



Development Standards for Design and Installation Water and Sewerage Systems

Adopted by the City Council:

April 15, 2019

TABLE OF CONTENTS

ARTICLE 1:	INTRODUCTION AND ADMINISTRATION	1
Section 101:	Statement of Necessity	1
Section 102:	Purpose.....	1
ARTICLE 2:	PROCEDURE FOR APPROVAL AND ACCEPTANCE.....	4
ARTICLE 3:	DEFINITIONS.....	5
ARTICLE 4:	WATER SYSTEM DESIGN REQUIREMENTS.....	10
Section 401:	General Design Requirements.....	10
Section 402:	Materials of Construction.....	13
ARTICLE 5:	WATER SYSTEM CONSTRUCTION STANDARDS	20
Section 501:	Installation Procedures.....	20
Section 502:	Hydrostatic Testing.....	33
Section 503:	Disinfection of Water Lines	33
Section 504:	Inspections and Acceptance.....	35
ARTICLE 6:	SEWER SYSTEM DESIGN REQUIREMENTS.....	37
Section 601:	General Design Requirements.....	37
Section 602:	Materials of Construction.....	43
ARTICLE 7:	SEWER SYSTEM CONSTRUCTION STANDARDS	53
Section 701:	Trenching and Excavation.....	53
Section 702:	Gravity Sewer Testing.....	65
Section 703:	Force Main Testing.....	67
Section 704:	Inspections and Acceptance.....	68
APPENDIX A	GUIDELINE FOR APPROVAL AND ACCEPTANCE	70
APPENDIX B	CHECKLIST SHOWING REVISIONS REQUIRED FOR APPROVAL BY WATER AND SEWER DEPARTMENT	74
APPENDIX C	REQUIREMENTS FOR PLACEMENT ON APPROVED CONTRACTORS LIST	76
APPENDIX D	Sample One (1) Year Letter of Credit.....	78
APPENDIX E	DEED OF CONVEYANCE AND EASEMENT.....	79
APPENDIX F	FEE SCHEDULE	81
APPENDIX G	STANDARD DETAILS	82

ARTICLE 1: INTRODUCTION AND ADMINISTRATION

Section 101: Statement of Necessity

It is hereby determined necessary for the protection of the public health, safety, welfare, and convenience of the citizens of the City of Commerce, and for the orderly development of City water distribution and sewage collection and transportation systems, to provide development standards and procedures for the installation of water and sewerage systems, assigning the cost for the installation of said facilities pursuant to the authority granted by Article IX, Section III of the constitution of Georgia as amended.

Section 102: Purpose

It is the purpose of these standards and procedures to ensure that all water distribution and sewage collection and treatment systems constructed in the City of Commerce satisfy all existing and future City of Commerce, State, and Federal regulations.

After the passage of this resolution, water and sewerage systems in the service areas of the City of Commerce, Georgia shall be constructed only after the plans have been approved as outlined in these standards. Only systems constructed in accordance with these standards will be allowed to connect to the City of Commerce water or sewerage system either immediately following construction or at any time in the future.

AN ORDINANCE
WATER AND SEWER DEVELOPMENT STANDARDS

CITY OF COMMERCE, GEORGIA

AN ORDINANCE TO ADOPT DEVELOPMENT STANDARDS FOR WATER AND SEWERAGE SYSTEMS, CITY OF COMMERCE, GEORGIA DATED April 15, 2019 TO PROVIDE FOR AN EFFECTIVE DATE FOR THIS ORDINANCE; TO PROVIDE THAT THE CITY MAY WITHHOLD THE ISSUANCE OF BUILDING PERMITS AND/OR PERMITS FOR OCCUPANCY OR USE TO WHICH THIS ORDINANCE APPLIES; TO REPEAL CONFLICTING ORDINANCES AND FOR OTHER PURPOSES.

WHEREAS, the City of Commerce has recommended the adoption of Development Standards for the Construction of Water and Sewerage Systems in the incorporated areas of Commerce, Georgia.

NOW, THEREFORE be it ordained by the authority of the City of Commerce as follows:

1. That Development Standards for Design and Installation of Water and Sewerage Systems be adopted as of April 15, 2019. These standards shall apply to all non-governmental Water and Sewerage Systems constructed in the service areas of City of Commerce, Georgia.
2. That this Ordinance shall be in force and effect from and after the date of its approval by the City of Commerce.
3. That City of Commerce may withhold the issuance of any building permit and/or occupancy or use permit in any subdivision, development or improvement to which this Ordinance applies until there is compliance with the regulations and

Article 1: INTRODUCTION AND ADMINISTRATION

specifications contained in said Development Standards for Water and Sewerage systems.

4. That a copy of this Ordinance, including Development Standards for Water and Sewerage Systems to be filed with the permanent records of the minutes of the City of Commerce and that it may be inspected by any interested party during regular office hours at the City of Commerce, Georgia.
5. That violation of this Ordinance shall be punished in accordance with OCGA § 36-32-1 et seq.; OCGA 36-35-6; and the City Charter.
6. That all Ordinances, or parts thereof, in conflict with this Ordinance are hereby repealed.

MOTION MADE AND SECONDED, PASSED AND ADOPTED THIS 15 day of April, 2019

MAYOR AND CITY COMMISSION OF COMMERCE, GEORGIA

J. Clark Harrison, Mayor

ATTEST:

Janet Harrison
City Clerk

POSTED: 4-18-2019

ADOPTED: 4-15-2019

END ARTICLE 1

ARTICLE 2: PROCEDURE FOR APPROVAL AND ACCEPTANCE

Prior to the design stage of a project, both developers and engineers are encouraged to discuss the water distribution and sewage collection needs with the Water and Sewer Department to assure compatibility with the City of Commerce plans and to review the requirements as documented in these Development Standards. The City of Commerce may require the upgrade of existing facilities to meet requirements of these development standards prior to the preliminary approval of any addition or modification to said existing facilities. All construction plans for water and sewer systems must be prepared by a Professional Engineer registered in the State of Georgia.

Initially, the developers and engineers shall submit three (3) full-size copies of preliminary plans on 24"x36" paper plus a digital copy in Adobe PDF format in accordance with the checklist included in these standards for review by the Water and Sewer Department. A review fee will be charged for each water and sewer plan submitted (Appendix F). The Water and Sewer Department may, in its discretion, based upon the size and complexity of the proposed project, retain outside consultants to review portions of the plans. All (or all redlines) of the preliminary plans will be returned with appropriate comments.

Prior to final plans being submitted for review, the developers and engineers shall make the required revisions to the plans and prepare other permits and approvals to be submitted to the Georgia Department of Natural Resources, Environmental Protection Division (EPD), the Georgia Department of Transportation (GDOT) and other necessary regulatory agencies.

Plans submitted for final review shall include three (3) full-size copies of the revised plans on 24"x36" paper plus a digital copy in Adobe PDF format for Water and Sewer Department review, in accordance with these standards, EPD's latest edition of their *Minimum Standards for Public Water Systems*, and the latest edition of the GDOT Utility Accommodations Manual. Additional sets may be required if other agencies are involved in the approval process.

END ARTICLE 2

ARTICLE 3: DEFINITIONS

The definitions of terms used in the Development Standards shall be as interpreted in the Georgia Safe Water Drinking Act of 1977, Chapter 391-3-5 of the Official Compilation of Rules and Regulations of the State of Georgia, "Rules for Safe Drinking Water", Chapter 391-3-6, "Rules and Regulations for Water Quality Control", and Ten State Standards, "Recommended Standards for Wastewater Facilities".

1. "ANSI" – The American National Standards Institute, Inc.
2. "ASTM" – The American Society of Testing and Materials.
3. "Authority" – the individual, official, board, department or agency established and authorized by county, city and/or other political subdivision created by law to administer and enforce the provisions of the Plumbing Code, the Federal and State Safe Drinking Water Acts, and the Ordinances, Rules, Regulations, and Policies of City of Commerce, in the State of Georgia.
4. "Authorized Water and Sewer Department Representative" – any individual employed by the City of Commerce Water and Sewer Department given direct authorization from the Director of the City of Commerce Water and Sewer Department to act as a department representative.
5. "AWWA" – The American Water Works Association.
6. "Backflow" – a reverse flow in a water system from the normal or intended direction.
7. "Backflow Preventer (BFP)" – a device designed to prevent reverse flow in a water system. The term should normally be used where backpressure-type backflow is implied.
8. "Branch Sewer" a sewer which receives sewage from a relatively small area and discharges into a main sewer.
9. "Clearing" – The selective removal of vegetation from a property, whether by cutting or other means.
10. "Contaminant" – any physical, chemical, biological, or radiological substance or matter in water that could cause a public health hazard.
11. "Contractor" – A person, firm or corporation who the owner of a property has employed, or contracted to perform, construction activity associated with a development. For purpose of this ordinance, the term contractor shall include all subcontractors who are under separate contract or agreement with the contractor for performance of a part of the work at the site.
12. "Customer" – any person who is responsible for contracting (expressly or implicitly) with the City of Commerce Water and Sewer Department in obtaining, having, or issuing sewer connections with or sewer tap to the sewer system of the City of

Article 3: DEFINITIONS

- Commerce Water and Sewer Department and in obtaining, having or using water and other related services furnished by the City of Commerce Water and Sewer Department for the purpose of the water supply or sewage disposal through said system.
13. "Department" – City of Commerce Water and Sewer Department. In the absence of any other designated department, the term shall refer to the Water Distribution Superintendent and the staff under their supervision.
 14. "Developer" – any person or entity, including their agent or construction contractor, who wishes to construct new water or sewer lines for new subdivisions or other development.
 15. "Drinking water" – water supplied for domestic use or human consumption, meeting the maximum contaminant levels established by the State.
 16. "Easement" – an acquired legal right for the specific use of land owned by others.
 17. "EPD" – the Environmental Protection Division of the Department of Natural Resources of the State of Georgia.
 18. "Force Main" – a pipe for delivering wastewater from a pumping station to its destination, which may be a wastewater treatment plant or another point in the sewerage system.
 19. "Government Owned Public Water System" – system to provide piped water to the public for human consumption. Such term includes any water treatment, storage, and distribution facility located in the service areas of the City of Commerce and owned by the City of Commerce.
 20. "Health Officer" – the director of the County Board of Health or other person designated by the City of Commerce and their duly appointed assistants.
 21. "House Sewer or Service Line" – a pipe conveying sewage from a single building to a common sewer or point of immediate disposal.
 22. "Industrial Wastes" – wastewater from industrial processes as distinct from domestic or sanitary wastes.
 23. "Infiltration/Inflow" – groundwater and surface water which leaks into the sewers through cracked pipes, joints, manholes, or other openings.
 24. "Inspector" – an individual qualified in a vocation and authorized to make inspections and interpret codes, regulations, and procedures.
 25. "Interceptor Sewer" – a sewer which receives flow from a number of main sewers and normally does not have service line connections.
 26. "Main Sewer" – a sewer to which one or more branch sewers are tributary. Also called a trunk sewer.
 27. "Manager" – the person responsible for the maintenance and operation of the water and/or sewerage system.

