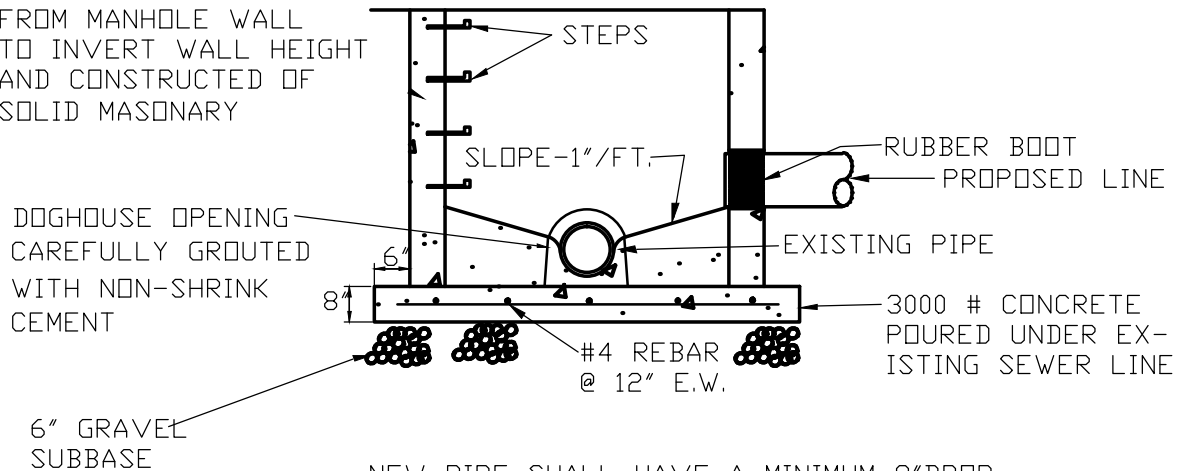


PROVIDE PRECAST MANHOLE RISER COMPLETE WITH UP-SIDE DOWN U-SHAPED OPENING TO SUIT EXISTING LINES

NOTE:

TABLES ARE TO BE GENTLY SLOPED AND TROWELED SMOOTH FROM MANHOLE WALL TO INVERT WALL HEIGHT AND CONSTRUCTED OF SOLID MASONRY

CORED AND BOOTED OPENING TO SUIT PROPOSED PIPELINES.



NEW PIPE SHALL HAVE A MINIMUM 8" DROP INTO MANHOLE WHENEVER POSSIBLE

CITY OF COVINGTON
SANITARY SEWER SYSTEM DETAIL



City of Covington
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

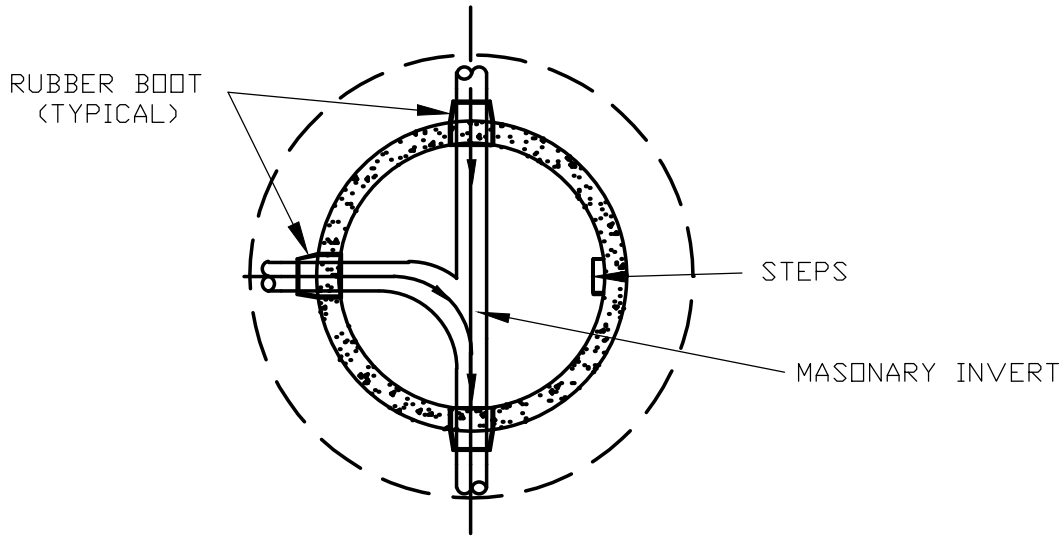
DOGHOUSE MANHOLE

DRAWN BY: EFT

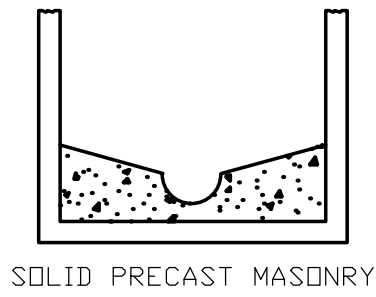
CHECKED BY:

DATE: 6/02

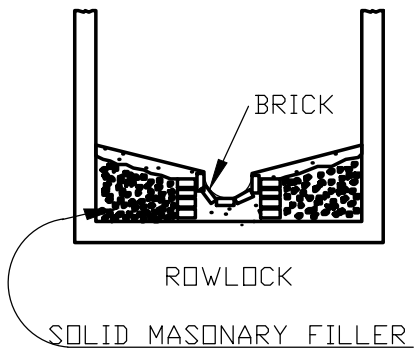
REVISED: 4/11



PLAN VIEW OF MANHOLE



SOLID PRECAST MASONRY



SOLID MASONRY FILLER

NOTE:

1. PRECAST INVERTS ARE ACCEPTABLE.
2. A 0.2 FOOT DROP ACROSS INVERT
3. FIELD INSTALLED INVERTS MUST BE ROWLOCK
4. INVERTS FOR MANHOLES RECEIVING FORCEMAINS SHALL BE SIMILARLY CONSTRUCTED

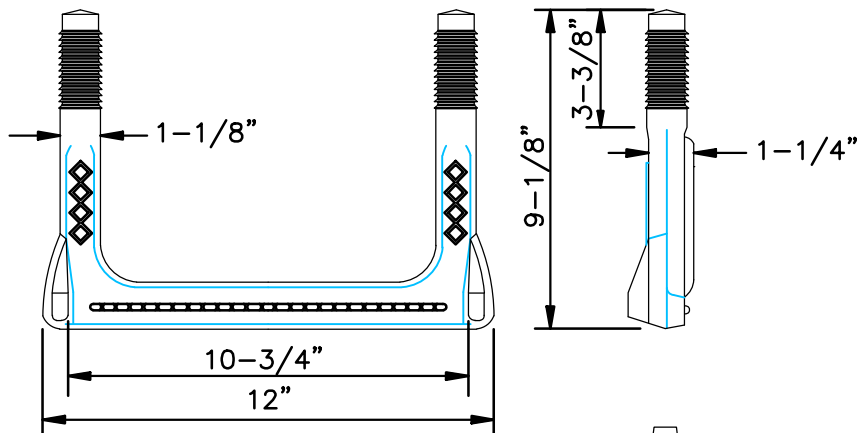
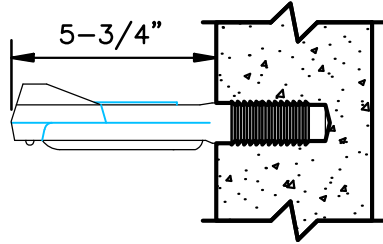
PIPE SIZE	DEFLECTION	MIN. MH DIA.
8" & 15"	0° - 90°	4' - 0"
18"	0° - 60°	4' - 0"
18"	60° - 90°	5' - 0"
21" & 24"	0° - 60°	5' - 0"
21" & 24"	60° - 90°	6' - 0"

CITY OF COVINGTON
SANITARY SEWER SYSTEM DETAIL

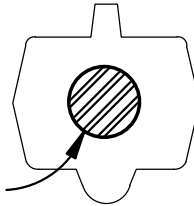
City of Covington
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

STANDARD INVERT

DRAWN BY: EFT
CHECKED BY:
DATE: 6/02
REVISED: 4/11



POLYPROPYLENE PLASTIC



1/2" GRADE 60
STEEL REINFORCEMENT

CITY OF COVINGTON
SANITARY SEWER SYSTEM DETAIL



City of Covington
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

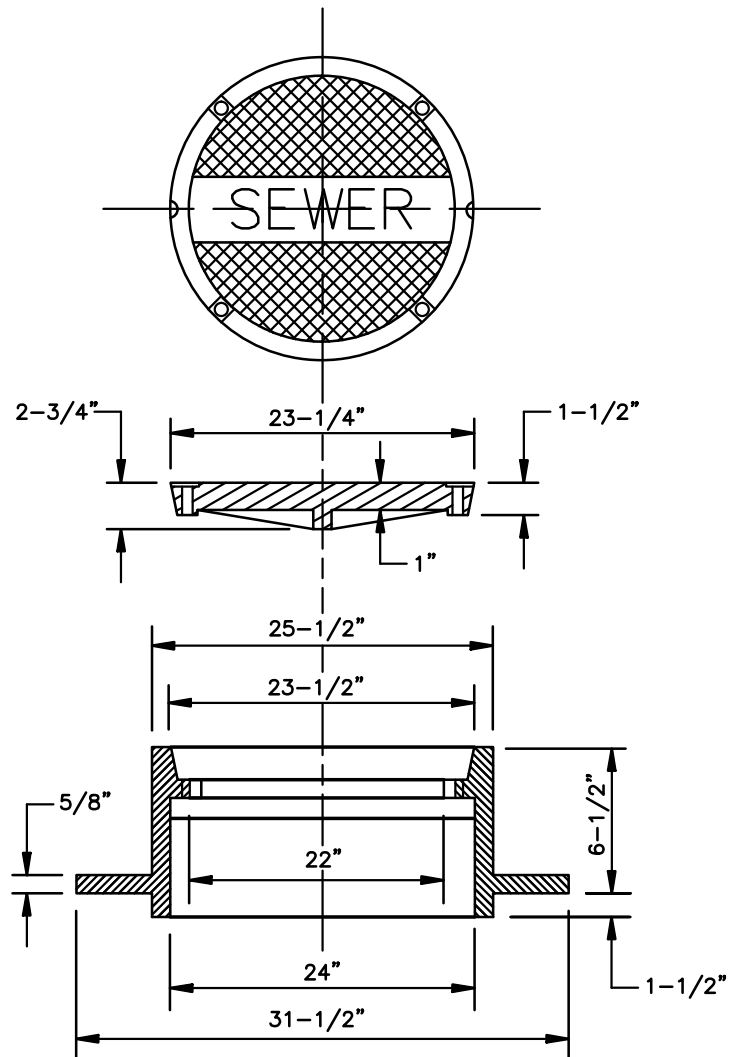
MANHOLE STEP

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON
 SANITARY SEWER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

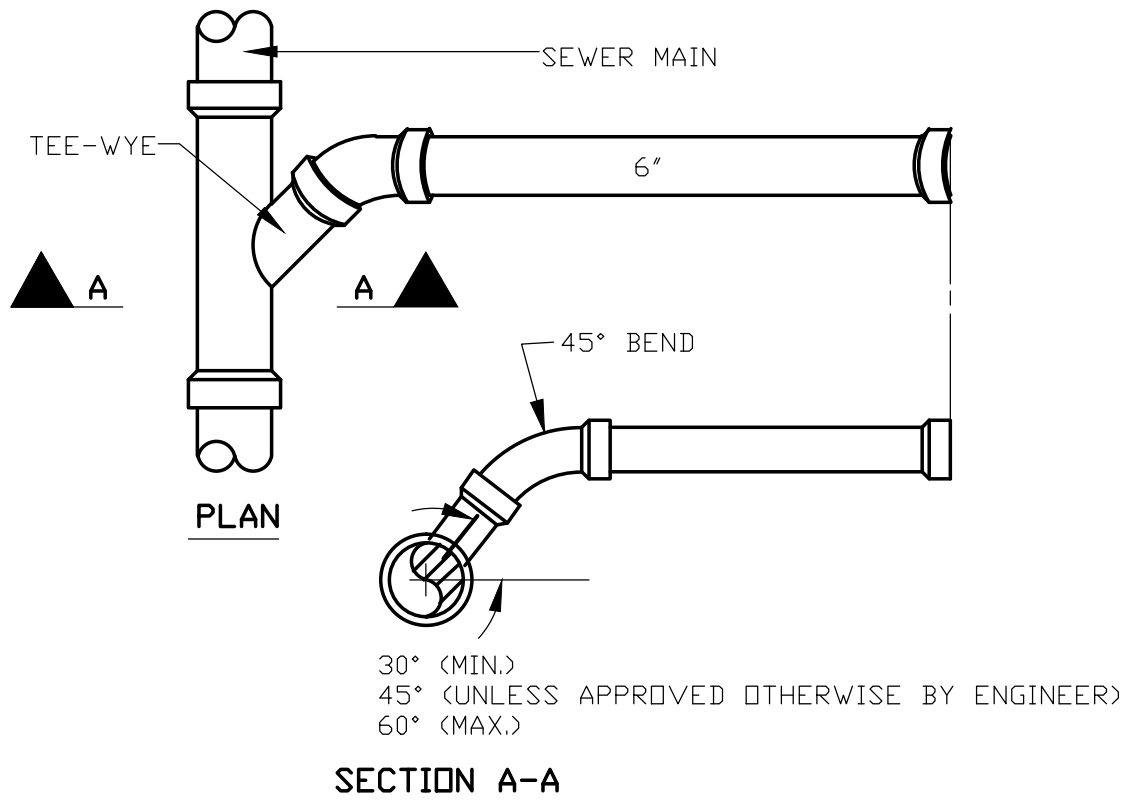
BOLT DOWN FRAME &
 COVER

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

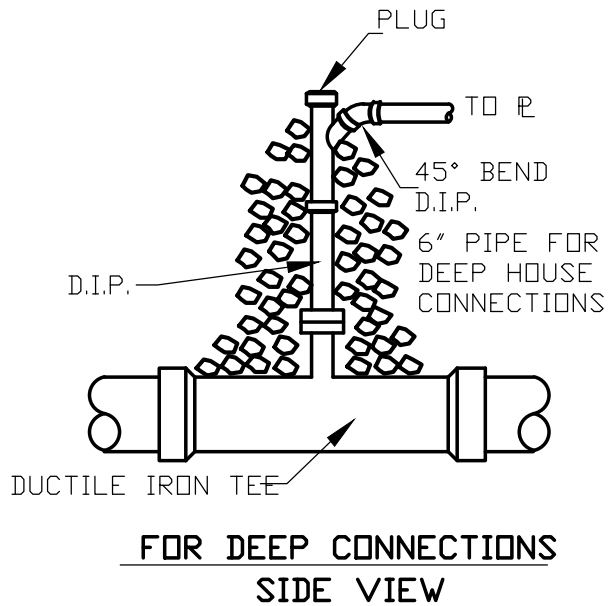
REVISED: 4/11



NOTE:

DEEP HOUSE CONNECTIONS MAY BE ALLOWED WHEN SEWER INVERT IS 12' OR MORE BELOW SURFACE.

STACKED SERVICE LINES PERMITTED UNDER ROADS ONLY WITH SPECIAL PERMISSION.



CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL



City of Covington

Engineering Department
2116 Stallings Street
Covington, Georgia 30015

6" TEE SERVICE
CONNECTIONS

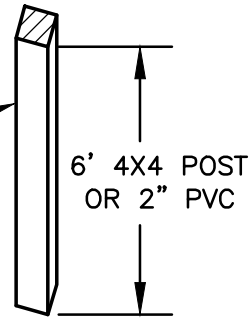
DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

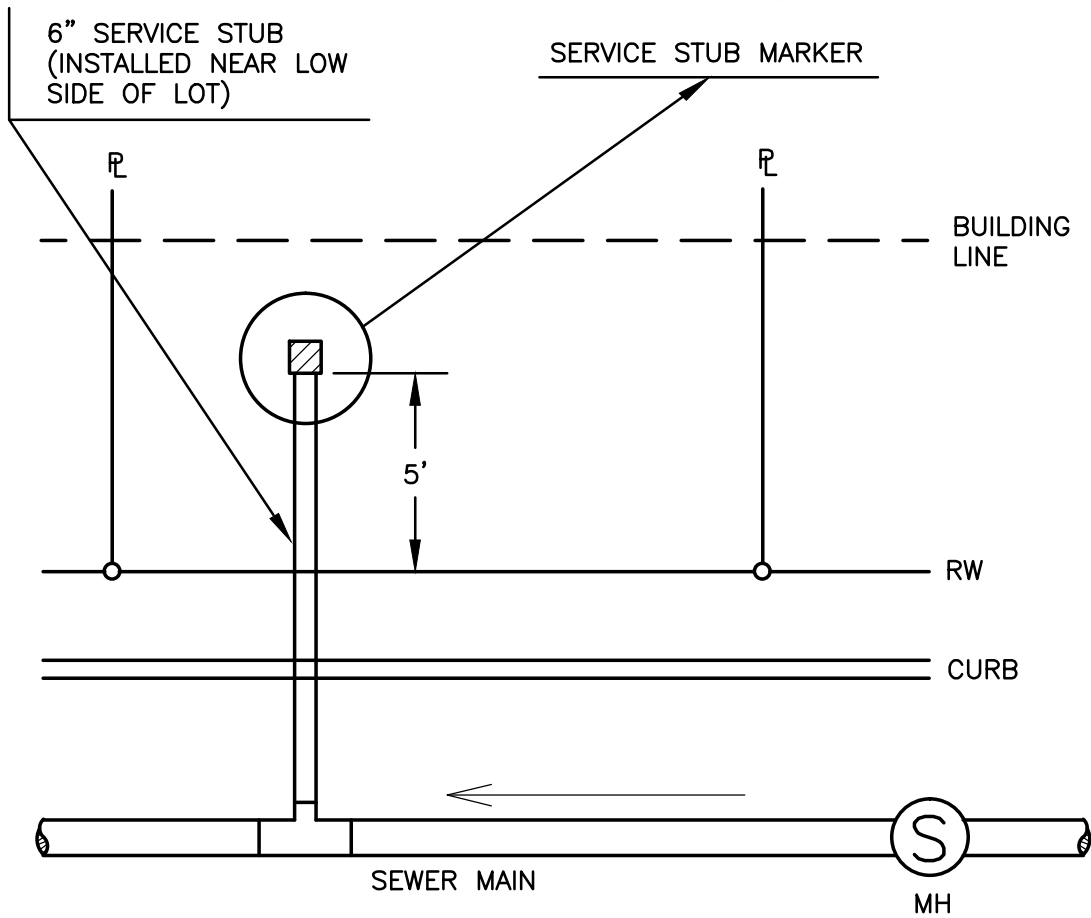
REVISED: 4/11

IDENTIFY AS PER OSHA SAFETY
STANDARD SPECIFICATION 1910.44
UTILITY PROTECTION MARKING
PAINT (GREEN)



6" SERVICE STUB
(INSTALLED NEAR LOW
SIDE OF LOT)

SERVICE STUB MARKER

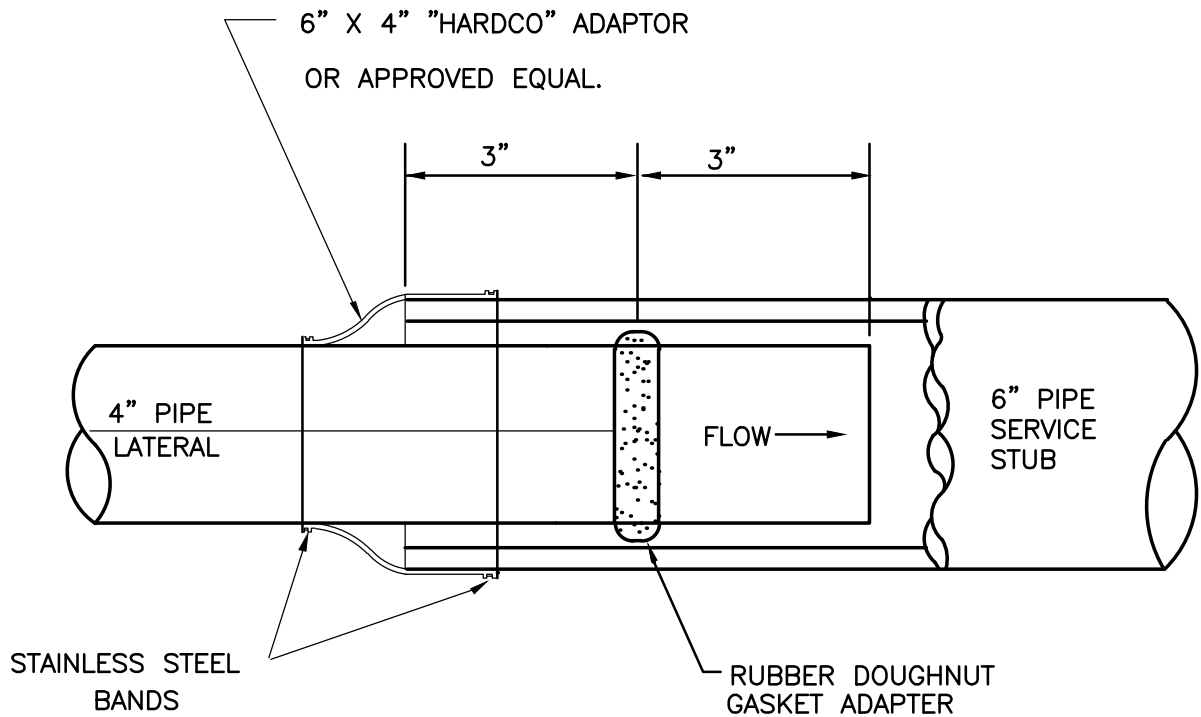


QUINNETT COUNTY DEPARTMENT OF PUBLIC UTILITIES

CITY OF COVINGTON
SANITARY SEWER SYSTEM DETAIL

SERVICE STUB
LOCATION DETAIL

DRAWN BY: EFT
CHECKED BY:
DATE: 6/02
REVISED: 4/11



NOTE:

1. CONCRETE GROUT WILL NOT BE PERMITTED.
2. BELL MUST BE REMOVED FROM 6" SERVICE STUB.
3. DAMAGED END OF 6" STUB PIPE SHALL BE CUT STRAIGHT AND BEYOND ANY PORTION OF PIPE.
4. ADDITIONAL 6" PIPE SHALL BE INSTALLED TO 5' (FEET) BEYOND THE PROPERTY LINE, THE RIGHT-OF-WAY ON STREET, OR THE EASEMENT.
5. EACH INSTALLATION MUST UTILIZE BOTH A DOUGHNUT GASKET AND AND A "HARDCO" TYPE ADAPTOR.

CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

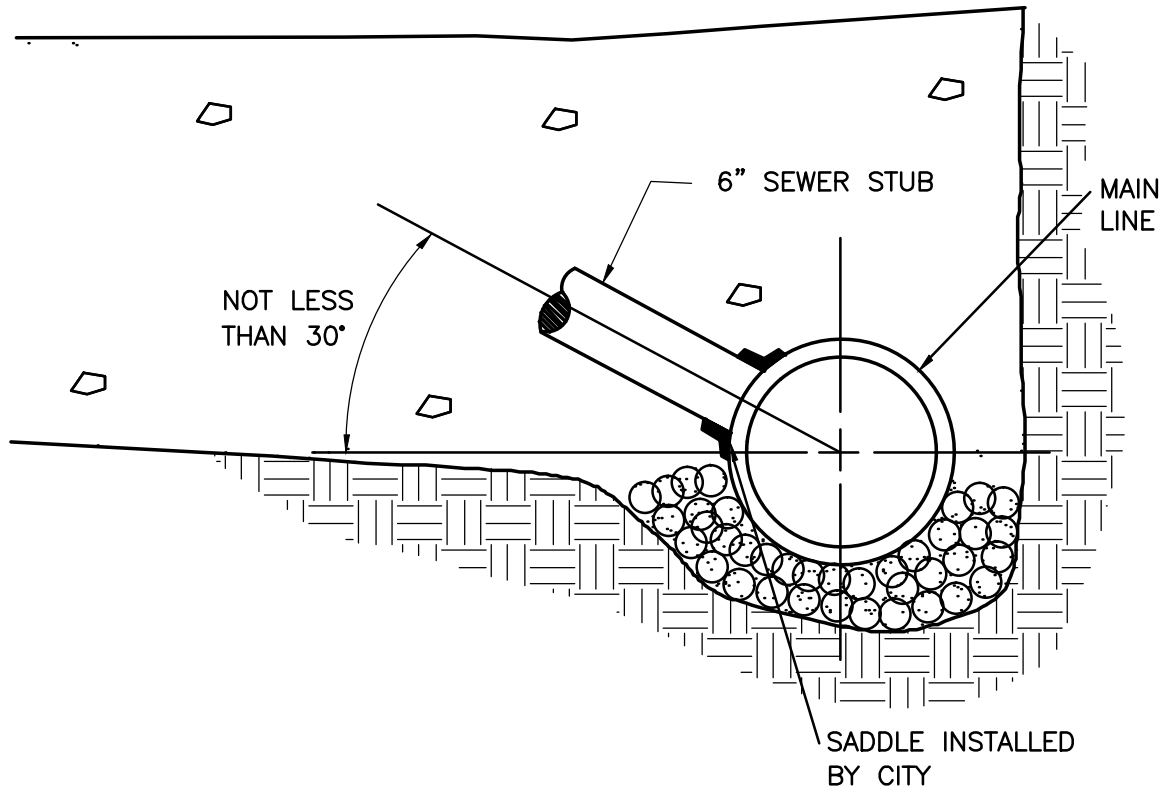
4" PIPE TO 6" PIPE
 INSTALLATION DETAIL

DRAWN BY: EFT

CHECKED BY:


DATE: 6/02

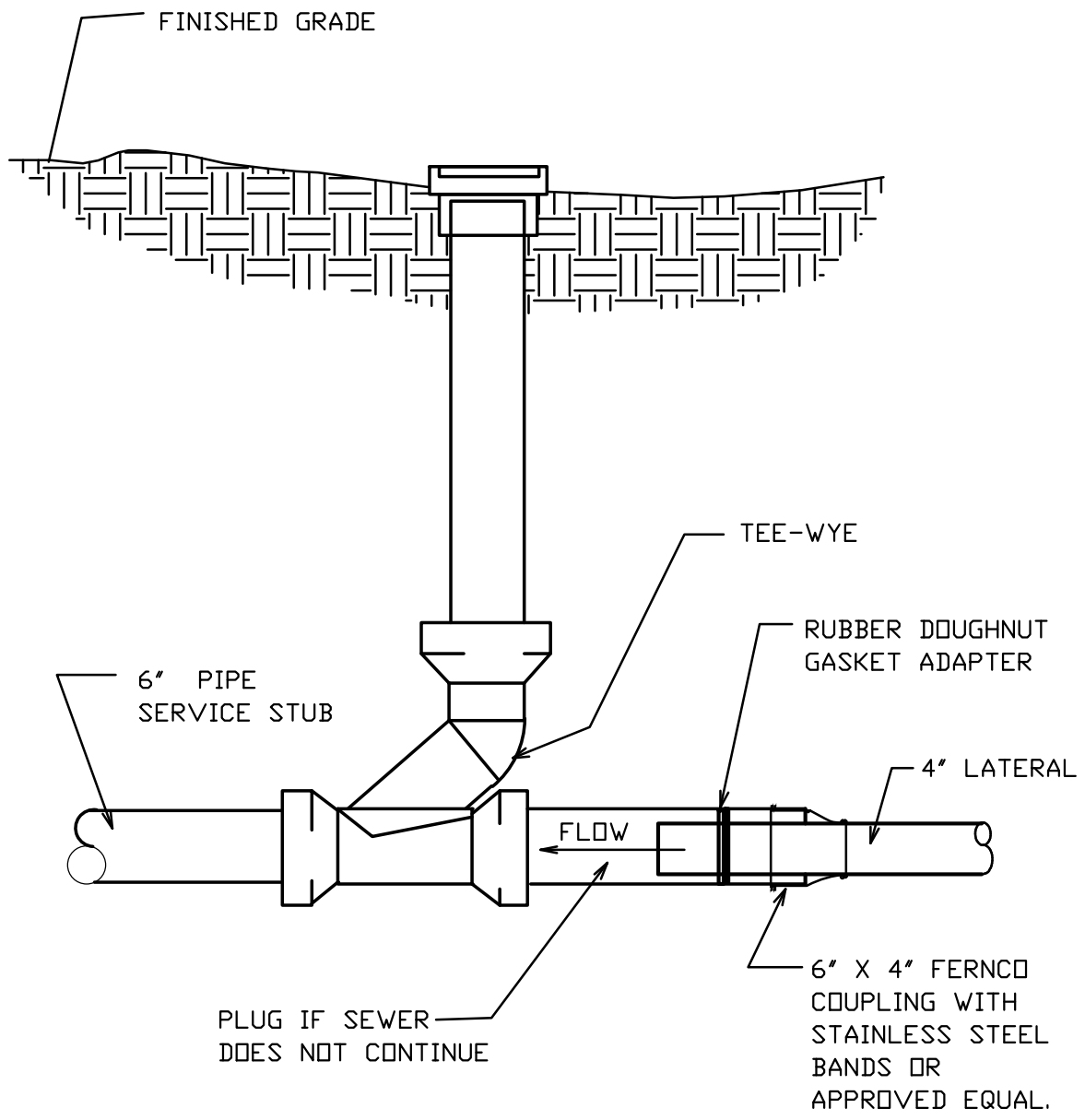
REVISED: 4/11



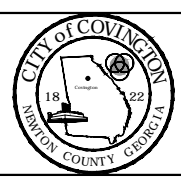
NOTE:

1. ALL TAPS TO BE MADE BY THE CITY OF COVINGTON
2. CONTRACTOR TO OPEN DITCH AND EXPOSE PIPE PRIOR TO NOTIFYING CITY TO MAKE TAP.

<h1>CITY OF COVINGTON</h1>	 <p>City of Covington Engineering Department 2116 Stallings Street Covington, Georgia 30015</p>
<h2>SANITARY SEWER SYSTEM DETAIL</h2>	
<h3>SERVICE STUB CONNECTION DETAIL</h3>	<p>DRAWN BY: EFT</p> <p>CHECKED BY:</p> <p>DATE: 6/02</p> <p>REVISED: 4/11</p>



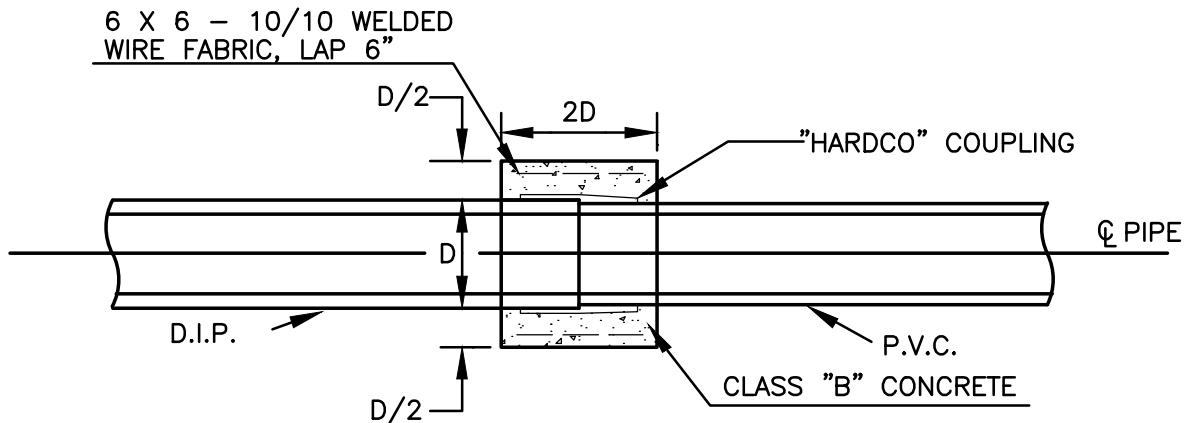
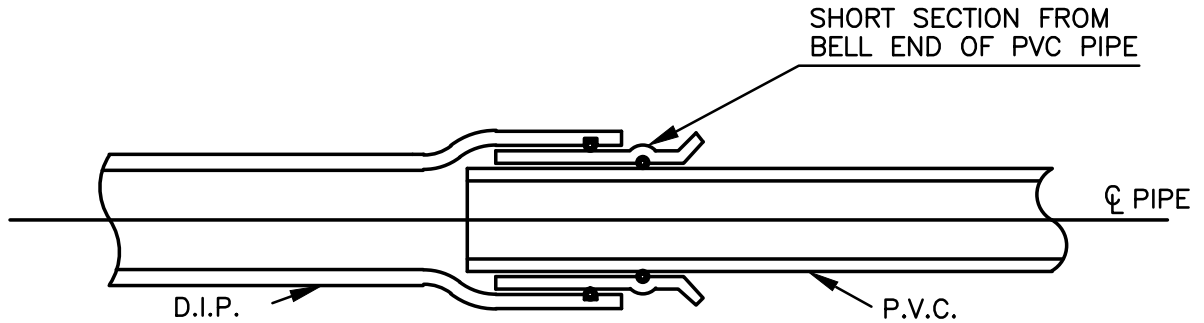
CITY OF COVINGTON
 SANITARY SEWER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

6" CLEAN OUT

DRAWN BY: EFT
 CHECKED BY:
 DATE: 6/02
 REVISED: 4/11



NOTES:

TRANSITION JOINTS -

FROM DUCTILE IRON PIPE TO P.V.C. PIPE FOR PIPE SIZES LESS THAN 12" SHALL UTILIZE: 1) WATER MAIN TYPE COMPRESSION COUPLINGS (WITH ADAPTER GASKETS IF NEEDED) OR 2) "HARDCO" TYPE COUPLINGS WITH STAINLESS STEEL SHEAR BANDS OR 3) SHALL BE CONSTRUCTED AS SHOWN IN THE DETAIL.

OTHER CONNECTIONS -

SHALL USE A "HARDCO" TYPE COUPLING ENCASED IN CONCRETE, (IF IT IS AVAILABLE IN THE APPROPRIATE SIZE).

THE USE OF POLYETHYLENE WRAP WILL GENERALLY BE PERMITTED ONLY FOR CONNECTIONS INVOLVING LARGE DIAMETER PIPES.

CITY OF COVINGTON
SANITARY SEWER SYSTEM DETAIL



City of Covington
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

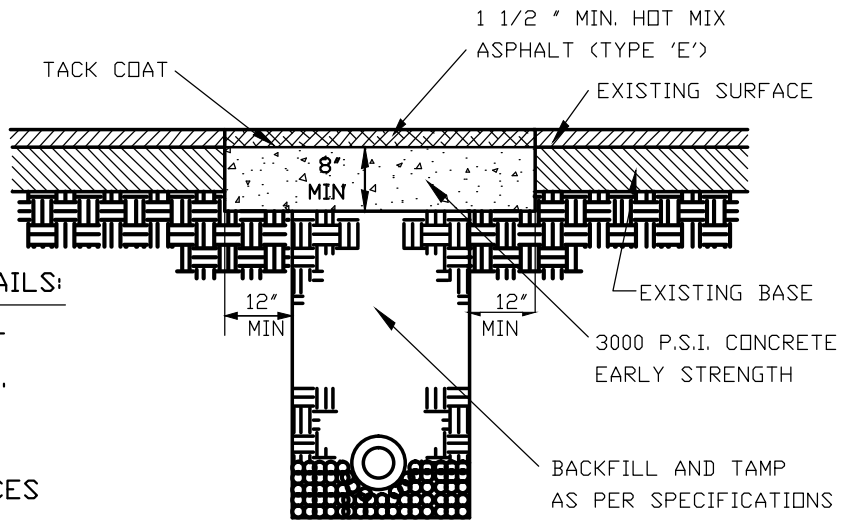
TRANSITION COLLAR

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



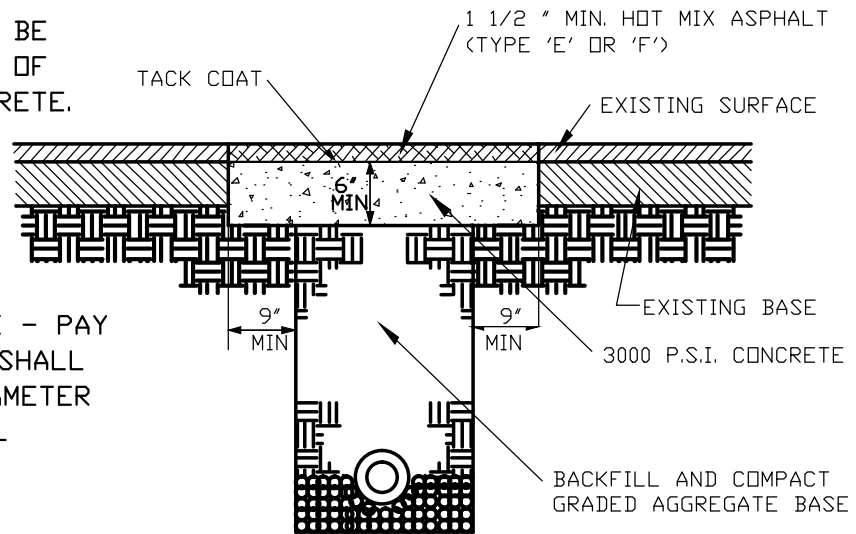
NOTES TO BOTH DETAILS:

1. PROVIDE STRAIGHT VERTICAL SAW CUTS.
2. CONCRETE SURFACES TO BE CLEANED AND BITUMINOUS TACK OR PRIME COAT APPLIED BEFORE PLACEMENT OF ASPHALTIC TOPPING.
3. HOT MIX ASPHALT WEARING COURSE TO BE APPLIED A MINIMUM OF 7 DAYS AFTER CONCRETE.
4. WHEN APPLICABLE - PAY WIDTH FOR PAVING SHALL BE THE OUTSIDE DIAMETER OF THE PIPE BARREL PLUS 42" (inches).

TYPE 'C' CUT REPAIR

FOR GA DOT ROUTES WITH NUMBERS

(e.g. - S.R.13, S.R.20, ..)



TYPE 'C' CUT REPAIR

CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL

TYPICAL PAVEMENT
PATCH



City of Covington

Engineering Department
2116 Stallings Street
Covington, Georgia 30015

DRAWN BY: EFT

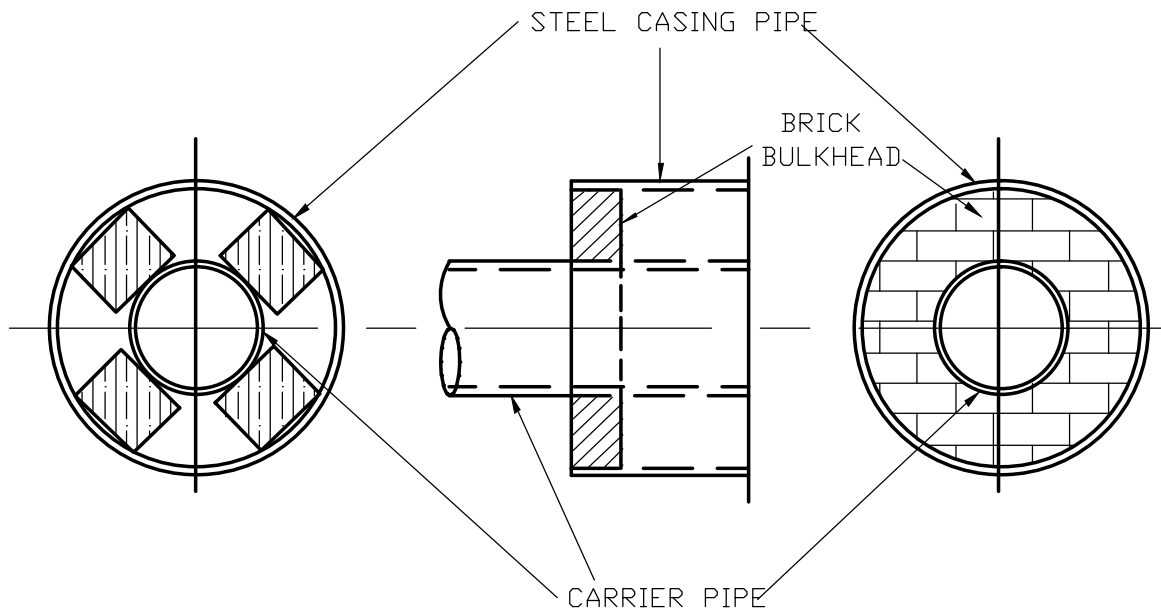
CHECKED BY:

DATE: 6/02

REVISED: 4/11

TREATED WOOD SKIDS SECURED AT BELL
 END OF EACH JOINT OF CARRIER PIPE
 (<24" MINIMUM LENGTH)

WOOD SKIDS SHALL BE TREATED IN
 ACCORDANCE WITH AMERICAN WOOD PRESERVES
 BUREAU STANDARD LP-22



BLOCKING DETAIL

BULKHEAD DETAILS

NOTE:

1. BLOCKING SHALL BE UTILIZED WHEN REQUIRED BY GCDPU
2. CASING PIPE UP TO 20" SHALL HAVE A THICKNESS OF .375 INCH
3. CASING PIPE OVER 20" SHALL HAVE A THICKNESS OF .5 INCH

CITY OF COVINGTON
 SANITARY SEWER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

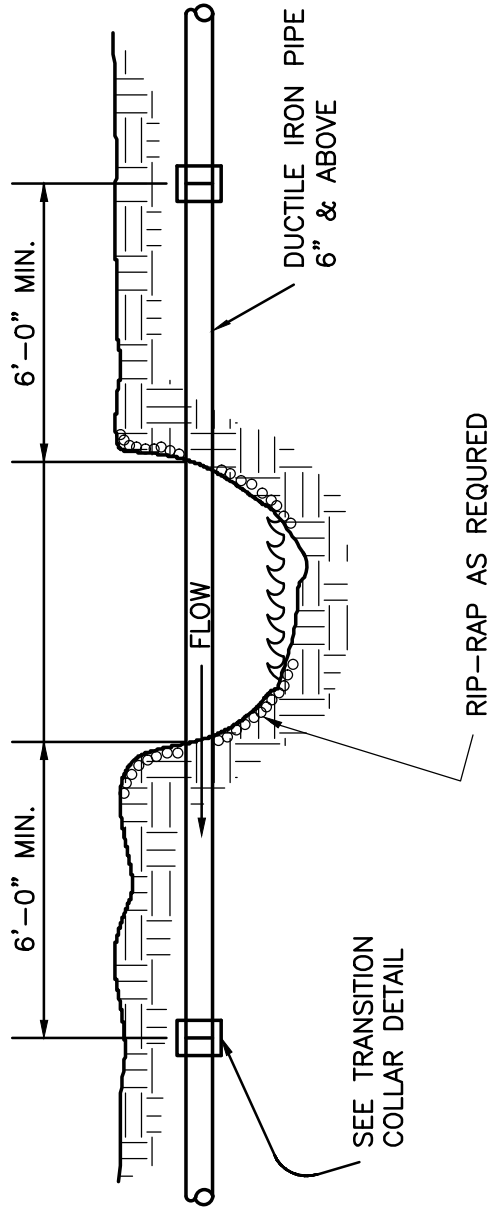
JACK & BORE CASING

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL



City of Covington

Engineering Department
2116 Stallings Street
Covington, Georgia 30015

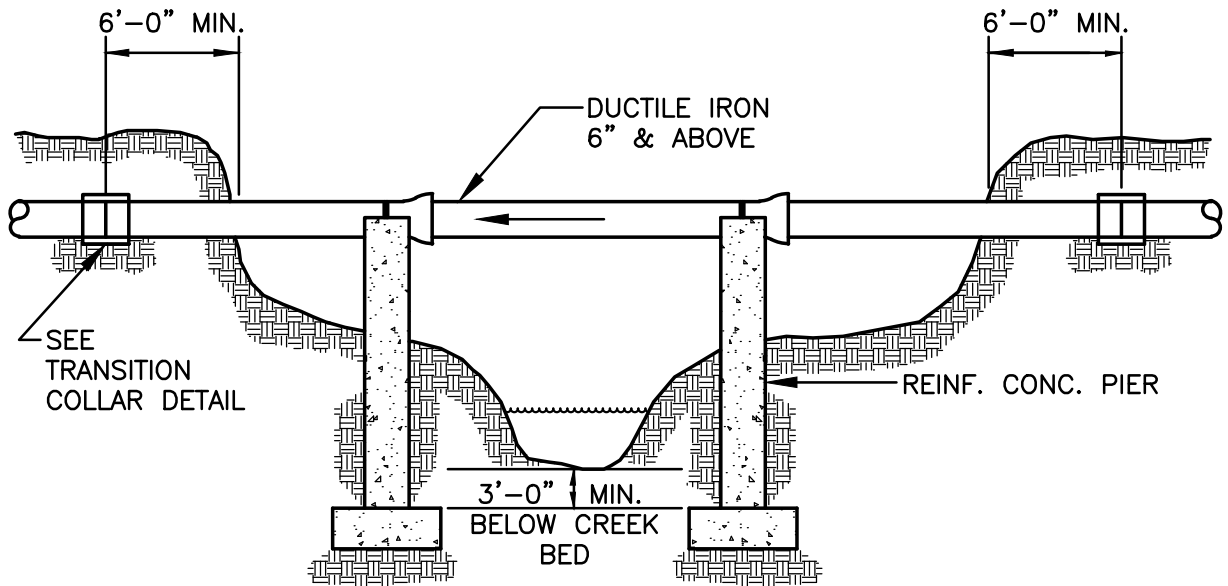
NON-PIER AERIAL DIP
SEWER LINE

DRAWN BY: EFT

CHECKED BY:


DATE: 6/02

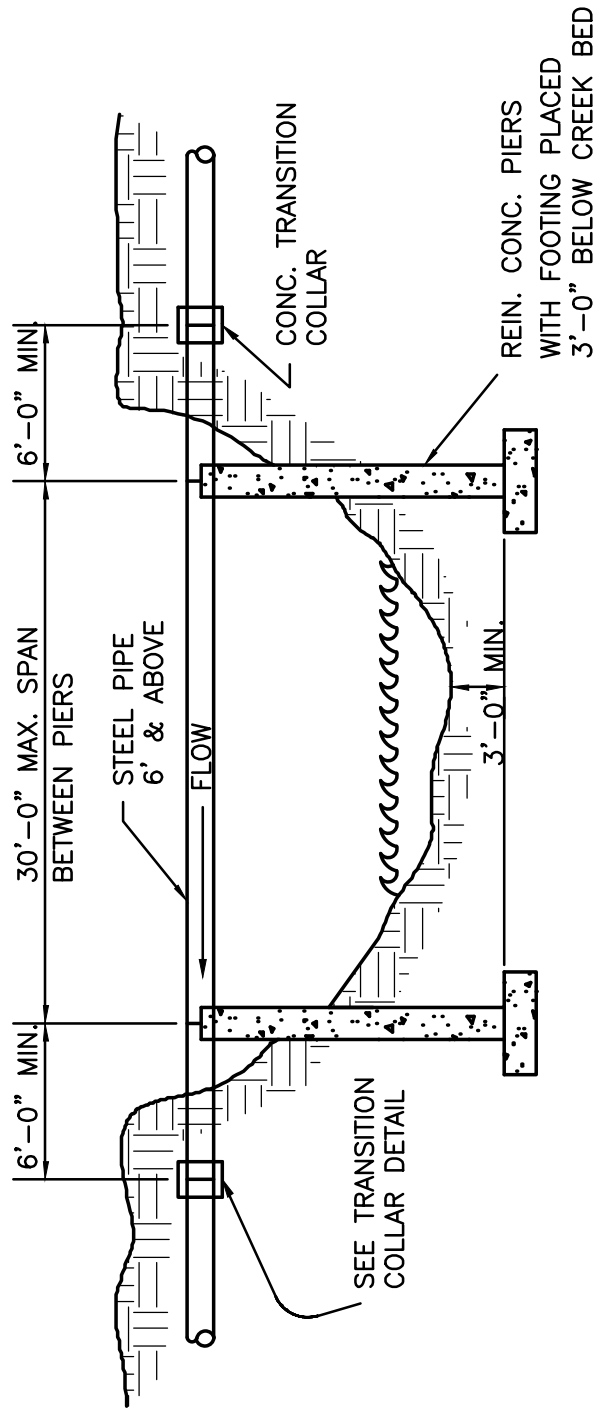
REVISED: 4/11



NOTE:

1. WHENEVER POSSIBLE NO PIERS SHALL BE PLACED WITHIN NORMAL FLOW OF CREEK. FOOTINGS SHALL BE PLACED 3 FEET MINIMUM BELOW CREEK BED.
2. REINFORCED CONCRETE PIERS SHALL BE PLACED BEHIND BELL OF EACH JOINT OF DUCTILE IRON PIPE.
3. ALL PIER PLACEMENT SHALL BE APPROVED BY GWINNETT COUNTY DEPARTMENT OF PUBLIC UTILITIES.
4. IF PIER PLACEMENT FOR DUCTILE IRON PIPE CAN NOT MEET THE ABOVE STIPULATIONS, STEEL PIPE SHALL BE USED.
5. DISTURBED AREA SHALL BE RIP-RAPPED AS REQUIRED.

<p>CITY OF COVINGTON</p>	 <p><i>City of Covington</i> Engineering Department 2116 Stallings Street Covington, Georgia 30015</p>
<p>SANITARY SEWER SYSTEM DETAIL</p>	
<p>PIER PLACEMNET FOR DIP AERIAL LINES</p>	<p>DRAWN BY: EFT</p> <p>CHECKED BY:</p> <p>DATE: 6/02</p> <p>REVISED: 4/11</p>



NOTE: PIERS ARE NOT NEEDED UNLESS AERIAL SPAN IS OVER 20'-0" IN LENGTH.

- NOTE:
1. WHENEVER POSSIBLE NO PIERS SHALL BE PLACED IN NORMAL FLOW OF CREEK.
 2. ALL AERIAL CROSSINGS MUST BE APPROVED BY THE CITY OF COVINGTON ENGINEERING DEPARTMENT.
 3. SPANS EXCEEDING 30 FEET REQUIRES SUBMITTAL OF DESIGN CALCULATIONS.

CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL

AERIAL STEEL PIPE CROSSING



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

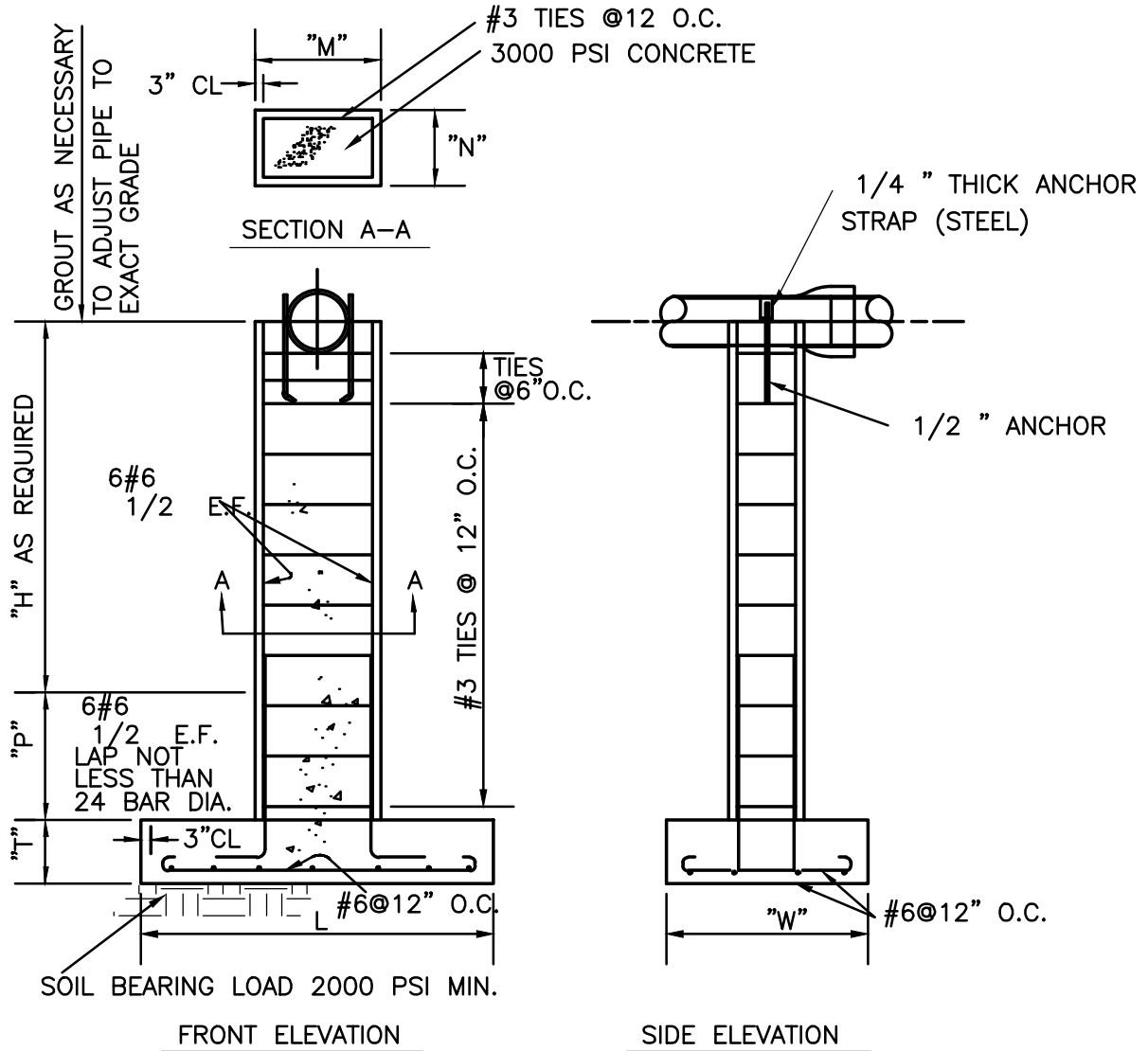
DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11

"H" =	0-5	5-10	10-15	15-20
"W" =	3	4	5	6
"L" =	4	5	7	10
"T" =	1	1	1.5	2
"Z" =	1	1	1.5	1.5
"Z" =	2	3	4	5
"T" =	2	3	4	5



NOTE:

1. ABOVE DETAIL IS THE MINIMUM ACCEPTABLE. - SITE CONDITIONS MAY DICTATE MORE STRINGENT REQUIREMENTS.
2. ALTERNATE DESIGNS MAY BE SUBMITTED.

CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL



City of Covington

Engineering Department
2116 Stallings Street
Covington, Georgia 30015

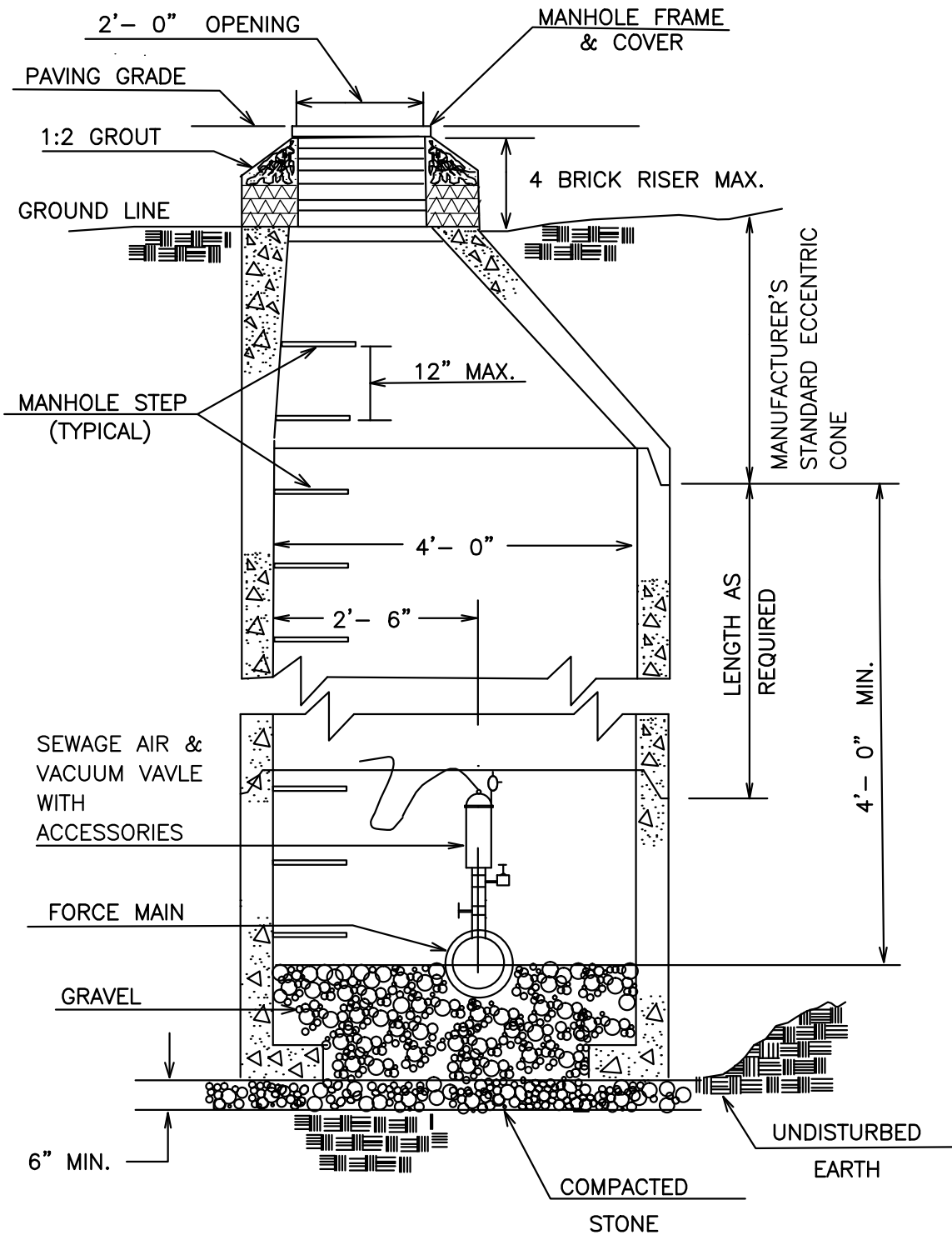
CONCRETE PIER &
FOOTING

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON
 SANITARY SEWER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

AIR & VACUUM VALVE
 MANHOLE DETAIL

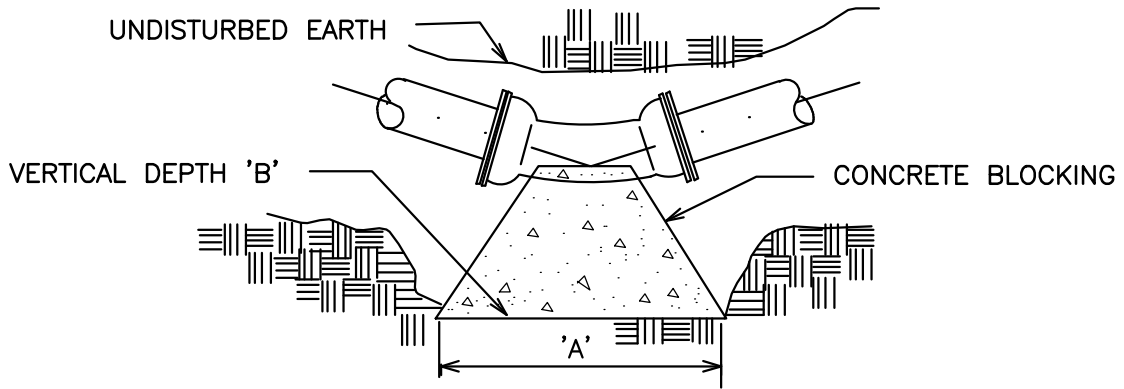
DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11

CONCRETE BLOCKING FOR HORIZONTAL BENDS



PLAN VIEW

90 DEGREE BEND

FM SIZE (in.)	A (ft.)	B (ft.)
24	8.53	6.00
20	7.47	4.83
18	6.40	4.50
16	5.87	4.00
12	4.27	3.00
10	3.20	2.83
8	2.67	2.33
6	2.13	1.50