Article 3: DEFINITIONS

28. "May" – is permissive.
29. "Outfall Sewer" – a sewer which receives the sewage from a collecting system and carries it to a point of treatment or pumping station.
30. "Person" – any individual, firm, company, association, society, corporation, or group.
31. "Pollutant" – any substance that, if introduced into the potable water system, renders the water harmful to human health or the environment or unsuitable for its intended purpose.
32. "Pollution" – the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water.
33. "Potable Water" – any water that, according to recognized Federal standards, is safe for human consumption.
34. "Privately Owned Public Water System" – any system to provide piped water to the public for human consumption. Such term includes any collection, treatment, storage, and distribution facility designed to serve fifteen (15) or more units from any source other than the City of Commerce and being owned and operated by any entity other than the City of Commerce.
35. "Professional "Engineer" – a person registered to practice professional engineering in the State of Georgia in accordance with the provisions of the Act governing the practice of professional engineering in Georgia.
36. "Public Sewer" – a common sewer controlled by a governmental agency or public utility.
37. "Public Water Supply/System" – a water system (including but not limited to supply, treatment, transmission and distribution facilities and appurtenances) operated as a Public Utility that supplies potable water to the service-connection of the consumer's water system. Herein defined, as the City of Commerce potable water supply/system as operated by the Water and Sewer Department.
38. "Representative" – a person authorized to represent the Director of the City of Commerce Water and Sewer Department.
39. "Right-of-way, public" – That area, distinguished from an easement or private road right-of-way, which is owned in fee-simple title by the City of Commerce or other government entity, for the present or future use of roads, roads and highways, together with its drainage facilities and other supporting uses and structures.
40. "Right-of-way, private" – That area, distinguished from an access easement or public right-of-way, dedicated to property owners of the subdivision involved or to other individuals, and which affords permanent access to abutting property or properties. A private right-of-way is distinguishable from a public road right-of-way in that maintenance and ownership of the road and accessory improvements is by private individuals or an association rather than the City of Commerce or another government entity.

Article 3: DEFINITIONS

41. "Sanitary Sewer" – a sewer pipe which carries sewage and to which storm, surface, and ground waters are not intentionally admitted.
42. "Sediment" – Solid material, both organic and inorganic, that is in suspension, is being transported or has been moved from its site of origin by air, water, ice or gravity as product of erosion.
43. "Sedimentation" – The process by which eroded material is transported and deposited by the action of water, wind, ice, or gravity.
44. "Service Connection" – the point of delivery of water to a premise: the normal location of the meter. It is the end of the water purveyor's jurisdiction and the beginning of the Plumbing Official's and the Consumer's, and defined as follows:
45. Dedicated – a single service connection that is designated for one use only; (i.e., domestic, fire protection or irrigation.)
46. Combination – a single service connection that is designated for more than one use; (i.e., domestic and fire protection.)
47. "Sewage" – is the spent water of a community. (See Wastewater)
48. "Sewage Works" – all facilities for collecting, pumping, treating, and disposing of sewage. (See Wastewater Facilities)
49. "Sewer" – a gravity flow pipe or conduit, normally not flowing full, for carrying storm water, sewage and other waste liquids.
50. "Shall" – mandatory
51. "Soil Erosion and Sedimentation Control Regulations" – Regulations promulgated by the State of Georgia through the Georgia Erosion and Sedimentation Act of 1975 as amended to date.
52. "Source of Water Supply" - the waters of the State from which raw water is taken into a public water system to be treated and distributed.
53. "Spring" - a surface water where water naturally issues forth for the first time from rock or soil onto the land or into a body of water.
54. "Spring Line" – the horizontal line on a section of pipe located at ½ O.D.
55. "Standard Methods" – "Standard Methods for the Examination of Water and Sewage", as published jointly by the American Public Health Association, the American Water Works Association and the Water Pollution Control Federation or with any other analytical procedure approved by the Commission.
56. "Storm Drain" (sometimes termed "storm sewer") – a drain or sewer for conveying water, groundwater, subsurface water, or unpolluted water from any source excluding sewage and industrial wastes other than unpolluted cooling water. (See Storm Sewer)
57. "Storm Sewer" – a sewer which carries storm water and surface water, street wash and other wash waters or drainage, but excludes sewage and industrial wastes. Also

Article 3: DEFINITIONS

- called a storm drain.
58. "Storm Water" or "Runoff" – any flow occurring during or following any form of natural precipitation and resulting there from.
59. "Supplier of Water" or "Supplier" – any person who owns or operates a public water system.
60. "Surface Waters" – includes any and all rivers, streams, branches, creeks, ponds, tributary streams, drainage basins, natural lakes, artificial reservoirs or impoundments.
61. "Ultimate Tributary Capacity" – the potential amount of sanitary sewer that a particular drainage basin may eventually convey to a lift station or a water pollution control facility.
62. "Unpolluted water" – is water of quality equal to or better than the effluent criteria in effect or water that would not cause violation of receiving water quality standards and would not be benefited by discharge to the sanitary sewers and wastewater treatment facilities provided.
63. "Utilities" – All lines and facilities related to the provision, distribution, collection, transmission, or disposal of water, storm and sanitary sewage, oil, gas, power, information, telecommunication and telephone cable, and including facilities for the generation of electricity.
64. "Wastewater" – the spent water of a community. From the standpoint of source, it may be a combination of the liquid and water carried wastes from residences, commercial buildings, industrial plants, and institutions, together with any groundwater, surface water, and storm water that may be present. (See Sewage)
65. "Wastewater Facilities" the structures, equipment and processes required to collect, carry away, and treat domestic and industrial wastes and dispose of the effluent. (See Sewage Works)
66. "Watercourse" – a natural or artificial channel for the passage of water either continuously or intermittently.
67. "Well" – any excavation that is cored, bored, drilled, jetted, dug, or otherwise constructed for the purpose of locating, testing, or withdrawing ground water.

END ARTICLE 3

ARTICLE 4: WATER SYSTEM DESIGN REQUIREMENTS

Section 401: General Design Requirements

The following shall establish the general design requirements for both publicly owned and privately-owned public water systems serving four (4) or more units, installed, operated, and maintained in the service areas of the City of Commerce. It shall be understood that these standards reflect the minimum requirements necessary to obtain construction plan approval.

1. The developers shall be required to provide the design and installation of an adequate water supply system through the entire development at no cost to City of Commerce. The water system shall be designed to provide a minimum of 1,000 gallons per minutes (GPM) to all fire hydrants in the proposed development. When available flows at the connection point are not in excess of 1,100 GPM, the proposed system should be designed to provide residual pressure to all fire hydrants in the proposed development within 40 psi of the residual pressure at the connection point using the calculation flow of 1,000 GPM. Calculated residual pressure shall be a minimum of 20 psi. (Supporting documentation for line sizing will be required.)
2. In the event that water mains are proposed outside street rights-of-way, the water mains shall be installed along the center of easements dedicated to the City. Easements shall be forty (40) feet in width for the duration of construction (temporary), reducing to a twenty (20) foot permanent easement thereafter. The easement shall be improved to provide an all-weather gravel road. The design of the gravel road shall be submitted indicating plan and profile, horizontal and vertical curvature, drainage, etc. The City shall be provided with the necessary means to access the easement at all times, including, without limitation, gates, keys, and access codes. A blue fiberglass post with "Water Pipeline" decal shall be provided every 200 ft along the main. These posts shall be 4 inches wide and 66 inches high and be Rhino 3-Rail or approved equal.
3. When water mains are extended along existing frontage roads, proposed main thoroughfares to serve a proposed development, the developer shall extend a water main of a size consistent with the overall distribution plan from the tie-in location to a point along the frontage of the development property and beyond all proposed entrances.
4. All water mains shall be a minimum of six inches in size except where a larger size is required as determined by the City Water and Sewer Department.
5. Dead end lines shall be minimized by looping of all mains when possible. A 6" standard hydrant is an acceptable alternative to a looped water line; however, the City Water and Sewer Department may consider or require a 3" automatic flushing hydrant in certain circumstances.