CONDITIONS:

200 PSI WATER PRESSURE
2500 PSI SOIL CAPACITY

45 DEGREE BEND

FM SIZE (in.)	A (ft.)	B (ft.)
24	5.33	5.25
20	4.80	4.00
18	4.27	3.67
16	3.73	3.33
12	3.55	2.00
10	2.67	1.87
8	1.95	1.67
6	1.95	1.00

22.5 DEGREE BEND

FM SIZE (in.)	A (ft.)	B (ft.)
24	4.80	3.00
20	3.73	2.67
18	3.20	2.50
16	2.85	2.33
12	1.78	2.00
10	1.42	1.83
8	1.07	1.67
6	1.07	1.00

CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL



City of Covington

Engineering Department
2116 Stallings Street
Covington, Georgia 30015

HORIZONTAL CONCRETE
BLOCKING

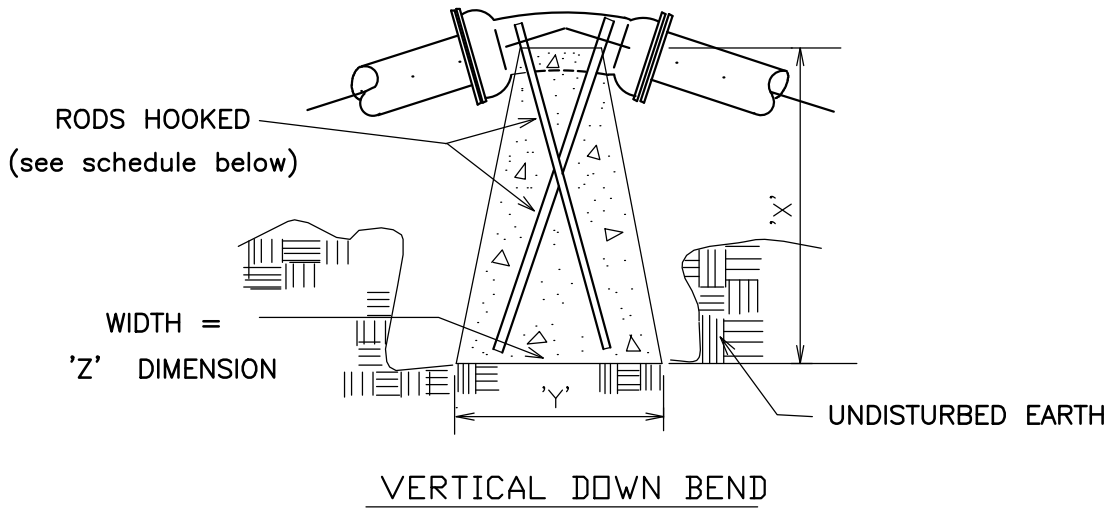
DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11

CONCRETE BLOCKING FOR VERTICAL BENDS



CONDITIONS:
 200 PSI WATER PRESSURE
 2500 PSI SOIL CAPACITY

NOTE:
 FOR VERTICAL UP BEND USE
 THE DIMENSIONS FOR
 HORIZONTAL BENDS

45 DEGREE BEND

22.5 DEGREE BEND

FM SIZE (in.)	X or Y or Z (ft.)	ROD (in.)
24	11.06	1.50
16	8.34	1.00
12	6.89	1.00
10	6.01	0.75
8	5.29	0.75
6	4.33	0.75

FM SIZE (in.)	X or Y or Z (ft.)	ROD (in.)
24	8.65	1.50
16	6.73	1.00
12	5.53	1.00
10	4.81	0.75
8	4.16	0.75
6	3.53	0.75

CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

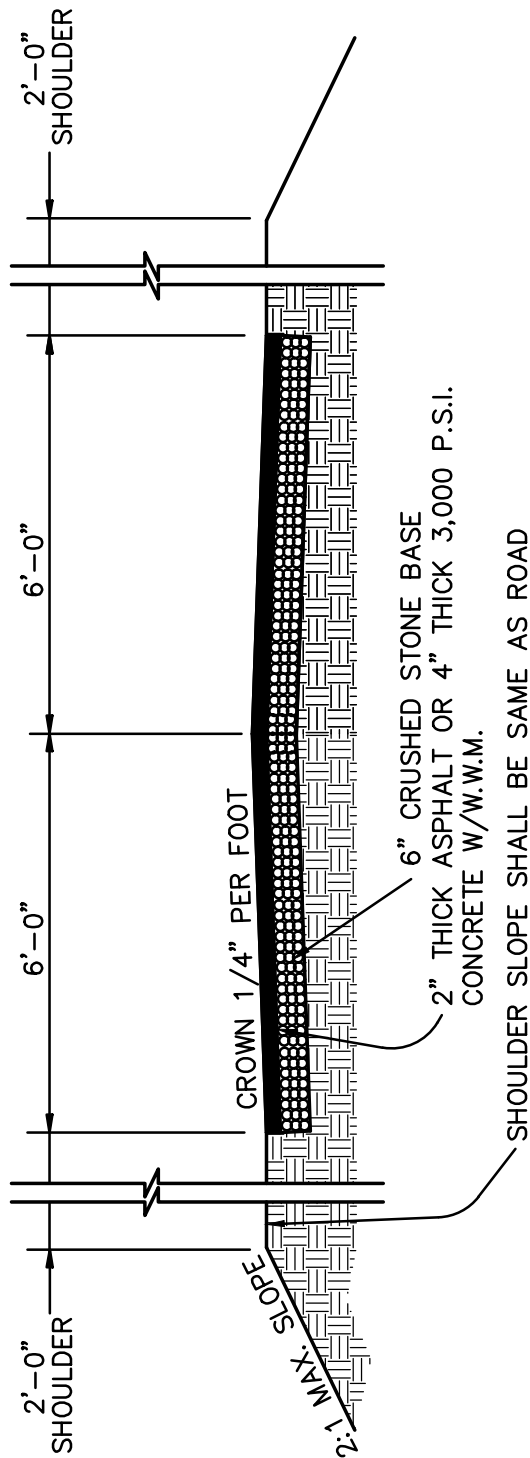
VERTICAL CONCRETE
 BLOCKING

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



NOTES

ENGINEER SHALL SUBMIT COPY OF PLAN AND PROFILE OF ACCESS ROAD FROM PUMP STATION SITE TO EXISTING ROAD OR STREET. SLOPE OF ACCESS ROAD SHALL COMPLY WITH COUNTY REGULATIONS.

CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL



City of Covington

Engineering Department
2116 Stallings Street
Covington, Georgia 30015

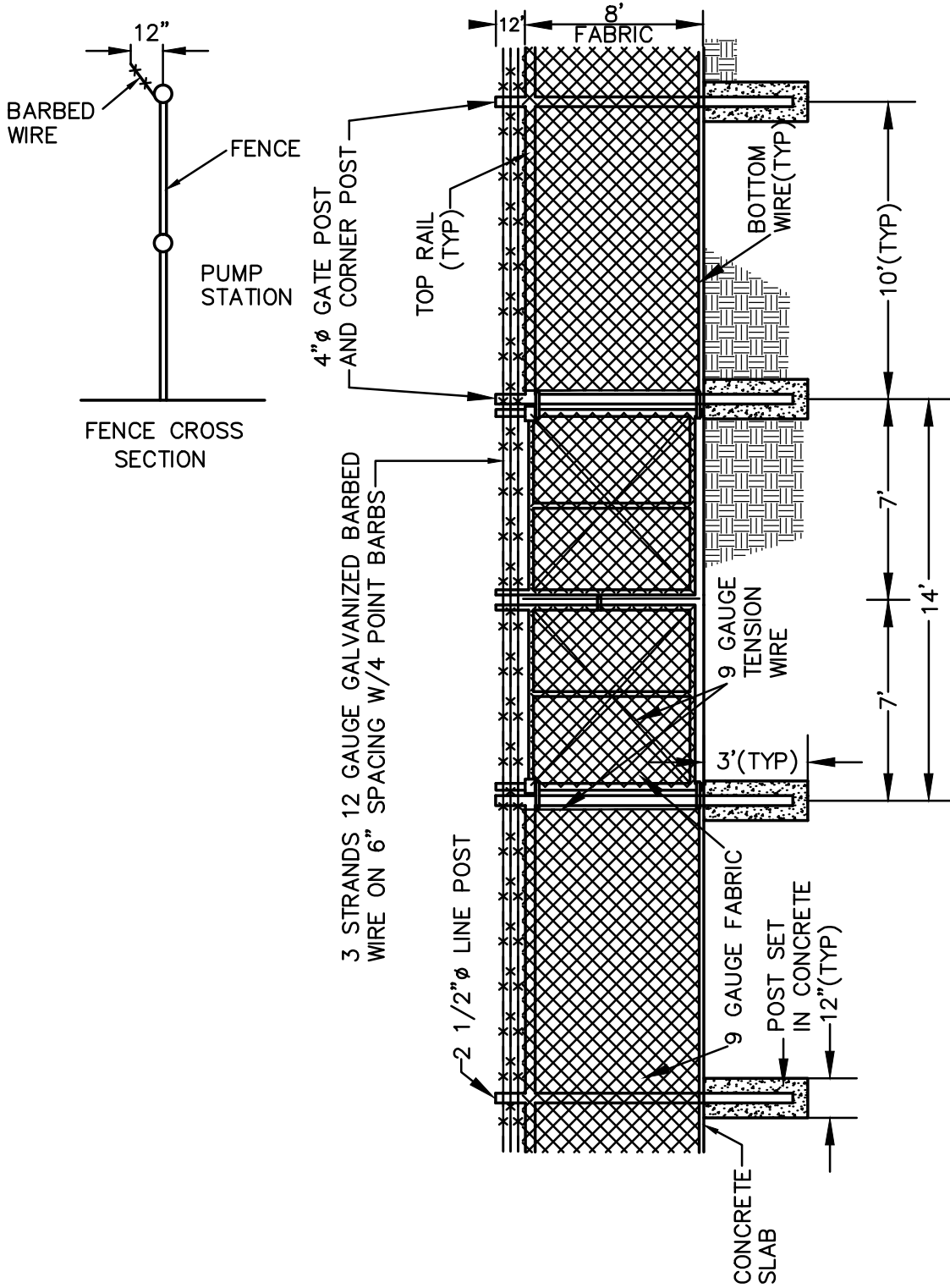
ACCESS ROAD DETAIL

DRAWN BY: EFT


CHECKED BY:

DATE: 6/02

REVISED: 4/11



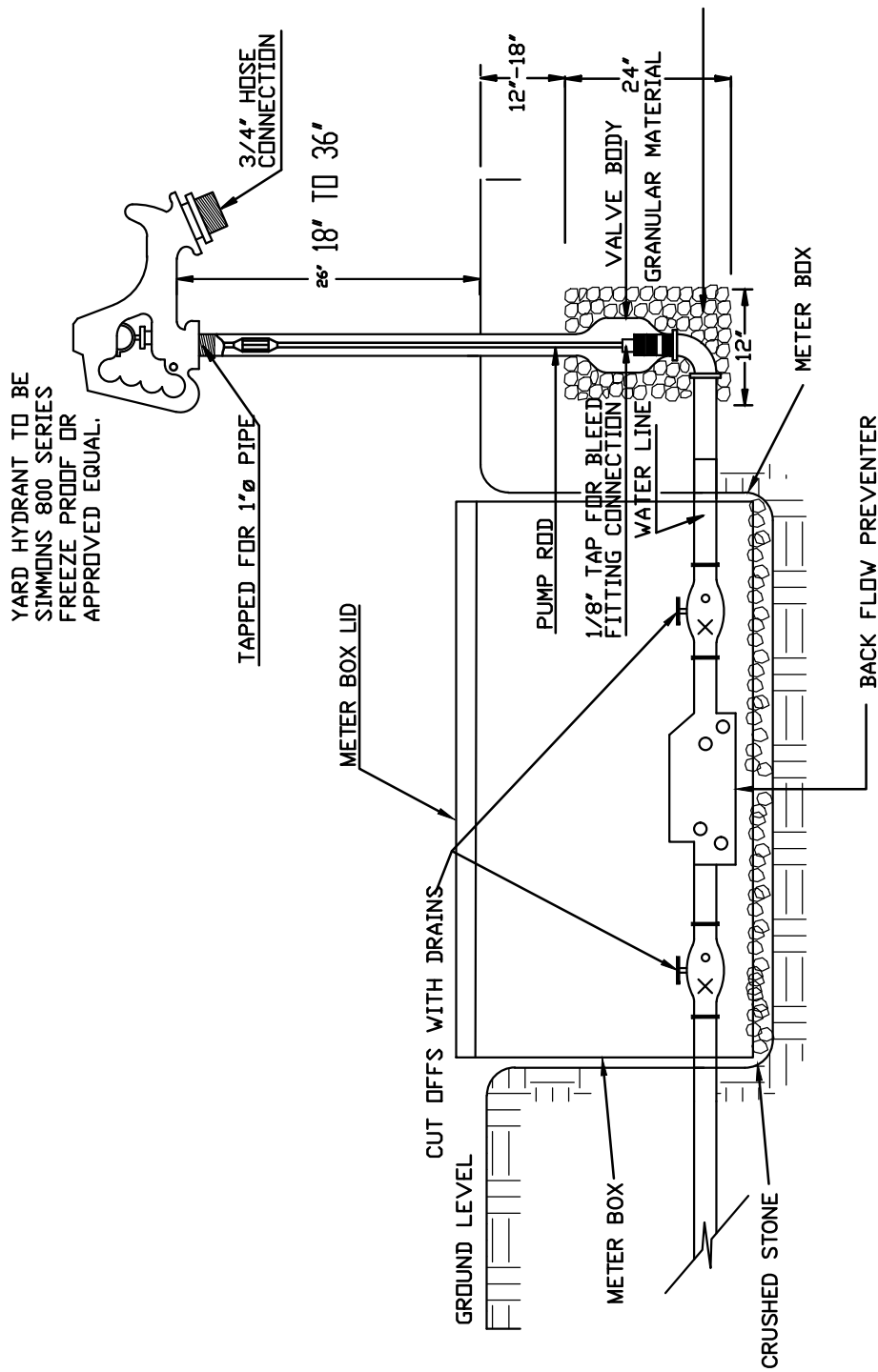
CITY OF COVINGTON
 SANITARY SEWER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

FENCE & GATE DETAIL

DRAWN BY: EFT
CHECKED BY:
DATE: 6/02
REVISED: 4/11



CITY OF COVINGTON
 SANITARY SEWER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