Article 4: WATER SYSTEM DESIGN REQUIREMENTS

6. Minimum horizontal distance between potable water lines and sanitary sewer lines shall be ten (10) feet. Minimum vertical separation between the bottom of the sewer and the top of the water main shall be at least 18 inches. Minimum distance for all other underground utilities or structures shall be two (2) feet radius.
7. Unless otherwise approved by the Water and Sewer Department, all creek crossings shall be accomplished by encasing a ductile iron pipe (DIP) water main in steel casing and sufficiently blocking with concrete each end of the casing to secure its position. As required by EPD, sampling taps shall be installed at each end of the crossing, and permanent taps shall be made for testing and determining leaks. The minimum depth from the existing creek bed to the top of the casing pipe shall be two (2) feet. Details of all creek crossings are required.
8. All crossings of existing and proposed paved streets shall be by the bore and jack method unless approved otherwise prior to installation. A county road shall be open cut only after written permission has been received from the City of Commerce Water and Sewer Department. All pipe placed under county roads shall be encased in steel casing. All pipe under roads shall have a minimum cover of four (4) feet from finish grade to the top of the pipe.
9. Crossings of driveways may be by means of uncased bore or open cut as determined by the Water and Sewer Department. Pipe over 10 inches in diameter shall be open cut unless casing is provided with the bore or approved otherwise prior to installation. Where open cut method is allowed, existing concrete and asphalt driveways shall be saw cut and the debris removed prior to trenching. When pipe installation is complete, the driveway shall be backfilled, compacted to 98% standard proctor density, and damaged area replaced with material consistent with the existing driveway within five (5) working days. Driveway installation shall be in accordance with these standards.
10. Tees, crosses, valves, and other necessary fittings shall be provided at all major intersections to provide for future expansion.
11. Continuous copper wire shall be placed directly over all pipe at a maximum depth of 2 feet from finished grade. Tracer wire shall be Copperhead® High Strength HS-CCS HDPE 30 mil or approved equal.
12. Fire hydrants serving residential areas shall be located at intervals not to exceed 500 linear feet (L.F) along all the street rights-of-way and must be located within 500 L.F. of all property improvements and less than 500 L.F. from right-of-way lines. Minimum main valve seat opening shall be 5-1/4" and must provide a minimum flushing velocity of 2.5 ft/sec.
13. Fire hydrants serving commercial, industrial, or multi-family residential areas shall be located at intervals not to exceed 500 L.F along all the street rights-of-way. Minimum main valve seat opening shall be 5-1/4".

Article 4: WATER SYSTEM DESIGN REQUIREMENTS

14. Fire hydrants are to be located on the right-of-way line and shall have a gate valve installed between the main and the fire hydrant.
15. All fire service lines and connections with private hydrants, hand hose connections, sprinkler heads, and any other supply including domestic lines will be required to have an SBCCI Plumbing Code approved detector check valve assembly in accordance with Section 402, Paragraph 13 of these standards.
16. Shutoff valves shall be located along the main line at intervals not greater than three (3) fire hydrants.
17. Shutoff valves shall be located on all branch lines as well as on each side of the branch as close to the intersection as possible.
18. All fittings (valves, tees, crosses, bends, reducers) shall be restrained in a method approved by the Water and Sewer Department.
19. Shutoff valves shall be located on each side of stream crossings within 100 feet of the stream.
20. Fire hydrants shall be required on all dead-end water mains.
21. Each valve 2 inches or larger, except fire hydrant valves, shall have a valve marker placed directly behind the valve. Valve markers shall be 4" square by 4' long with four (4) #2 reinforcing rods. The marker shall be set to leave 18 inches exposed above grade. The word "WATER" shall be stamped in the concrete and shall be visible after installation.
22. Each underground valve shall include a valve box placed vertically to allow operation of the valve. Valve boxes not located in roadways shall have a precast concrete collar placed level around the top for protection. If valve nut is not within 60" of the surface, add an extension stem to nut.
23. Single service lines shall be provided from the water main to each residential lot in the proposed development. Lines shall normally be $\frac{3}{4}$ " minimum diameter and furnished with curb stops, corporation stops and meter boxes. Meter boxes shall be placed directly over the water main or as directed by GDOT and installed on a 6" gravel base.
24. The Developer of a privately-owned public water system shall be required to install an approved meter, meter box and backflow preventer for each residence prior to occupancy. In addition, all fire hydrants in a privately-owned public water system shall be tagged in a manner and with a message approved by the Water and Sewer Department indicating non-department responsibility. These requirements apply to all privately-owned public water systems in the City of Commerce.

Article 4: WATER SYSTEM DESIGN REQUIREMENTS

25. Water services for commercial, industrial, or multi-family residential shall be adequate to provide for the specific needs of the installation including adequate fire protection. Backflow prevention devices shall be in accordance with City of Commerce requirements.
26. All temporary and interim water connections connected to City water sources shall be approved prior to installation. Connections shall be metered and billed in accordance with the rates established by the Water and Sewer Department.
27. Water mains that are installed crossing or immediately parallel to existing gas lines, sewer lines, or storm drains shall be ductile iron pipe as required by the Water and Sewer Department and/or the Owner of the affected utility. Polyethylene encasement shall be installed on ductile iron piping, fittings, and valves below grade whenever the water main crosses or is in close proximity to a steel gas main and where indicated on the drawings. Polyethylene encasement shall be V-Bio® Enhanced Polyethylene Encasement or Approved Equal.
28. The Developer shall be required to ensure that none of the water mains, service lines, and structures will be located on or in close proximity of an abandoned landfill site or any other site used for waste disposal.
29. There shall be no physical connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water and other contaminating materials may be discharged or drawn into the system.

Section 402: Materials of Construction

1. General Material Requirements

All materials shall be specified herein or approved equal by the City of Commerce Water and Sewer Department and/or these standards.

2. Pipe

2.1 Ductile Iron Pipe (Required over 8")

Pipe shall be Pressure Class 350 with slip joints conforming to ANSI/AWWA Standards C106 or C108, latest designation. Pipe shall have an exterior coating of coal tar varnish and an interior cement mortar lining with bituminous seal coat conforming to NSF Standard 61, latest designation. The seal coat for the lining shall not impair the portability or impart color, taste, odor, phenols, toxicity, caustic alkalinity, or have a deleterious effect to the water. Each pipe shall bear a mark denoting the class to which it belongs. All pipe shall be manufactured within the limits of the continental United States.

2.2 Polyvinyl Chloride Pipe (Maximum 8")

Pipe shall be American Water Works Standard AWWA C-900, latest designation, made from compounds meeting standard code designation PVC 1120. Couplings, bells, gaskets and lubricants to be used with PVC pipe shall

Article 4: WATER SYSTEM DESIGN REQUIREMENTS

conform to AWWA C-900 requirements. Pipe shall have ductile iron equivalent outside diameters. Each joint of pipe shall be marked with the nominal size, base material, material code designation, dimension ratio number, AWWA Pressure Class, AWWA designation number, manufacturer's name or trademark, production record code, and seal of the National Sanitation Foundation (NSF) verifying the suitability of the pipe material for potable water service. Gaskets and lubricants shall be of proper size and shape and suitable for potable water. At the request of the Water and Sewer Department, the developer shall furnish manufacturer's affidavit certifying that the pipe meets AWWA C-900, latest designation standards. Of this pipe, only AWWA Pressure Class 200 or greater will be accepted.

2.3 Steel Casing Pipe

Pipe shall be of steel construction of the size and wall thickness below with lengths called for on the approved plans.

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

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

*C-900, CL150 & PC 350 Slip Joint DIP Applications with Field Lok Gaskets or approved equal.

Article 4: WATER SYSTEM DESIGN REQUIREMENTS

2.4 Nestable Corrugated Steel Casing Pipe

Pipe shall consist of matching half-round segments of 14 gauge corrugated galvanized steel casing pipe which when assembled become lengths of full-round corrugated steel pipe. Feasible alternatives will be considered by the Water and Sewer Department.

2.5 Service Pipe

Pipe shall be Type K Copper of the size and outside diameter (O.D.) designated in the proposal or drawing and shall conform to AWWA Specification 7S-CR, ASTM Specifications B-88, and Federal Specification WW-T-799.

2.6 Service Pipe Encasement

Service piping encasement installed following curb and gutter construction shall be 2" PVC Class 200 or approved equal.

3. Joints and Gaskets

3.1 Mechanical Joint Ductile Iron Pipe

Mechanical joint ductile iron pipe shall be furnished with mechanical joint retainer glands complete with rings gaskets, bolts, and joint materials conforming to AWWA Standard C110, C111 or C513, latest designation.

3.2 Slip Joint Ductile Iron Pipe

Gaskets shall conform to AWWA C111, latest designation. Use lubricants and gaskets of proper size, shape, and composition as recommended by the pipe manufacturer.

3.3 Polyvinyl Chloride Pipe

Pipe shall be furnished complete with push type bell and spigot joints conforming to ASM D-3139, latest designation. Gaskets shall be elastomeric seals conforming to ASTM F-477, latest designation designed for joining plastic pipe.

3.4 Nestable Corrugated Steel Casing Pipe

Pipe shall be joined in strict accordance with manufacturer's recommendations for the size required.

4. Pipe Fittings and Specials

4.1 Specials

Specials shall be short body Class 350 ductile iron conforming to AWWA Standard C110 or C153. Fittings shall be cement lined and conform to AWWA Standard C104. Ductile iron fittings shall be manufactured by the Ductile Iron Company of America or approved equal. Fittings and Specials shall be complete with rings, bolts, gaskets, etc. for joints.

Article 4: WATER SYSTEM DESIGN REQUIREMENTS

5. Valves

5.1 Eighteen (18) Inch and Larger Valves

Eighteen inch and larger valves shall be Butterfly Type Dresser Style 450, Mueller, Pratt or approved equal for underground service with two (2) inch square operating nut. Connections shall be mechanical joint with retainer glands.

5.2 Sixteen (16) Inch and Smaller Valves

Sixteen inch and smaller valves shall be Resilient Seat Gate Type Dresser Style 3067-01 Mueller or approved equal for underground service with a two (2) inch square operating nut. Connections shall be mechanical joint with retainer glands.

5.3 Air Release Valves

Air release valves shall be Apco No. 200A or approved equal with a ball check valve on vent to prevent return of air into water main.

5.4 Check Valves and Backflow Preventers

Check valves and backflow preventers are required on all new construction and shall be in accordance with City of Commerce requirements.

5.5 Tapping Sleeves, Crosses and Valves

A valve is required on each branch of a cross or tee.

6. Valve Boxes

Valve boxes shall be of the roadway extension type, of proper length and base size with suitable detachable cover and coated inside and out with a good asphaltum paint. Boxes shall be manufactured of ductile iron, 5-1/4 inch inside diameter, and "Standard Telescopic Valve Box" as manufactured by Griffin Foundry and Manufacturing Company, Rome, Georgia, or approved equal. Cover shall be marked "Water" in raised cast letters. All boxes not located in roadway shall have a 24" diameter precast concrete collar placed level around the top for protection.

7. Fire Hydrants

Fire hydrants shall be cast iron, bronze mounted, left opening with tamper proof operating nuts and mechanical joint end connections, conforming to the requirements of AWWA C502, latest revision for 250 psi working pressure. Hydrants shall be compression type, closing with line pressure. The valve opening shall not be less than 5-1/4 inches with two 2-1/2-inch hose connections and one 4-1/2-inch pumper connection. The minimum bury depth shall be 42 inches (48 inches in State Highway right-of-way) with 30 to 36 inches above grade. Hydrants not meeting this requirement must be furnished and installed with extensions. Hydrants shall be traffic model and meet Georgia Fire Insurance Commission Standards, local fire department requirements, and be furnished in accordance with owner's standards.

Article 4: WATER SYSTEM DESIGN REQUIREMENTS

8. Service Saddles

Service saddles shall be double strap as manufactured by Rockwell, Baker, Mueller or approved equal for each specific piping material.

9. Service Pipe Couplings

Shall be as follows:

<u>Size</u>	<u>Mueller</u>	<u>McDonald</u>	<u>Ford</u>
3/4"	H-15403	4758T	C44-33
1"	H-15403	4758T	C44-44
2"	H-15403	4758T	C44-77

10. Corporation Stops

Shall be as follows:

<u>Size</u>	<u>Mueller</u>	<u>McDonald</u>	<u>Ford</u>
3/4"	H-15008	4701-T	F1000
1"	H-15008	4701-T	F1000
2"	H-15013	4701-T	FB1000

11. Meter Stops

Shall be as follows:

<u>Size</u>	<u>Mueller</u>	<u>McDonald</u>	<u>Ford</u>
3/4"	H-14350	6100-T	B43-232W
1"	H-14350	6100-T	B43-444W
2"	-	6100-T	BF43-777W

12. Meter Coupling/Backflow Preventer

Shall be as follows:

<u>Size</u>	<u>Mueller</u>	<u>McDonald</u>	<u>Ford</u>
3/4"	7-U4-2	BF43	40-3C5-5A
1"	-	HHC 38323 Male Outlet	40-105-01
2"	-	HHC 31323 Female Outlet	40-108-01

13. Service Meters

13.1 House Service Meters

House service meters shall be Neptune 5/8" x 3/4" x 7-1/2", or City of Commerce approved with volume measured in gallons.

13.2 Commercial and Industrial Meters

Commercial and Industrial meter installations shall be dependent upon the industry served, service line size, fire protection, and other factors related to each location. Meters greater than 2" shall be Neptune Compound Meter with volume measured in gallons. Meter installations shall be reviewed and

Article 4: WATER SYSTEM DESIGN REQUIREMENTS

approved by the Water and Sewer Department prior to installation. A certification of meter calibration and test of Backflow Prevention device shall also be provided.

13.3 Fire Line Meters

Fire lines shall be provided with a double check detector meter equal to Watts 774DCDA or a factory mutual fire meter equal to Neptune HP PROTECTUS III. Fire line meters and detector meters shall be designed to meet site specific conditions.

14. Meter Boxes and Enclosures

14.1 Residential Meter Boxes

Meter boxes shall be installed at the property line of a lot to be served. Meter boxes for residential use shall be series 20, type A, stretch yokebox designed for 5/8" x 5/8" x 3/4" AWWA 20 GPM water meter with option L and A or approved equal.

14.2 Commercial and Industrial Meter Enclosures

Commercial and Industrial Meter Enclosures may be Composolite as manufactured by Quazite Corporation or approved equal Composolite. Enclosures shall be rated for no less than 5,000 pounds over a 10" x 10" area and be designed and tested to temperatures of -50°F. Material compressive strength should be no less than 11,000 psi. Covers shall have a minimum coefficient of friction of 5. Boxes shall be stackable for extra depth. Enclosures may also be constructed as a precast structure or poured concrete construction. If precast or poured concrete construction is used, a waterproof, lockable, aluminum H2O loading access hatch shall be provided.

15. Manhole Covers, Frames, and Steps

Manhole Covers, frames, and steps shall conform to Federal Specifications NQ-1-652, free from scale, lumps, blisters, sand holes, plugs, or other defects. Covers and frames shall be tough, strong even grained, Griffin type "R" Neenah, Higgins, or approved equal.

16. Concrete Manholes

Concrete manholes shall conform to ASTM C-478, latest designation.

17. Manhole Joints and Gaskets

Manhole joints shall be "O" ring gaskets. Ring shall be sealed with Igas, Sika Seal, or equal. Joints shall also be mortar plastered inside and outside.

18. Pressure Regulators

Pressure regulators shall be Cash-Acme Type, EU Series 3 or approved qual.

19. Valve Markers

A concrete valve marker post shall be furnished and installed as directed with each

Article 4: WATER SYSTEM DESIGN REQUIREMENTS

gate valve (excluding fire hydrant valves). The concrete marker shall have a four-inch minimum square section and a minimum length of 42 inches with beveled edges and containing at least three-eighths inch diameter bar of reinforcing steel. Markers shall be placed as directed by the Engineer and set so as to leave 18 inches exposed above grade. The exposed portion of the valve markers shall be stamped "WATER".

20. Pipeline Detection Marking

All water mains shall be protected by a plastic marking tape placed a minimum of 12 inches above the top of the pipe for its full length. The tape shall be similar to Reef Industries Terra Tape Standard. It will have sufficient thickness, tensile strength, elongation, and resistance to alkalis, acids, and other destructive agents to remain a permanent marker of the line buried below. A message shall be printed on the tape at least every 30 inches stating, "CAUTION WATER LINE BURIED BELOW".

21. Residential Backflow Preventers

Residential backflow preventers shall be installed on all new residential service lines as specified in Section 402, Paragraph 12.

22. Commercial and Industrial Backflow Preventers

Commercial and industrial backflow preventers shall be installed on all connections to the City water main. The backflow prevention device on lines 3" and larger shall be a Watts Series LF709 or approved equal and the backflow prevention device on lines less than 3" shall be a Watts Series 007 or approved equal. The backflow device shall be installed in a separate vault. All commercial or industrial businesses shall submit certification of installation of the backflow preventer as a condition to obtaining a City business license.

END OF ARTICLE 4

ARTICLE 5: WATER SYSTEM CONSTRUCTION STANDARDS

Section 501: Installation Procedures

1. General

The following shall establish the general construction requirements for the installation of water distribution systems installed, operated, and maintained in the service areas of the City of Commerce. It shall be understood that these standards reflect the minimum requirements necessary for final acceptance of the utility by the Water and Sewer Department.

- 1.1 It shall be the responsibility of the Developer to notify all utility companies prior to any excavation and obtain necessary utility locates through the Utility and Protection Center (UPC). Any pipe, solder, or flux used in the installation or repair of water service lines or water mains must be lead-free. Pipe and fittings must not contain more than 8.0% lead and solders and flux must not contain more than 0.2% lead.
- 1.2 The Developer shall notify the City of Commerce Water and Sewer Department forty-eight (48) hours prior to beginning construction. This department may request a pre-construction conference with the Developer and his Contractor before beginning construction.
- 1.3 All construction shall be subject to inspection by authorized representatives of the Water and Sewer Department at any time, and at their request, no dirt cover shall be placed on any portion of installed facilities until it has been inspected and approved by the Water and Sewer Department Inspector.
- 1.4 It shall be the responsibility of the Developer to coordinate all construction and ensure that these standards are adhered to. Any work not meeting these standards shall be corrected immediately by the Developer after notification by the City Water and Sewer Department Representative. Should the work not be corrected after verbal notification, a written stop work order shall be issued by the Water and Sewer Department until the deficiencies have been corrected.
- 1.5 The Developer shall employ a Utility Contractor with a valid State Utility Contractor license and shall have a competent supervisor on site employed by the Contractor.
- 1.6 All construction shall be appropriately flagged prior to construction. And the Contractor shall adhere to the Traffic Control Plan.

2. Erosion Control and Sedimentation

2.1 General

The Developer shall be responsible for maintaining proper control measures on the construction site and adjacent areas for the duration of the project. Sediment control barriers, temporary sediment traps, sediment basins, grass,

Article 5: WATER SYSTEM CONSTRUCTION STANDARDS

mulch, etc., as may be required to adequately control erosion and prevent sedimentation will be required. All measures shall be in accordance with the City of Commerce Soil Erosion and Sedimentation Control Ordinance and the Georgia Soil Erosion and Sedimentation Act. The Developer shall provide the Department with evidence of possession of all applicable local, State and Federal permits related to soil erosion and sediment control and land disturbance (i.e. GA EPD NPDES Notice of Intent, stream bank buffer variance, wetland permit, etc.).

2.2 Materials

All materials shall be as specified or approved equal.

A. Sediment Barriers

Barriers shall be approved silt, fencing, or stacked hay bales which will allow water seepage while filtering solids

B. Mulch

Shall be baled wheat, oat, or rye.

C. Fertilizer

Fertilizer shall be FSO-F-241, type I, Grade B, with a formulation of 5-10-5.

2.3 Execution

A. Sediment Barriers

Silt fencing shall be properly toed in. Silt fencing or hay shall be placed prior to and maintained in place until grass seed is planted.

B. Mulch

Mulch shall be applied to the grassed areas to contain grass seed.