HOSE BIBB & BACKFLOW
 PREVENTER DETAIL

DRAWN BY: EFT

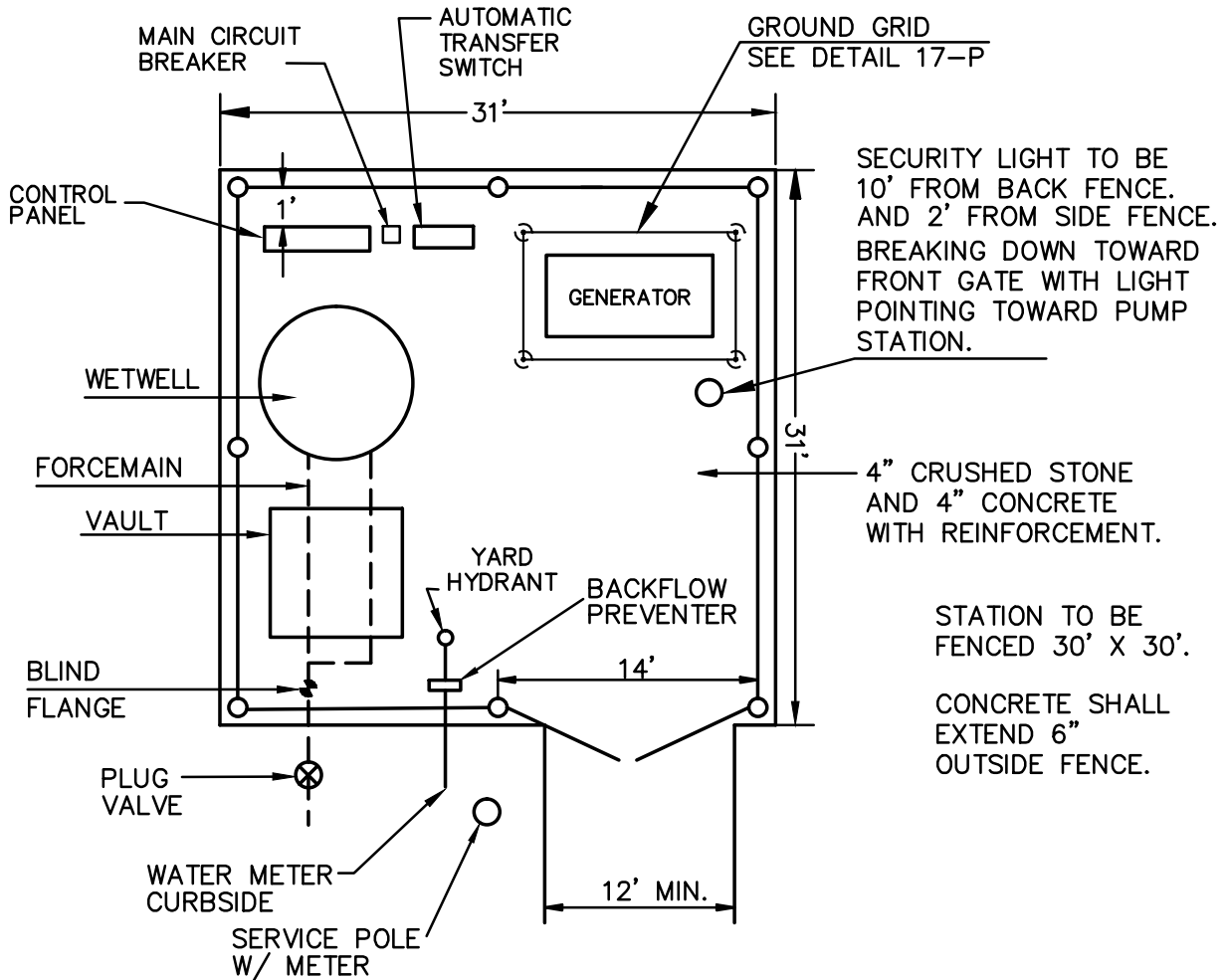
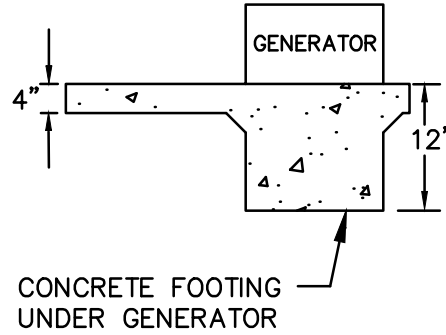
CHECKED BY:

DATE: 6/02

REVISED: 4/11

NOTE: COMPACTION CERTIFICATION LETTER
REQUIRED AS STATED IN THE G.C.D.P.U.
DESIGN MANUAL.

NOTE: FLOOR OF CHECK
VALVE VAULT TO BE
SLOPED TO DRAIN.



NOTE: THIS IS A GENERAL SCHEMATIC LAYOUT. LOCATIONS MAY
VARY ACCORDING TO EQUIPMENT SIZE AND SITE REQUIREMENTS.

CITY OF COVINGTON
SANITARY SEWER SYSTEM DETAIL



City of Covington
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

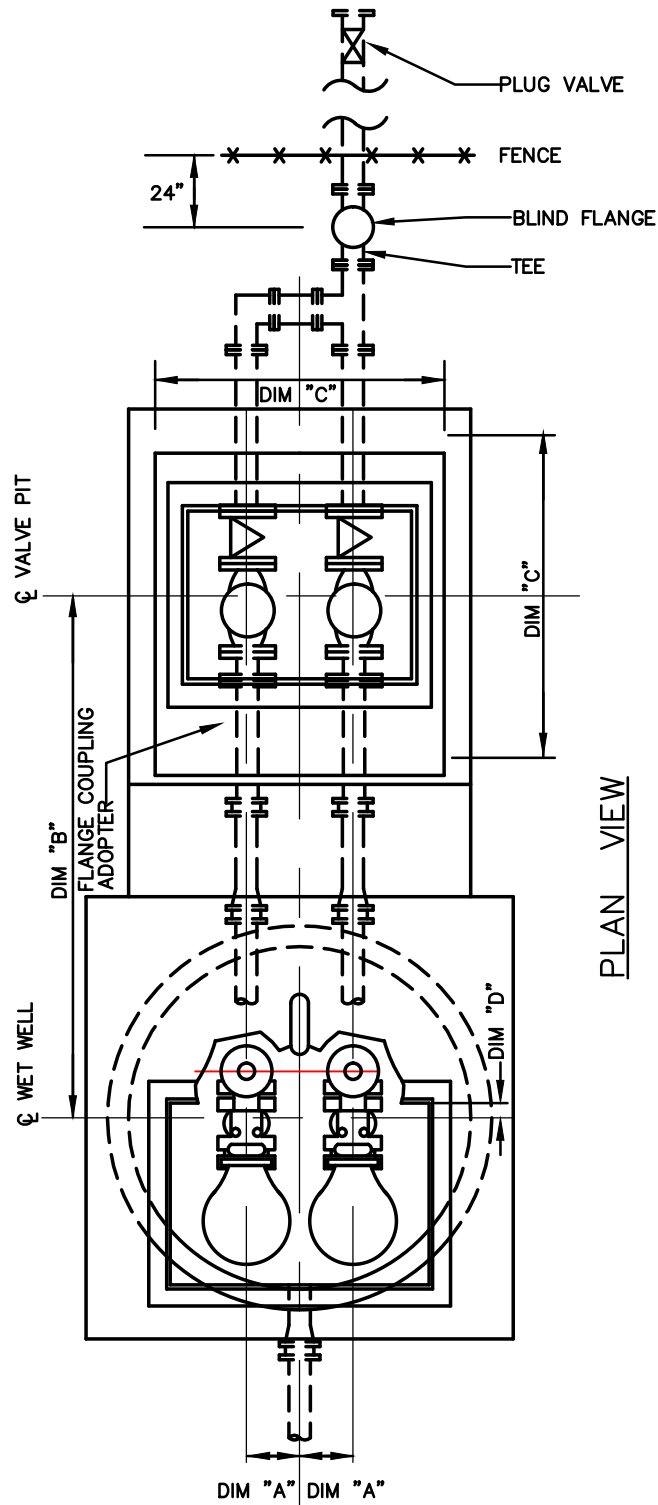
SUBMERSIBLE SITE
LAYOUT PLAN

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON
 SANITARY SEWER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

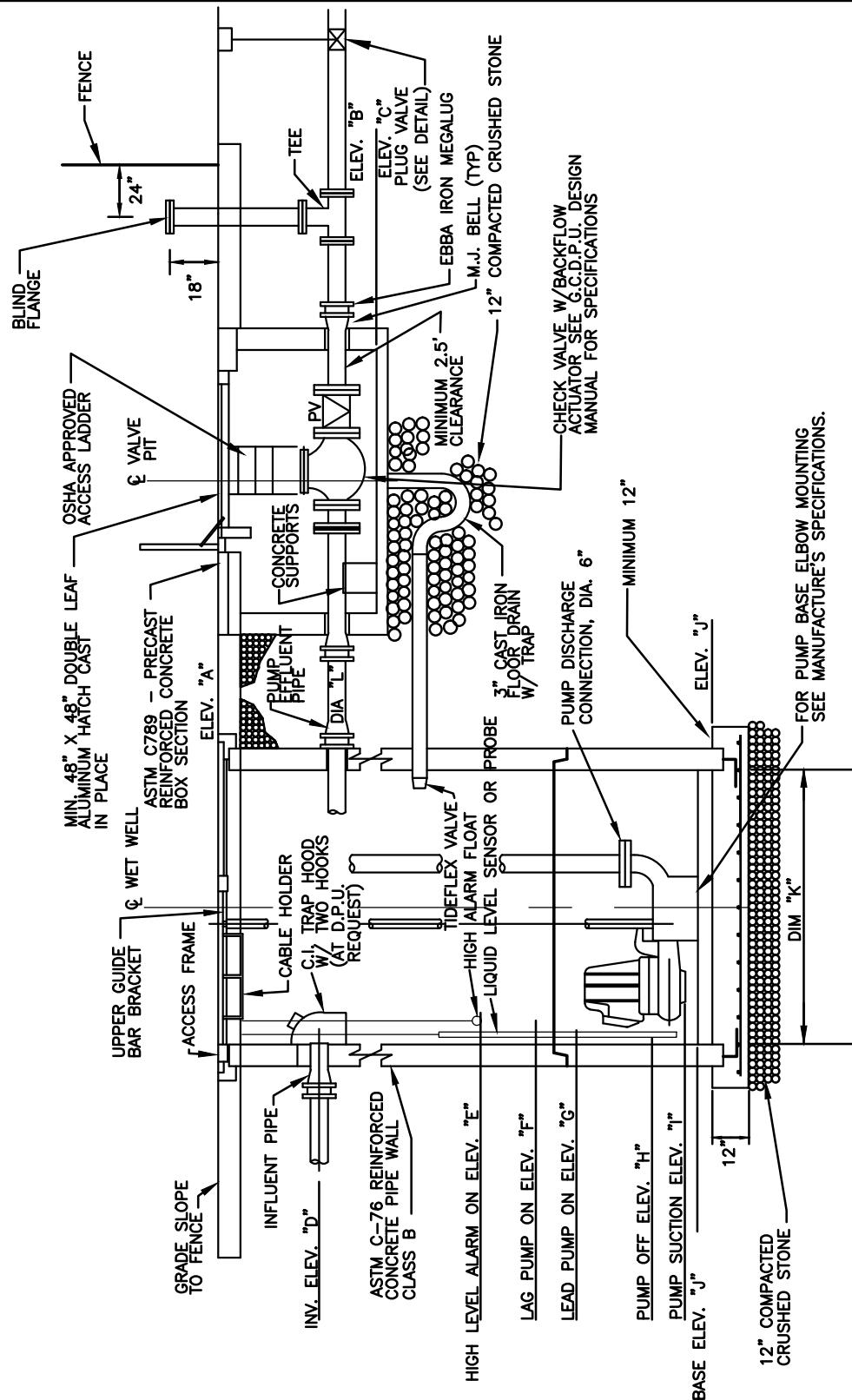
SUBMERSIBLE
 PUMPING STATION

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



SECTION A

- NOTE: 1) ALL PIPES INSIDE THE WET WELL AND VALVE VAULT SHALL BE FLANGED FITTINGS.
 2) WETWELL TO BE COATED WITH A TWO-PART EPOXY COATING ON INTERIOR SURFACES.

CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL

SUBMERSIBLE PUMPING STATION PLAN



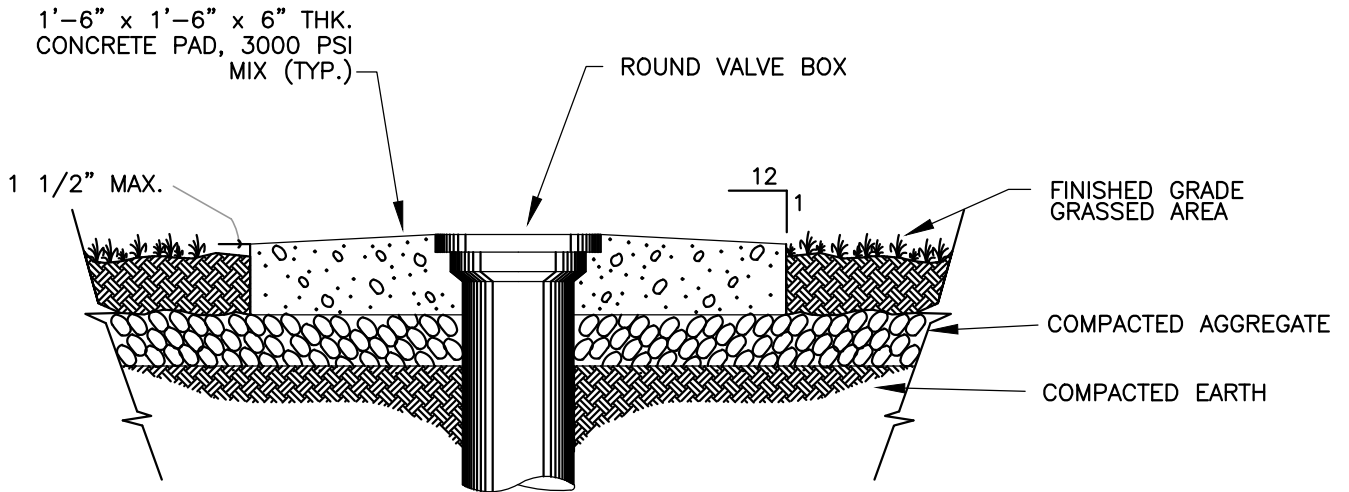
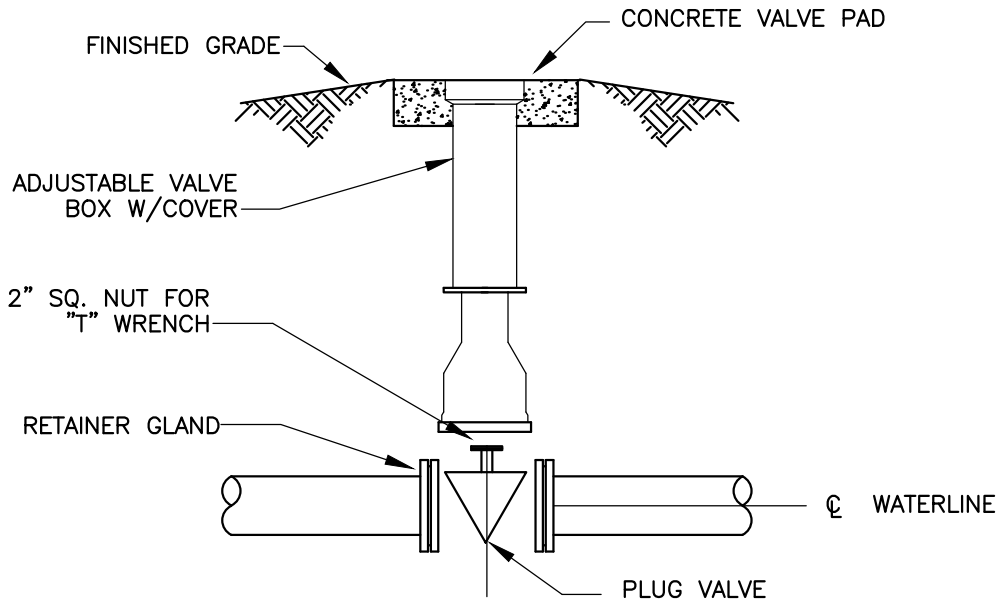
City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON
SANITARY SEWER SYSTEM DETAIL