C. Fertilizer

Fill fertilizer into the top two (2) inches of soil at a rate of 1,000 lbs. per acre. Dry areas should be watered to a depth of four (4) inches at least forty-eight (48) hours prior to seeding to obtain a loose friable seed bed.

D. Grass Seed

Seed shall be broadcast by hand or mechanical spreader. Broadcast half of seed in one direction, then broadcast other half at right angles to the first seeding pattern. Seeded area shall be rolled immediately after seeding. Erect signs to protect seeded areas from traffic until grass is established.

E. Sprigs

Sprigs shall be separated or shred and broadcast over the area prepared for planting at a rate of one bushel per 200 sq. ft. Sprigs shall then be harrowed into the ground with a harrow disc turned straight.

Article 5: WATER SYSTEM CONSTRUCTION STANDARDS

F. Watering

Watering shall be required to provide adequate soil moisture during the germination period as well as sprinkled throughout the construction area to maintain dust control.

3. Clearing and Grubbing

3.1 General

The clearing and disposal of all trees, bushes, shrubbery, and miscellaneous debris as outlined in the project plans and specifications shall be the sole responsibility of the Developer subject to the approval of the City of Commerce Water and Sewer Department.

3.2 Clearing

Clearing operations shall be performed so as to prevent damage to existing trees and other property located on property other than that of the Developer. Safety of employees and others should be considered throughout the operation. No clearing should be performed on property not owned by the Developer without first obtaining a written permission from the Owner.

3.3 Grubbing

It shall be the responsibility of the Developer to remove all debris from fill material in areas to be excavated, areas to be stripped of topsoil, and areas to receive fill.

3.4 Disposal

All cleared and grubbed material shall be disposed of in a manner satisfactory to the Water and Sewer Department. Burning shall not be allowed unless specifically permitted by the County Fire Marshall.

3.5 Bench Marks and Monuments

All established bench marks, property pins, monuments, and other reference points shall be maintained. If destroyed or disturbed, they shall be replaced as directed by the Water and Sewer Department.

4. Traffic Control Plan

The Developer shall conduct his operations in accordance with the *Manual on Uniform Traffic Control Devices* and DOT traffic control plans so that there will be minimum interference with or interruption of traffic upon the roadway. This applies to both the initial installation and the continuing maintenance and operation of facilities. Whenever construction is conducted along a highway, utility construction signs shall be provided at 1,500 feet, 1,000 feet, and 500 feet along the affected roadway prior to construction. In the case of single lane closings, a flagman shall also be provided on each side of the construction site to direct traffic. Lane closings shall not be permitted without prior approval of the Water and Sewer Department. Traffic cones shall also be placed along the closed lane at a distance, in feet, not to exceed the maximum speed

Article 5: WATER SYSTEM CONSTRUCTION STANDARDS

limit, in miles per hour, of the affected roadway. Road closings shall be protected by effective barricades and obstructions shall be lighted during hours of darkness. Flagmen and suitable warning signs shall be provided as may be required to properly control and direct traffic. Safety of both motorists and the general public shall be provided at all times. The Developer shall be responsible for obtaining any GDOT permits that are required and provide the Water and Sewer Department with evidence of all GDOT permits.

5. Trench Construction

5.1 Trench Description

Trench may be open cut from the ground surface where designated on the plans or approved by the Water and Sewer Department. Boring may be required to protect certain surface improvements and to satisfy requirements of the City of Commerce, the County, Georgia Department of Transportation, and/or railroad companies. Minimum width shall be the nominal diameter of the pipe plus twelve inches and minimum cover on pipe shall be 48 inches. Bottom of the trenches shall be hand dressed so that the pipe has even bearing on solid undisturbed earth throughout its entire length between bell holes. Bell holes of sufficient size for making perfect joints shall be provided. Changes in grade shall be gradual.

5.2 Alignment

Alignment shall be as indicated on the approved plans. When an obstruction is encountered, make necessary changes in alignment on grade as approved by the Water and Sewer Department. Injury or damage to adjacent structures, water, sewer, gas line, or other utilities should be avoided. See Detail TYP-01.

5.3 Excavation

Excavation shall consist of removing earthwork for the satisfactory placement of water mains and appurtenances. This includes vegetation, brush and debris, soil, rock, pavements, etc., for the intent and purpose of constructing the work to required lines and grades, including sheeting, bracing, and dewatering of excavations, trench bed stabilization, and such other incidentals necessary to comply with plans and specifications. Plans direct sections where jack and bore methods are required under certain pavements and/or railroads.

5.4 Trenching

Except as specified for jack/bore procedures under pavements and railroads, all excavation shall be made by open cut unless otherwise authorized by the Water and Sewer Department. All work within rights-of-way of railroads and State highways shall be subject to an approval permit for construction (processed through the Owner) and all rules and regulations of those authorities shall be required. It shall be the responsibility of the developer to prepare the applications for the required permits and pay all permitting fees. It is preferable that all trenching be done by a trencher made specifically for

Article 5: WATER SYSTEM CONSTRUCTION STANDARDS

such purposes, however; a backhoe or other equipment will be made acceptable.

Where excessive excavation results, the Contractor shall construct special foundations or use special backfill methods. Overdepth excavation will be required to remove material unsuitable to support the pipe.

5.5 Sheeting and Bracing

When trench sides must be kept as nearly vertical as possible, it may be necessary to sheet, brace or support the trench sides. When trench depth excavation exceeds five (5) feet, sheeting and bracing shall be required to protect the pipe crew from injury irrespective of the visible judgement of soil conditions by the Contractor. In the event the sheeting cannot be removed without injury to the pipe or adjoining structures, it shall be left in place or cut, and the upper part then removed. All trenching, sheeting, bracing, side sloping, etc., shall conform to the regulations of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). Side sloping in accordance with OSHA regulations is acceptable where conditions permit. It shall be the responsibility of the Contractor to ensure that all safety measures are met.

5.6 Stabilization and Bedding

Subgrade stabilizer is to be used where required by the Water and Sewer Department. In soft ground, quicksand, or in areas where soil conditions are such that pipe alignment, or grade is endangered, the trench shall be excavated below grade and then brought back to grade with stone stabilizer material. Stone stabilizer material shall be ASTM #57 crushed stone. Depth of stone shall be a minimum of 6 inches minimum or as directed by the Water and Sewer Department.

5.7 Excavated Material

All excavated material shall be placed on one side of the trench in a manner to prevent blockage of surface drainage patterns and traffic. It shall be so placed as to not endanger the work, allowing at all times free access to the trench and all existing utilities publicly owned, particularly fire hydrants.

Where necessary, wood fencing or retainers shall be erected to retain the excavated material within narrow limits to prevent obstruction or traffic and/or encroachment upon pavements or other areas restricted by property owners. Included shall be the protection of hedges, walls, flower/rock gardens, shade trees, fruit trees, and vegetable gardens. Satisfactory provisions shall be made for travel on sidewalks, crosswalks, streets, railroads, bridges, private ways, railings, barriers, etc. All drains, gutters, culverts, and sewers for surface drainage shall be kept open. If it is evident they must be temporarily closed, all requirements of the Owner must be met prior to such closing.

Excavated material shall not, in any case, be placed upon pavements surfaces

Article 5: WATER SYSTEM CONSTRUCTION STANDARDS

of public roads or streets owned by the City, County, or State unless prior approval is given by the proper authority having jurisdiction. In periods between dusk and daylight and during inclement weather when visibility is limited, caution lights and barricades shall be placed at each end and along the excavated material. Each building, wall, fence, pile, bridge, railroad, sidewalk, driveway, tree, lawn, garden, or any other improvement encountered is to be properly protected from injury. In the event of damage during the work, prompt repairs satisfactory to the Water and Sewer Department and the property owner shall be made by the Contractor.

5.8 Limit of Open Trench

The length of the trench to be opened or the area of the surface to be disturbed and restored at any one time shall be limited to that which the Contractor can complete in one day's work or less in the event of apparent inclement weather. The length shall not exceed 100 feet.

It shall be the Contractor's responsibility to provide adequate barricades, warning signs, flagmen, flashing lights, etc., as necessary to safeguard the public. All trenches must be backfilled by the close of each work day.

5.9 Disposition of Water

Trenches shall be kept free of water. The Contractor shall furnish all equipment and labor necessary to remove any water found or accumulated in the trench. Other excavation shall be kept clear of water while the pipe is being laid or concrete or masonry is being placed. No pipe shall be laid in water and water must not be permitted to flow over or rise upon any masonry or pipe until the work has been accepted to prevent flow-in of silty water and thus prevent buildup of foreign matter in the pipe.

All water pumped or bailed from the trench or other excavation must be conveyed in an acceptable manner to a suitable point of discharge, i.e. a stream or ditch where it shall not cause injury to public health, damage to public or private property, damage to work under construction previously completed, damage to the street surfaces, or interference with the use of streets by the public.

5.10 Excavation Near Roads and Railroads

Special care must be exercised in trenching near roads and railroads to protect against collapsing of the roadbed structure. Each situation must be evaluated on account of varying soils. Where excavations encroaching at or near roads and/or railroads will be limited because of scheduled jack/bore methods required for installations under roads and/or railroads, the trench excavated shall be halted at least ten (10) feet from the pavement edge of a road, or more if soil conditions so indicate and no nearer than twenty-five (25) feet from the centerline of the railroad track nearest the excavation as measured at 90 degrees (right angles) to the railroad.

5.11 Subsurface Obstructions

In excavating, backfilling, and laying pipe, care must be taken not to remove, disturb, or injure any water, sewer, gas, electric, telephone, or other conduits or utilities without prior approval of the owner of the utility encountered, including private utilities.

If necessary to perform the intended work, the Contractor shall sling, shore, and maintain such utilities in operation and promptly repair any damage done to them. Before final acceptance of the work, all such utilities shall be made "equal to or better" than prior to construction.

It shall be the Contractor's responsibility to locate underground utilities. In the event of damage to the utilities, the Contractor will promptly notify the utility owner (private or public) and must assume full responsibility therefore.

If the Contractor damages any part of an existing utility, the Contractor shall immediately make repairs if qualified to repair the utility or pay at his own expense to have the utility repaired by the utility owner; the City of Commerce will charge time and materials plus 30% for overhead and administration to repair any of its utilities damaged by the Contractor.

5.12 Embankments

Whenever the water main is to be installed in a fill area, the Water and Sewer Department will require the installation of ductile iron pipe.

5.13 Rock Excavation

If rock is encountered, the Contractor shall remove rock to 6 inches below grade of trench and build back the trench bottom with suitable material tamped into place. When necessary, blasting operations shall be conducted in strict accordance with all existing ordinances and regulations. Blasting shall be conducted by persons licensed to use explosives. When explosives are required to prosecute the work, the contractor shall use blasting mats or similar products to eliminate or lessen the danger from projectiles occasionally resulting from blasting rock. It shall be contractor's responsibility to incorporate the use of seismic monitoring should rock excavation, by use of explosives, occur within 150 feet of any residential, commercial, industrial, or institutional structure and within 300 feet of any miscellaneous structure. Blasting conducted near dams or bridge foundations shall incorporate the use of a seismic monitor should such blasting occur within 25 feet of said dam and/or bridge foundation. Contractor shall maintain all seismic records and blasting logs to be furnished to City upon request.

Where blasting is to be conducted along the right-of-way of a State claimed roadway, the Developer shall provide the Water and Sewer Department all necessary information to submit blasting permit applications to the Georgia Department of Transportation for approval. Blasting may be conducted only after this permit is received.

6. Inspection Before Laying of Pipe

Before any pipe is laid in the trench, the pipe shall be subject to inspection. Only first quality pipe with smooth surfaces (interior and exterior) and free from cracks, flaws, blisters, etc. shall be used. Pipe contaminated with dirt deposits shall be cleaned prior to installation in the trench.

7. Pipe Installation

7.1 Handling

Pipe shall be carefully unloaded with a pipe unloader or crane. Do not drop or dump materials. All materials dropped or dumped will be subject to rejection without additional justification.

7.2 Laying

Pipe shall be swept clean of trash or dirt before lowering into the trench. After the pipe has been cleaned it shall be lowered into the trench in such a manner that the pipe shall not be damaged. Each joint shall then be lined and brought to a uniform grade upon a solid trench bottom. Bell holes for couplings or bell shall be prepared with a minimum clearance of two inches. Pipe shall be laid in straight lines on uniform grades and shall not be deflected either vertically or horizontally in excess of that recommended by the manufacturer. Before stopping work each day, all open pipe ends shall be closed with a proper size plug. Pipe shall be protected from floating.

7.3 Jointing

A. Mechanical Joints

Clean spigot and bell of foreign material and apply a prepared lubricant solution before slipping gasket and gland over spigot end of pipe. The small side of gasket and the lip of gland must face the socket. Paint gasket with lubricant solution and place spigot end of pipe securely home in socket. Push gasket evenly into position in socket, slide gland into position, and tighten bolts with fingers. Tighten bolts with a torque wrench to recommend tightness by tightening bottom bolt and then top bolt. Thereafter, all bolts shall be tightened in sequence of 180° apart until all bolts are within the range of torque recommended by the manufacturer. If effective sealing is not accomplished, disassemble and reassemble after thorough cleaning.

B. Slip Joints

Jointing shall be made with rubber gaskets and lubricant furnished by the manufacture in strict accordance with the manufacturer's recommendations. Prepare field cut pipe by filing a 1/8-inch 30° bevel on the pipe end to avoid injuring the gasket.

C. Threaded Pipe

Wire brush threads clean and apply an approved joint compound. Tighten until joint is snug and watertight.

D. Polyvinyl Chloride Pipe

PVC pipe shall not be threaded. When connections to existing threads are necessary, adaptors shall be used. Trap wrenches shall be used to couple threaded PVC pipe fittings and lubricant recommended by pipe manufacturer shall be used. The Contractor shall not use excessive torque or score of the pipe. Couplings furnished with pipe for fittings shall be used and installed in strict accordance with the manufacturer's recommendations.

E. Copper Tubing

Use compression joints. Dielectric adaptors shall be provided where copper or brass pipe connect to steel. No joints shall be allowed under paved roadway.

F. Nestable Corrugated Steel Casing Pipe

Construct trench approximately 12 inches wider than the diameter of the pipe to be installed. Round the bottom of the trench to conform to the shape of the pipe. Remove large stones and other obstructions. Do not excavate more material than necessary. If excavation is made in unstable soil, place a 12-inch layer of gravel in trench bottom. Assemble pipe casing in strict accordance with the manufacturer's recommendations.

7.4 Connections to Existing Mains

Connections to existing mains shall be made at the locations shown on the plans or as directed by the Water and Sewer Department. No connections shall be made without first submitting the name and references of the Contractor performing the work for approval by the Water and Sewer Department. After Contractor approval, connections may be made forty-eight (48) hours after notice is given to the Water and Sewer Department.

City personnel shall supervise the tap and associated work by private licensed utility contractor. All taps shall be made on wet line under pressure. Water service must be maintained at all times to commercial and industrial businesses. All taps to be made with saddles or tapping sleeves.

When existing gate valves on the distribution system must be shut off in order to make connections, this work will be done by the Water and Sewer Department. Shut-offs will be made at such time as will be convenient to the greatest number of customers affected.

When an existing main has been cut or a plug removed for a connection, the work of making a connection shall proceed without interruption until complete.

Article 5: WATER SYSTEM CONSTRUCTION STANDARDS

Connections to existing mains shall be governed by all applicable provisions of these specifications. The Developer shall locate, excavate, and cut the existing main, remove the section of old pipe, rework the trench, connect the new pipe with the old pipe, and set necessary specials and valves as shown on the approved plans. All necessary precautions shall be taken to brace valves and mains under pressure to prevent blow outs.

8. Backfilling

The trench shall be backfilled with loose native earth free of clods, large stones, debris, or other objectionable material. In traffic areas, particularly roads and streets, parking lots and walkways, the full depth of backfill shall receive thorough tamping in 6-inch layers to a minimum of 98% standard proctor density. The Water and Sewer Department may request that soil compaction test be performed by an outside testing consultant. The developer will be responsible for payment to the testing consultant. Particular attention is directed to driveways, walkways, and areas subject to mail delivery where prompt backfilling is required to prevent inconvenience to the public.

In all areas of construction, the excavated material shall be cleared from the premises and the completed work left in a neat and acceptable condition. Included are such items as broken pavement and other matter not classified as earth.

Trenches and other excavated areas completed by the Contractor shall be kept in a good and safe condition during a one-year maintenance period following acceptance by the Water and Sewer Department and regulatory agencies.

8.1 Time

Trenches shall be backfilled as soon as practical after laying and jointing the pipe. Provisions for traffic as specified under Section 501, Paragraph 5.7 must be adhered to.

8.2 In Non-Traffic Areas

Carefully refill with suitable material in layers not exceeding 6-inches in thickness and thoroughly tamp with mechanical tamps to one foot above the top of the pipe. The remainder of the trench may be backfilled without tamping with the exception of areas around valves and fire hydrants which require tamping as specified under the installation of those items. The backfill shall be rounded over the trench to provide allowance for future backfill settlement.

9. Highway and Railroad Crossings

Install in strict accordance with railroad or State Highway requirements and all applicable provisions on the plans and specifications. See Detail TYP-04.

Perform no work until satisfactory arrangements have been made and permits secured from the State Highway Department or railroad and permits obtained. Install casing pipe by jacking and boring or tunneling in strict accordance with the requirements of the Georgia Department of Transportation and FHWA or railroad. The diameter of the hole shall not exceed the outside diameter of the casing pipe.

Article 5: WATER SYSTEM CONSTRUCTION STANDARDS

Cement grout shall be pumped around pipe where voids were developed during the installation operation. Casing pipe shall be steel as previously specified and joints shall be welded. Carrier pipe shall be ductile iron with mechanical joints as previously specified. Welds shall be performed only by qualified welders, meeting American Welding Society, and American Institute of Steel Construction Standards. Welds shall be continuous watertight and develop a greater strength than the pipe. Install on required grade. Inside and outside of welds shall have all rust, mill scale, flux flumes, oxides grease and oil removed by chipping and wire brushing immediately before apply touch-up coating. All weld areas and areas where coating has been scratched shall be recoated with coal tar material of same type and thickness as original coating. Outside shall be coated immediately after welding. The carrier pipe shall be supported within the casing by use of casing spacers sized to limit radial movement to a maximum of 1 inch. Provide a minimum of one casing spacer per nominal length of pipe. Casing spacers shall be attached to the pipe per manufacturer's recommendations or at maximum 18 to 20-foot intervals. Seal ends of casing in accordance with the Georgia Department of Transportation requirements.

10. Uncased Bores for Driveways

Uncased bores for water lines under paved driveways shall be in strict accordance with State Highway requirements and all applicable provisions of the plans and specifications. Shore, brace, and maintain all safety measures to avoid danger or damage.

11. Asphalt Concrete Paving Replacement (Where Open Cut is Allowed)

Materials and construction methods shall conform to the Georgia State Department of Transportation Standards Specifications, latest editions, and Detail TYP-03 of these standards.

11.1 Removal

Before removing pavement, the pavement shall be marked for cuts nearly paralleling pipe lines and existing street lines. All pavement cuts shall be made by sawing prior to excavation to eliminate uneven and ragged edges. Concrete pavement, and asphalt pavement on concrete base, shall be scored to a depth approximately two (2) inches below the surface of the concrete along the pavement may be broken below the scoring with a jackhammer or other suitable equipment.

11.2 Excavation and Backfill

Excavation and backfill shall be in accordance with this Section.