City of Covington
Engineering Department
2116 Stallings Street
Covington, Georgia 30015

PLUG VALVE FOR
BYPASS ASSEMBLY

DRAWN BY: EFT

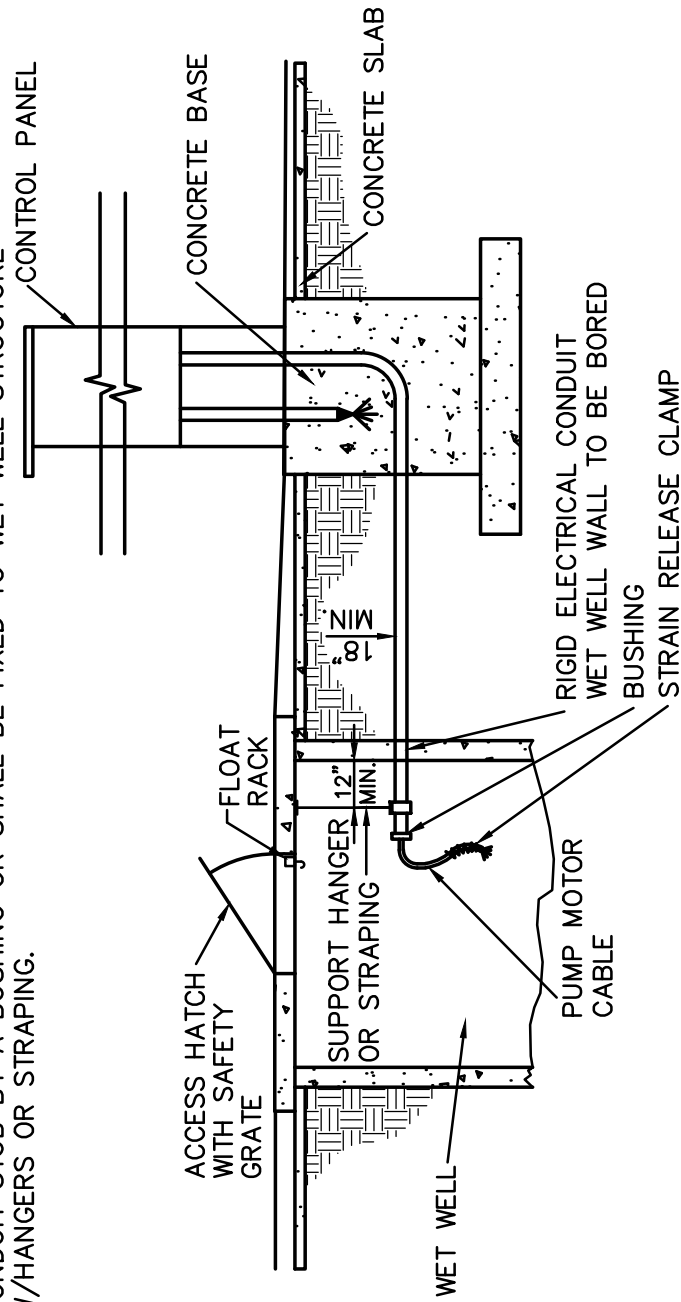
CHECKED BY:

DATE: 6/02

REVISED: 4/11

NOTE

1. RIGID CONDUITS SHALL BE STUBBED INTO WALL OF WET WELL 18" MIN. BELOW GROUND LEVEL TO PROVIDE ACCESS TO CABLES & CONTROL WIRING TO CONTROL PANEL.
2. THE HOLE IN THE WET WELL WALL FOR THE CONDUIT STUBS SHALL BE SIZED & BORED FOR THE CONDUIT TO FIT. HOLE SHALL BE GROUTED.
3. WHEN CONDUIT STUB IS 12" OR OVER IN LENGTH, THE STUB SHALL BE SUPPORTED BY HANGERS OR STRAPING.
4. THE STUBS INSIDE THE WET WELL SHALL NOT PROTRUDE OR INTERFERE WITH CLEARANCE OF ACCESS HATCH'S OPENING, NOR HINDER REMOVAL OF THE PUMPS.
5. THE CABLES SHALL HAVE A STRAIN RELEASE CLAMP MOUNTED TO THE CONDUIT STUB BY A BUSHING OR SHALL BE FIXED TO WET WELL STRUCTURE W/HANGERS OR STRAPING.



NOTE:

IF FLOAT SWITCHES ARE TO BE USED, THEY SHALL BE INSTALLED THE SAME WAY AS PUMP CABLES ARE INSTALLED.

CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

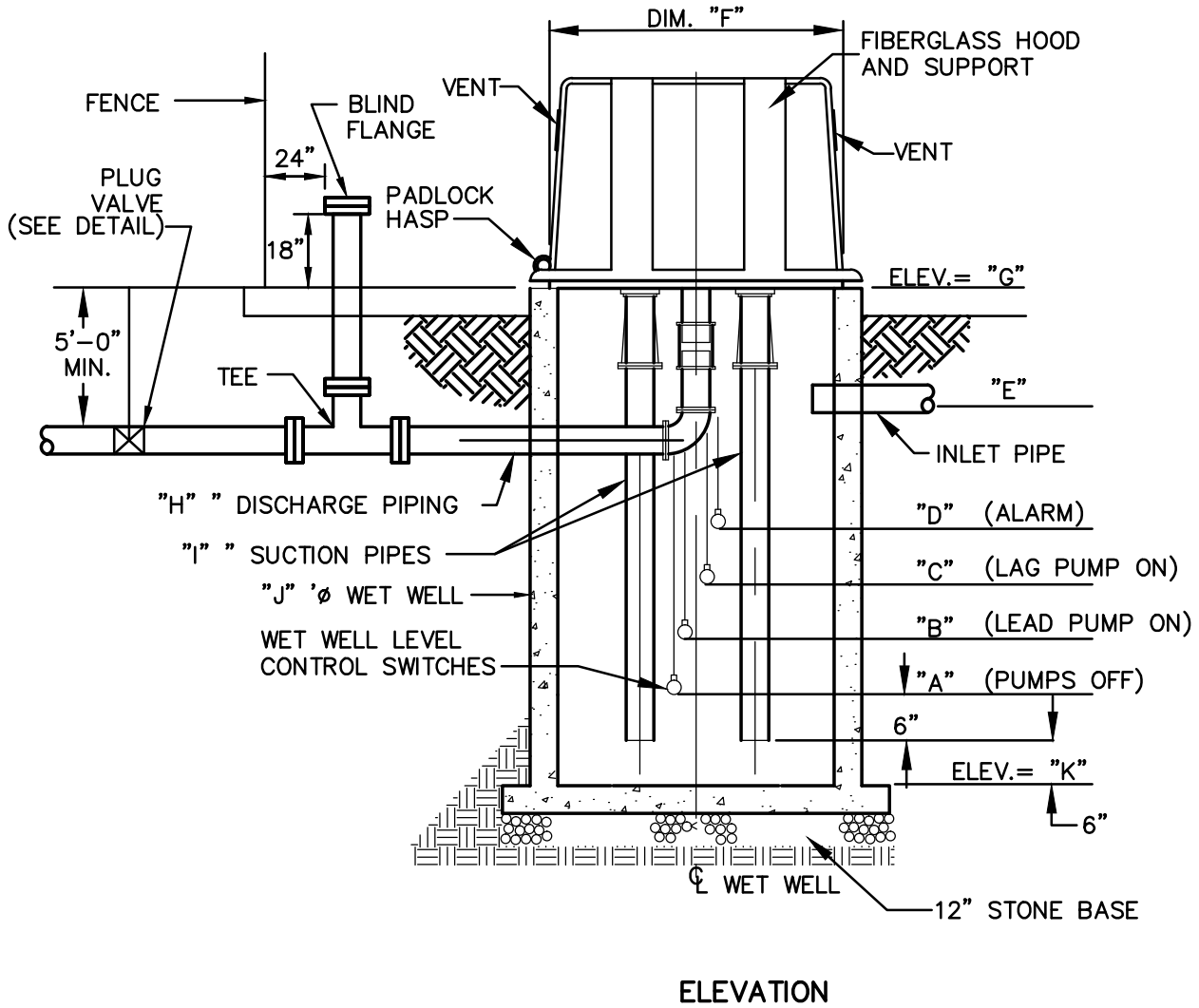
SUBMERSIBLE PUMP CABLE

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON
 SANITARY SEWER SYSTEM DETAIL



City of Covington
 Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

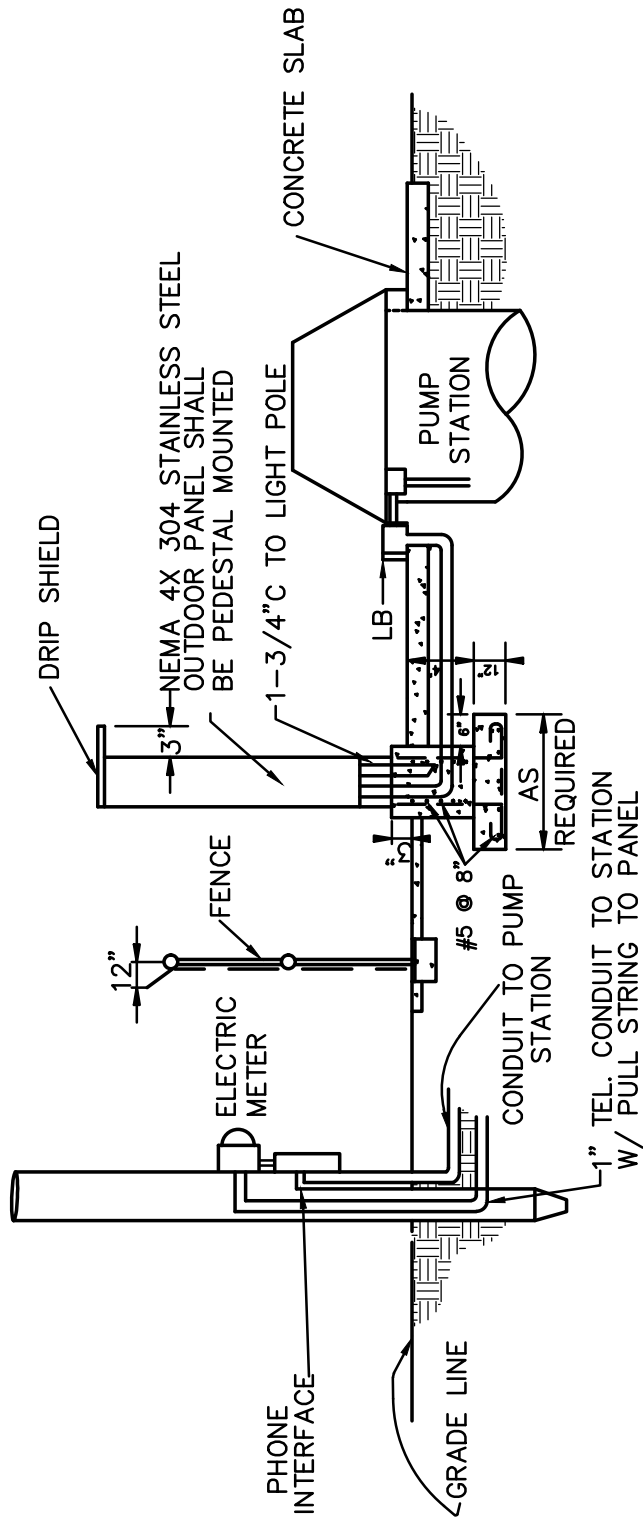
ABOVE GROUND PUMP
 STATION ELEVATION

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



NOTE
 METER & C.T. CABINET SHALL BE PLACED ON UTILITY POLE OUTSIDE OF FENCE.

DISCONNECT SWITCH IS REQUIRED MUST BE LOCKABLE IN OFF AND ON POSITION.

CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL



City of Covington

Engineering Department
 2116 Stallings Street
 Covington, Georgia 30015

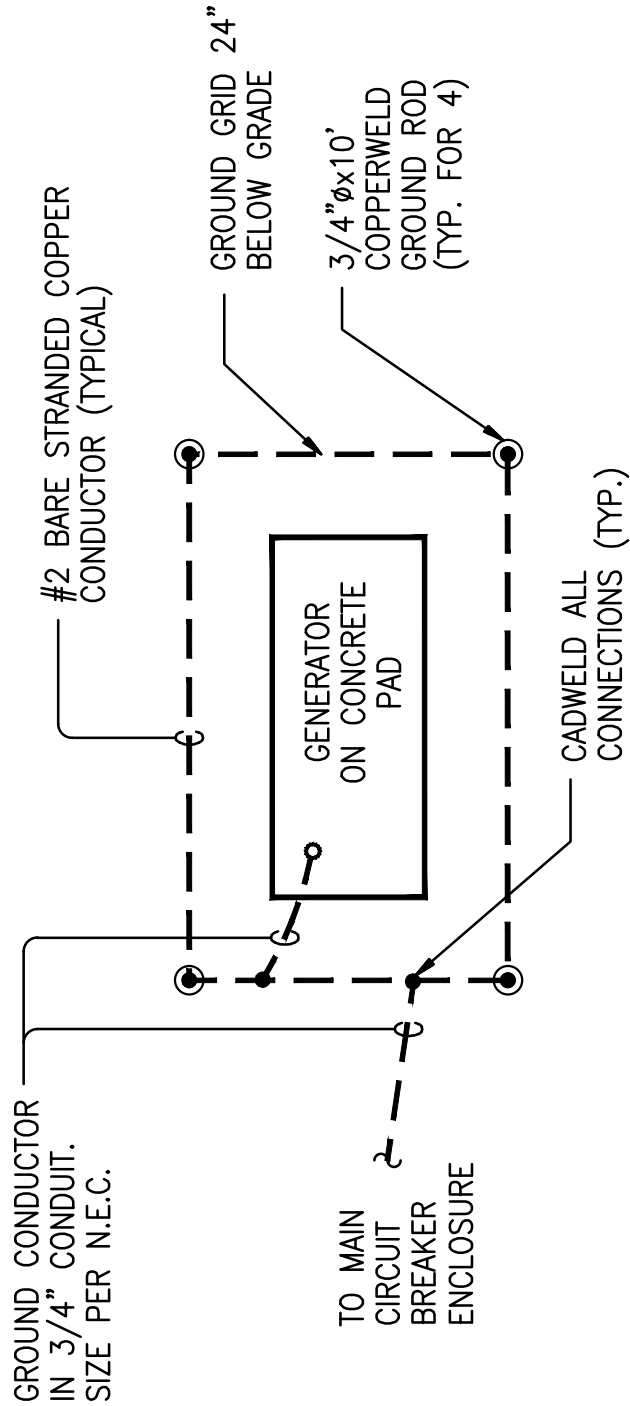
ABOVE GROUND
 CONDUIT ELEVATION

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11



CITY OF COVINGTON

SANITARY SEWER SYSTEM DETAIL



City of Covington

Engineering Department

2116 Stallings Street

Covington, Georgia 30015

PUMP STATION GROUNDING

DRAWN BY: EFT

CHECKED BY:

DATE: 6/02

REVISED: 4/11

APPENDIX A

CITY FEES FOR WATER AND SEWER EXTENSIONS

City of Covington
Engineering Fees

+Plan Review Fees		
<i>Type</i>	<i>Land Use</i>	<i>Amount</i>
Preliminary	Residential	\$200.00
Preliminary	Commercial	\$200.00
Construction Plans	Residential	\$100.00 + \$25 per lot
Construction Plans	Commercial	\$250.00 + \$50 per acre
Final	Residential	\$100 + \$15 per lot
Final	Commercial	\$100 + \$25 per lot
†These fees include review and inspection of water, storm water, sanitary sewer, roads, streets, grading, and E&S pertaining to additions or extensions in residential, commercial, or industrial subdivisions within the City Limits. A \$200.00 fee will be added for every resubmittal.		
◇Water and Sanitary Sewer Additions or Extensions Review Fees		
<i>Type</i>	<i>Land Use</i>	<i>Amount</i>
Construction	All	\$200.00
Final	All	\$200.00
◇These fees include review of water or sanitary sewer additions or extensions not within a subdivision or within a subdivision outside the City Limits. A \$200.00 fee will be added for every resubmittal.		
▣ Additional Fees		
<i>City Service</i>	<i>Amount</i>	
24-hour water pressure, static pressure, residual pressure, and flow test for any proposed addition or extension to the City Water System	\$250.00	
Sanitary sewer flow test (per invert)	\$250.00	
Preparation of the City Water and Sewerage Standards and Specifications (one copy)	\$30.00	
▣ Services may be performed by the Engineering Department; workload permitting. Otherwise, it will be the responsibility of the developer to coordinate these tasks with an outside consultant.		

APPENDIX B

DRINKING WATER SUBMITTAL FORM

Georgia Department of Natural Resources

Environmental Protection Division
205 Butler Street, S.E., Suite 1362 East Tower, Atlanta, Georgia 30334-4100
Drinking Water Program
(404) 656-2750
FAX: (404) 651-9590

DRINKING WATER PROJECT SUBMITTAL FORM

Water System Name: _____ WSID Number: _____

General Project Information

Project Name: _____

Project Description: _____

Project Location: _____ County: _____

Type of Development: _____

Maximum Elevation in Development: _____ (feet)

Number of Service Connections Proposed: _____

Size(s) of Water Main in Project: _____ (inches)

Length of Water Main to be Installed: _____ (feet) Water Main Material: _____

Wastewater for this Project will be handled by: Septic Tank: or Sewer System: (check one)

Is this project an addition to an existing water system? Y N If YES, please indicate: _____

a) Static Pressure (point of tie-in): _____ (psi) at _____ feet elevation

b) Elevation at the point of tie-in: _____ feet

c) Flow Available: _____ (gpm) at _____ (psi) residual, at the point of tie-in.

d) Size of Water Main at Point of Tie-in to Project: _____ (inches)

e) **Include 24-hour pressure test results for projects connecting to existing systems.**

General Existing Water Supply Information

Number of Sources: _____ Total Production Capacity: _____ (gpm)

Number of Existing Service Connections: _____

Finished Water Storage Type(s): _____ Total Storage Volume: _____ (gallons)

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

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

Name

Signature

Title

Date

APPENDIX C

SANITARY SEWER EXTENSION SUBMITTAL FORM

Submitted for review pursuant W. Q. Rules section 391-3-6-.02(3)(a) are this form and (as applicable).

- | | |
|---|--|
| <input type="checkbox"/> Plans (one copy) | <input type="checkbox"/> Project Description, design data |
| <input type="checkbox"/> Specifications (one copy) | |
| <input type="checkbox"/> General map of proposed sewer extensions, outlined proposed service area, connection to the existing system, and flood plain contours and elevations if applicable | <input type="checkbox"/> Certified statement as indicated in 8 |
| | <input type="checkbox"/> Certified statement as indicated in 9 |

1A. Name of local government _____

Local government official _____

Mailing Address _____

City, County, State, Zip Code _____

1C. Project name or identification _____

1E. Designing engineer(s) _____

GA P.E. # _____ Expiration Date _____

Mailing Address

2A. Wastewater treatment plant to which extensions are tributary

Name _____

Permit flow _____ MGD

Permit # _____

2B. List, by month, the average daily flow (MGD) and effluent concentrations (mg/l) for biochemical oxygen demand (BOD₅) and suspended solids (SS) for the immediately preceding 12 months for the wastewater (on discharge monitoring reports).

<u>Month</u>	<u>Flow</u>	<u>BOD₅</u>	<u>SS</u>	<u>Month</u>	<u>Flow</u>	<u>BOD₅</u>	<u>SS</u>

3A. Name of developer (if not a local government, a certified statement as indicated in 8 is required with this submittal). See attached example.

Name

Mailing Address

City, County, State, Zip Code

3B. Proposed service area (this project).

Immediate _____ acres Ultimate _____ acres

3C. Type of developments: (check as applicable)

Industrial _____ Residential _____ Commercial _____ Other _____ (explain)

3D. Population to be served

Population _____ Density/acre _____

3E. Per capita wastewater contribution

Average _____ GPD Peak _____ GPD

3F. If receiving industrial wastewater, describe industrial waste characteristics.

Quantity _____ GPD. Describe pretreatment received (if any)

(use extra sheet if needed)

4A. Average Design Flow (this project) _____ GPD Peak _____ GPD

4B. Design BOD (this project)

Average _____ lbs/day

4C. List nominal pipe diameter(s) and length

4D. No., size and type of pump stations (if any)

Submit design calculations with this form.

5A. Source of project funding _____

5B. Some Farmers Home Administration loan/grant projects will require adequacy of treatment (A.O.T.) certifications. Date of A.O.T. issued by EPD.

6. Name of the Georgia P.E. that project inspector will report to:

_____ Georgia P.E. # _____

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

Name _____

8. Provide a certified statement by the authority responsible for treatment of wastewater from the project stating a) it has reviewed this project, b) it has adequate transport and treatment capacity to treat wastewater from this project, c) is willing to accept the project wastewater for treatment, d) all provisions of erosion and sediment control program will be enforced.

9. Provide a certified statement by the local government who will own and maintain the proposed sewers that the sewers are not constructed on or serving structures constructed or proposed to be constructed on solid waste landfills.

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

Signature _____

Signature of Responsible Local Official

Name (Print) _____

Title or Position _____

Date _____

Additional Comments:

FOR EPD USE ONLY:

Information Sheet
Sanitary Sewer Extension Submittal

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

Question: Why is a form needed?

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

Question: How does one complete the form?

Answer: We will address each question by number, and refer to the checklist when appropriate.

- 1A. The name of the local government in which the proposed sewer extension will be located. The name of the local government official whom the correspondence should be addressed to.
- 1D. The name of firm which prepares the sewerage plans and specifications. The name of the signed Georgia registered professional engineer on the plans.
- 2A. The name of the wastewater treatment facility to which the proposed sewer extension(s) will be tributary. NPDES permit flow in million gallons per day to the wastewater treatment facility listed in 2A.
- 2B. From the discharge monitoring reports for the wastewater treatment facility, list the appropriate month, flow, biochemical oxygen demand (BOD₅) and suspended solids (SS) for the 12 months preceding the sewer extension submittal.
- 3A. The name and address of the developer (firm) requesting the sewer extension. If the party responsible for initiating the sewer extension request is not a local government, a certified statement as indicated in 8 will be required.
- 3B. Immediate acres to be served by this project includes development directly tributary to the proposed sewer extension. Ultimate acres to be served by this project includes development that will be tributary to the proposed sewer extension in the future.
- 3D. Population density for the immediate service area should be listed. Dividing the population served by the immediate acres should equal the density per acre.
- 3E. Average gallons per day per capita wastewater contribution should be based on realistic, preferably documentable data for residential development and documentable, equivalent flows for commercial and industrial development. The peaking factor should reflect documentable flow data for the appropriate types of development.
- 3F. List pollutants and their concentration in mg/l and quantity in gallons per day of industrial wastewater discharging to the proposed sewer extension. Briefly describe the industrial pretreatment process employed.

- 4A. The average flow in gallons per day for the proposed sewer extension for the immediate service is calculated. The second blank shows either the capacity of the sewer pipe for the proposed sewer extension or the ultimate flow in gallons per day if it is less than the pipe capacity.
- 4B. Biochemical oxygen demand (5-day) for the immediate service area.
- 4C. A list of nominal pipe diameters to be used in this project is placed in this blank (8-inch, 12-inch, etc.).
- 5A. List agencies which are funding the project; i.e. local, private, FmHA, CDBG, DCA, GEFA, State Grant, etc.
- 5B. Plans/specifications cannot be approved until the A.O.T. is certified by the Environmental Protection Division (EPD). List date of the A.O.T. certification issued by EPD.
- 6. The name of the Georgia registered professional engineer who the project inspector will report to. If the project inspector is a Georgia registered professional engineer, list the name of the project inspector.
- 7. The EPD requires all sewers to be owned and maintained by the local government which extensions are tributary to.
- 8. The local government with in-house sanitary engineering capability must review and approve the plans and specifications. The local government with no in-house sanitary engineering capability must provide a certified statement that it is willing to accept the project wastewater for treatment. The local government that has erosion and sediment control permitting program must certify that all provisions of program will be enforced.
- 9. The EPD requires certification that the proposed sewers are not constructed on or serving structures constructed or proposed to be constructed on solid waste landfills.

ATTACHMENT NO. 1

Example Letter for Item 8

Date _____

Unit Coordinator
Georgia Environmental Protection Division
Engineering & Technical Support Program
4220 International Parkway Suite 101
Atlanta, Georgia 30354

RE: (Name of Project)

Dear Sir/Madam:

This is to certify that (a) the (name of local government) has reviewed this project, that (b) (name of local government) has adequate transport and treatment capacity to treat wastewater from this project, (c) (name of local government) is willing to accept the project wastewater from the project for treatment and (d) (name of local government) ensures that all provisions of applicable erosion and sediment control programs will be enforced.

Sincerely,

(Signature of Responsible
Local Government Official)

ATTACHMENT NO. 2

Example Letter for Item 9

Date _____

Unit Coordinator
Georgia Environmental Protection Division
Engineering & Technical Support Program
4220 International Parkway Suite 101
Atlanta, Georgia 30354

RE: (Name of Project)

Dear Sir/Madam:

This is to certify that according to the records of the (name of local government), none of the sewers, services or any other utilities associated with this project are constructed on or serving structures constructed or proposed to be constructed on solid waste landfills.

Sincerely,

(Signature of Responsible
local government official)

APPENDIX D

CITY OF COVINGTON STIPULATIONS FOR LIFT STATIONS

Stipulations for Lift Stations

1. \$100,000 escrow account established in the City of Covington's name that can be used to cover the costs of daily inspections, maintenance, repairs, operations, and fines associated with sewerage spills. These monies are to remain readily accessible to the City of Covington for a period of three (3) years or until the development reaches 2/3 completion, whichever comes first. At that time all monies remaining in the escrow account will revert back to the developer.

If, however, the development, at the end of three (3) years has not reached 2/3 completion, the developer will be billed quarterly for any and all costs associated with inspections, maintenance, repairs, operation, and fines until the development does reach 2/3 completion.

2. The developer's contractor shall install, at the lift station, Gorman-Rupp pumps or others as approved by the City's engineers.
3. The developer's contractor shall install Verbatim auto-dialers at the lift station to notify City of Covington maintenance personnel of lift station problems relating to high level alarms, power failures, and phase failures. If the developer desires, the auto-dialers can also be set up to notify their personnel.
4. The lift station must be covered by a weather-tight structure and enclosed by a six (6) foot high chain link fence that can be locked.
5. The developer's contractor shall install an adequately sized emergency power generator at the lift station to provide electrical service to the station in the event of a power failure. The generator shall be equipped with an automatic transfer switch and shall be natural gas or have a twenty-four (24) hour diesel fuel tank that meet all current EPA/EPD and NFPA standards.
6. City of Covington maintenance personnel shall inspect and maintain the lift station from the time of its installation until all the houses that are to be built are occupied. This will be done in accordance with the lift station inspection and maintenance procedures currently in place and utilized by the City of Covington. All costs for inspection and maintenance of this lift station during the time period specified shall be borne by the developer and paid for out of the escrow account.
7. All stipulations and agreements are contingent upon the developers design and installation plans being approved by the City of Covington's consulting engineers, Welker and Associates and, of course, final acceptance of these terms and conditions by the developer.
8. A permanent point of ingress and egress must be granted to the City of Covington to access the lift Station.

Optional:

These terms and conditions should not be construed to replace or void any manufacturer's or contractor's warranties either expressed or implied.

APPENDIX E

SAMPLE UTILITY EASEMENT AGREEMENT

STATE OF GEORGIA)
) UTILITY EASEMENT
COUNTY OF NEWTON)

This grant of easement, made this _____ day of _____
by THE CITY OF COVINGTON, A MUNICIPAL CORPORATION, of NEWTON
COUNTY, as Party of the First Part (hereinafter called "Grantor",
whether one of more persons), to _____ as
Party of the Second Part (hereinafter call the "Grantee");

W I T N E S S E T H:

That the said Grantor for and in consideration of the recitals herein contained including the special conditions specified herein, if any, and the sum of One (\$ 1.00) Dollar and other valuable considerations, cash in hand paid, at and before the sealing and delivery of these presents, the receipt whereof is hereby acknowledged, has granted, bargained, sold and conveyed and by these presents does grant, bargain, sell, and convey unto the Grantee, its successors and assigns, a perpetual easement for the purposes and uses herein set out, over, through, across and under the following described property;

This easement is given for the purpose of installing, constructing and maintaining an underground _____ and the Grantee shall have the right to go upon the within described land to install said _____ main(s) and to inspect, maintain and repair the same as may be necessary from time to time, with all the rights, members and appurtenances to said easement in any way appertaining to or belonging.

It is agreed be the Grantee that it will install the _____ main(s), herein authorized in a workmanlike manner and upon the completion of same, will remove from the property all severed brushes, underbrush, branches and trees along with other debris including excess dirt that might have accumulated by reason of the required excavation and will restore and grass the terrain to its original condition insofar as reasonably possible in view of the necessary construction and the possible use of the permanent easement as provided for herein.

SPECIAL CONDITIONS:

TO HAVE AND TO HOLD the said described easement unto the said Grantee, its successors and assigns, so that neither the Grantor, the Grantor's heirs, administrators assigns, or any person claiming under the Grantor, shall at any time, have, claim or demand any right, title or interest to the aforesaid easement and its appurtenances. The Grantor warrants title to the said easement against the claims of all persons whomsoever.

IN WITNESS WHEREOF, the Grantor has duly executed this easement under seal on the day and year first above written.

Signed, sealed and delivered _____ (SEAL)
in the presence of:

_____ (SEAL)

Witness

Notary Public (SEAL)