11.3 Base

Base shall be 8 inches of "High Early Strength" concrete in accordance with Section 430 of the Georgia Standard Specifications for Construction of Roads and Bridges.

Article 5: WATER SYSTEM CONSTRUCTION STANDARDS

11.4 Pavement

Pavement shall be hot mix asphaltic concrete superpave Mix Type 9.5 mm, 12.5 mm, or 19 mm and shall be in accordance with Section 400 of the Georgia Standard Specifications of Roads and Bridges.

12. Valves and Fittings

Valves shall be placed every 500 L.F. as shown on the approved plans or directed by the Water and Sewer Department. See Detail W-06 and W-07. Valves shall be set plumb and on firm bearing. Valves 12 inches and larger installed on ductile iron pipe shall be complete with mechanical joint retainer glands. All valves and fittings shall be secured with a method of restraint and approved by the Department. Valve boxes shall be set plumb and the top of the box brought to the surface of the ground or pavement.

12.1 Setting Valve Markers

Set vertically in ground with 18-inch projecting. Locate as directed by Water and Sewer Department.

12.2 Shut-Off Valves

Shut-off valves shall be placed 100' from edge of a stream or creek crossing on both sides or as directed by the Water and Sewer Department.

13. Plugging Dead Ends

All dead ends of pipes, tees, or crosses shall be plugged or capped. Installation of plugs or caps shall be as specified for similar pipe and fittings. A fire hydrant assembly shall be installed on the end of a pipe as directed by the Water and Sewer Department.

14. Concrete Blocking

All bends, tees, ends of mains, and crosses shall be blocked as indicated on the plans or as directed by the Water and Sewer Department. Blocking shall be 3,000 psi. concrete placed between undisturbed soil and the fitting to be anchored. Blocking shall be so placed that the pipe and fitting joints are accessible. See Detail W-08.

15. Fire Hydrants

Fire hydrants shall be located and installed as shown on the plans or as directed by the Water and Sewer Department, but not greater than 500 feet apart for residential and 500 feet apart for commercial and industrial, and set plumb from 30 to 36 inches of hydrant exposed above the ground. Developer will furnish adjustable anchor couplings as required to maintain these dimensions. Hydrant extension kit will only be allowed if approved by City of Commerce Water and Sewer Department prior to installation.

Foreign matter shall be removed from the interior of hydrants, stuffing boxes tightened, and the valve operated to assure they are in working order before installation.

Eight (8) cubic feet of gravel shall be placed around the base of hydrants to ensure

Article 5: WATER SYSTEM CONSTRUCTION STANDARDS

drainage. Geotechnical fabric shall be placed between the soil and the gravel and wrapped around the base of the hydrant to prevent migration of the soil into the gravel. Tie rods or hydrant tees and anchor couplings shall be installed and backfill shall be thoroughly tamped around hydrants. See Detail W-04 and W-05.

16. Services

16.1 Service Connections

Corporation stops and curb stops shall be used on all service connections. Connections to main lines shall require a double strap saddle. Use approved tapping machine to make all taps. Service saddles shall be equal to ROMAC Style 202 double strap or approved equal. See Detail W-03.

16.2 Service Lines

Service line conduit and/or piping shall be installed at a minimum depth of 18 inches. Long side services installed in new subdivisions shall be installed by casing service lines in 2" conduit. Conduit may be installed under proposed streets either by open cut prior to curb and gutter installation, by mechanical boring from beyond the back-of-curb to back-of-curb following curb installation, or by other acceptable means pre-approved by the Water and Sewer Department Engineer or designate. Service leans shall not be connected to fire hydrant leads. All service lines shall be copper.

16.3 Setting Meters and Meter Boxes

Meter boxes shall be located as directed by the Water and Sewer Department (See Section 402, Paragraph 14.1), installed plumb, and backfill thoroughly tamped. Developer shall replace any meter boxes damaged during construction.

16.4 Cross Connections

Cross connection to any other water supply, either by the Developer or an Individual, is not permitted.

17. Cleanup and Property Restoration

Upon completion of backfilling, all surplus earth, rock, damaged or broken pipe, or other materials shall be moved and disposed of immediately by the Contractor. All streets, driveways, monuments, mailboxes, or other private property damaged by the Contractor or Sub-Contractors shall be cleaned up and restored to their original condition as soon as possible.

18. Protection of the Work

The Developer will be responsible for the care of all work and for any damage or injury until final completion and acceptance.

Section 502: Hydrostatic Testing

1. After all piping has been placed, but prior to the placement of pavement, the Contractor, in the presence of a City inspector or their representative, shall test each valved section of newly laid pipe. 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 required tests. Every precaution must be taken to valve-off or otherwise protect control equipment in or attached to the pipeline to prevent damage or injury thereto.
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 after the test has been completed.
3. Prior to the pressure test, pipe laid in trenches shall be adequately backfilled to secure the pipe during the test. Any observed leakage shall require corrective measures to pipe lines and/or joints as to the satisfaction of the Inspector.
4. The City will furnish the necessary water for testing and disinfection of the lines. However, any water lost through breakage of lines, or unnecessary or excessive flushing of lines, will be charged to the contractor at the current residential rate. All lines shall be tested to a minimum of 1.5 times the working pressure, but not less than a pressure of 200 psi (whichever is greater) for a minimum time of two (2) hours. Test pressure shall not vary by more than ± 5 psi for the duration of the test. This may require periodic pumping, in which case the added water will be counted as part of the leakage. Lines shall be tested in sections between the valves. Allowable leakage amounts are found in Table 6-3 below. Only the Administrative Officer with input from the City Engineer can allow any variances to the limits presented below.

Permissible Leakage: Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, of any valved section thereof, to maintain the specified leakage test pressure after the pipe has been filled with water and the air in the pipeline has been expelled. No installation will be accepted if leakage is greater than that determined by the formula:

For PVC Installations:
$$L = \frac{ND(P)^{0.5}}{7,400}$$
 Where:

L is the allowable leakage, in gallons per hour; N is the number of joints in the length of pipeline tested; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gauge.

For Ductile Iron Installations:
$$L = \frac{ND(P)^{0.5}}{133,200}$$
 Where:

Article 5: WATER SYSTEM CONSTRUCTION STANDARDS

L is the allowable leakage in gallons per hour; N is the length of pipeline tested in feet; D is the nominal diameter of the pipe in inches; and P is the average test pressure during the leakage test in pounds per square inch gauge.

Leakage values determined by the above formulas are to be found in the following Table.

Allowable Leakage for Water Main Installation (Per 1,000 ft) in Gallons per Hour

Average Test Pressure in Pipeline

Allowable Leakage Table (gph/1,000 LF of pipeline*)

Nominal Pipe Diameter, Inches	150 PSI		200 PSI	
	PVC	DI	PVC	DI
4"	0.33	0.37	0.38	0.43
6"	0.50	0.55	0.57	0.64
8"	0.66	0.74	0.76	0.85
10"	0.83	0.92	0.96	1.06
12"	0.99	1.10	1.15	1.28
14"	1.16	1.29	1.34	1.48
16"	1.32	1.47	1.53	1.70
18"	1.49	1.66	1.72	1.91
20"	1.66	1.84	1.91	2.12
24"	1.99	2.21	2.29	2.55

**If the pipe line under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage of each size.*

Section 503: Disinfection of Water Lines

1. General

After piping has been satisfactorily installed, pressure, tested, and flushed, the Developer shall disinfect all potable water lines and equipment installed. Precaution should be taken in laying pipes, valves, and hydrants to keep them as clean as possible to minimize contamination. Water mains shall be disinfected by filling them with water and introducing a chlorine solution during the filling process to achieve 25 mg/L free chlorine throughout the main. Care should be taken in filling the mains so that the entrained air is drawing from the pipe at all high points so as to permit intimate contact of the disinfection agent with the entire inside surface of the pipe and appurtenances. The disinfection solution shall be allowed to remain in the lines for not less than twenty-four (24) hours during which all valves and hydrants are

Article 5: WATER SYSTEM CONSTRUCTION STANDARDS

operated to ensure disinfection. At the end of the 24-hour period, all portions of the main shall show a residual chlorine content of not less than 10 mg/L. The heavily chlorinated water shall be neutralized with an approved chemical or method prior to discharging from the water mains. Disinfection of water lines and the disposal of heavily chlorinated water (following disinfection) must be accomplished in accordance with the latest edition of AWWA Standard C651. Note that the "tablet method" of disinfection, which consists of placing calcium hypochlorite granules in pipes during construction and then filling the main with potable water when installation is complete, is not allowed.

2. Notification of Testing

The Water and Sewer Department shall be notified twenty-four (24) hours before filling lines for disinfection.

3. Amount of Disinfecting Agent Used

An acceptable method is by preparing a 1% solution with sodium hypochlorite or calcium hypochlorite. The required amount of chlorine to produce a 25 mg/L concentration in 100 feet of pipe is as follows:

Pipe Dia. (Inches)	100% Chlorine (lbs.)	1% Chlorine Solutions (gals.)
4	.013	0.16
6	.030	0.36
8	.054	0.65
10	.085	1.02
12	.120	1.44
16	.217	2.60

4. Residual Testing

After wasting the heavily chlorinated water and final flushing, water samples with a residual equal to that of the existing system shall be taken from the water main and be tested for bacteriological quality in accordance with the Georgia Rules for Safe Drinking Water, Chapter 391-3-5 at a state approved lab. The laboratory results must show the absence of coliform organism in the water. Copies of written lab results must be submitted to the Water and Sewer Department prior to acceptance by the City and installation of any water meters.

Section 504: Inspections and Acceptance

1. General

Before water can be used in a new system, the system must first receive final approval and acceptance from the City of Commerce Water and Sewer Department.

Article 5: WATER SYSTEM CONSTRUCTION STANDARDS

2. Inspection for Approval

Authorized representatives of the Water and Sewer Department shall have access to the work for inspection at any reasonable time. The final inspection of all improvements shall be held before conditional acceptance of the work and before the start of the one (1) year maintenance period. When all construction in accordance with these standards has been completed, the Developer shall request by letter a final inspection and acceptance from the Water and Sewer Department. All permits and drawings will be examined at this time to ensure that the work has been completed in accordance with the approved plans and these standards.

3. Stop Work Order

Any work not meeting the requirements of these standards or the approved plans shall be corrected by the Developer. At any time, throughout construction should the work not be corrected after notification by the City, a stop work order shall be issued by the City.

4. Acceptance

After all improvements are complete, the Developer shall provide the City with a one (1) year maintenance agreement to provide from the cost of maintenance of the public improvements (water system or parts thereof). The Developer shall also issue the Water and Sewer Department a letter of conveyance, granting ownership of the completed water system to the City of Commerce.

If failures occur, in the opinion of the City Engineer, to any public improvements (water systems) within a one-year period from the date of the letter of acceptance, the Developer shall be notified in writing of the defects and shall be given a reasonable time to correct the problem; otherwise, it shall be deemed a breach of the Maintenance Agreement and the City shall have the right to make the necessary repairs, either by public contract, or using City equipment, and the Developer shall be liable for the full amount of the cost of the repairs.

END OF ARTICLE 5

ARTICLE 6: SEWER SYSTEM DESIGN REQUIREMENTS

Section 601: General Design Requirements

The following shall establish the design requirements for all sewage collection systems installed, operated, and maintained in the sewer service areas of the City of Commerce. It shall be understood that these standards reflect the minimum requirements necessary to obtain construction plan approval.

1. In areas which are accessible to City sewage and/or within 1,500 feet of a sanitary sewer line, the developer shall be required to install an adequate sewage collection system through the entire development with stub outs to each lot.
2. Minimum horizontal distance between water lines and sanitary sewer lines shall be ten (10) feet. Minimum vertical distance shall be at least 18 inches.
3. Minimum cover and clearance from drainage piping for sanitary sewer PVC shall be 30 inches.
4. Creek crossings shall generally be accomplished by encasing the carrier piping in steel casing and sufficiently blocking each end to secure the pipe. Minimum depth from existing creek bed to top of casing pipe shall be three (3) feet. Details of all creek crossings are required.
5. Maximum turning angle for sewage flow shall be 90 degrees. A manhole is required for all horizontal and vertical changes of direction.
6. All crossings of paved streets shall be by the installation of steel casing by the jack and bore method unless approved otherwise prior to installation. At the discretion of the City's Water and Sewer engineer or their designate, dependent upon site or specific conditions, ductile iron piping may be required as carrier piping.
7. Crossings of driveways may be made by means of open cut or cased bores. The existing concrete and asphalt paving shall be saw cut and the debris removed prior to trenching. When pipe installation is complete, the damaged area replaced with material consistent with the driveway as soon as possible.
8. The City of Commerce reserves the right to require developers to provide easements for sewage collection systems through proposed developments.
9. A grease trap and/or a combination sand/oil trap is required for restaurants, service stations, feed mills, car wash operations and any other establishment where such devices are necessary for the proper handling of liquid wastes containing sand, grease, oil, flammable wastes or other harmful ingredients. The grease trap and/or combination sand/oil trap shall be located between the business and the tap into the City's sewer line. All grease traps shall be Zabel A300 or approved equal and shall include sampling manholes.
10. Continuous copper wire shall be placed directly over all nonmetal pipe at a maximum depth of 2 feet from finished grade.

Article 6: SEWER SYSTEM DESIGN REQUIREMENTS

11. Gravity Flow Systems

11.1 Location

Sewer lines/mains for residential subdivisions shall be constructed along the center of the street (along drainage features) with an individual service connection or stub extending from the service lateral to the edge of the right-of-way of each lot. The services shall be located at elevations and locations compatible with the best service for each lot. When drainage features make it impractical to install sewers within street rights-of-way, the sewers shall be installed along the center of easements dedicated to the City. Easements shall be forty (40) feet in width for the duration of construction (temporary), then reducing to a thirty (30) foot permanent easement thereafter.

11.2 Design factors

Sewer systems shall be designed for the ultimate tributary capacity. In determining the required capacities of the sanitary sewers, the following factors should be considered:

- i. Peak hourly domestic sewage flow;
- ii. Additional maximum sewage or waste flow from industrial sources;
- iii. Inflow and groundwater infiltration;
- iv. Topography of area;
- v. Location of sewage treatment plant;
- vi. Depth of excavation;
- vii. Pumping requirements;
- viii. Mean velocities, when flowing full of not less than two (2) feet per second based on Manning's formula using an "n" value of 0.013.

The design calculation for sewer projects shall accompany plan documents as requested by the Water and Sewer Department.

11.3 Minimum size lines

All sewer mains shall be sized adequately to serve the drainage basin where the sewer is located. Gravity sewer mains shall be based on pipe flowing 50% full and be a minimum of eight (8) inches in diameter. Service lines shall be six (6) inches in diameter or larger.

11.4 Depth

Sewer lines installed from 12 to 18 feet in depth will be considered on a case by case basis at the discretion of the water and Sewer Department's engineer or designee. The decision will be made on site or condition specific situations with special consideration given to soil types and potential future use of sanitary sewer easements or rights-of way. Manholes 12 feet deep or greater shall be 6 feet in diameter.

Article 6: SEWER SYSTEM DESIGN REQUIREMENTS

11.5 Slope

Sewers shall be designed and constructed to provide a mean velocity of 2.0 feet per second when flowing full, based on Manning's formula with an "n" value of 0.013. When slopes of twenty percent (20%) or greater are necessary, lines shall be anchored securely with concrete anchors to prevent movement. The following table provides recommended minimum slopes which should be provided; however, slopes greater than these are desirable.

Nominal Sewer Size	Minimum Slope
8"	0.40%
10"	0.28%
12"	0.22%
15"	0.15%
18"	0.12%
21"	0.10%
24"	0.08%

11.6 Manholes

Manholes shall be installed at the end of each sewer main; at changes in grade, size, or alignment; and at all pipe intersections. Additional control manholes will be required on service lines serving commercial and industrial facilities. For observation, sampling, and measurement of wastes, such manholes shall be conveniently and safely located. The property owner shall be required to maintain the manhole in a safe and accessible condition at all times. Maximum spacing for manholes shall be 350 feet. Spacing of greater than 300 feet will not be allowed when the slope exceeds ten percent (10%). Cleanouts may be used only when special conditions are approved by the Water and Sewer Department. A minimum 0.10 ft drop in elevation shall be provided in each manhole and considered during the design of each sewer line.

12. Pump Stations

12.1 Location

Pump stations shall be located on property purchased or owned by the developer and dedicated to the City of Commerce when the construction project is complete. The pump station shall be protected by an eight (8) foot cyclone fence with a three (3) strand barbed wire security extension, and a sixteen (16) foot wide double gate with gate keepers at each gate to hold in open position. A PVC privacy fence may be used in lieu of chain link fencing. The pump station shall be designed and constructed to fully operate during a 100-year flood event. Pump stations shall be readily accessible by maintenance vehicles during all weather and flooding conditions. The site shall contain an exterior light and a minimum 2" potable water line with a ¾"

Article 6: SEWER SYSTEM DESIGN REQUIREMENTS

or 1" freeze proof yard hydrant, a reduced pressure zone check valve, and reduced pressure zone backflow preventer. The RPZ's must be installed above grade in a freeze-proof box with heat or heat tracing.

12.2 Design Requirements

Pumping stations shall be designed for the ultimate tributary capacity. In determining the required capacities of the pumping stations, the following factors should be considered:

- A. Peak hourly domestic sewage flow;
- B. Additional maximum sewage or waste flow from industrial plants;
- C. Inflow and groundwater infiltration;
- D. Total dynamic head;
- E. Location of sewage treatment plant;
- F. Pipe friction;
- G. Pumping requirements;

The design calculations for all pumping stations shall accompany plan documents as requested by the Water and Sewer Department. Pumping stations designed for a peak hourly flow of 500 gallons per minute or less shall be submersible type pump stations designed specifically for raw sewage use, including totally submerged operation during a portion of the pumping cycle. When design flows exceed 500 gallons per minute, alternate designs shall be considered. If a divided well type system is required, the City of Commerce Water and Sewer Department should be consulted prior to preliminary station design. All pumping stations shall meet the requirements of the latest edition of "Ten State Standards."

12.3 Structures

Structures for pump stations shall be water tight concrete or fiberglass and approved by Director designed specifically for the intended application. All conduit entering or leaving shall be sealed air tight to minimize corrosion. All metal components within the wet well, with the exception of the pumps, motor, and pumping station piping shall be stainless steel. All discharge piping, valves, and other ferrous materials shall be coated with two coats of coal tar epoxy or high solids epoxy paint with a minimum dry film thickness of 6 mils per coat. A 50-mil minimum hydrogen sulfide resistant coating shall be applied to the interior of the wet well. A minimum clearance of six inches shall be provided from an inside wall of the valve vault or wet well to a pipe's flange face or flange edge. Appropriate thrust restraint shall be provided.

There shall be a maximum of one (1) inlet at the pump station wet well and it shall be designed to minimize turbulence and air entrainment.

Manholes receiving force main effluent must be coated with a factory applied

Article 6: SEWER SYSTEM DESIGN REQUIREMENTS

coal tar epoxy to prevent corrosion. The coating shall be 300 M as manufactured by Kopper Company, Inc. or acceptable equivalent. The coating shall be applied in two coats to achieve a dry film-thickness of at least 10 mils per coat in accordance with the manufacture's recommendations. Surfaces shall be cleaned of dust, form oil, curing compounds or other foreign material prior to coating. If the City believes that coatings will not provide adequate protection, more stringent requirements like PVC liners may be required on a case-by-case basis.

12.4 Submersible Pumps

Submersible pumps shall be designed for pumping sewage in accordance with Section 602, Paragraph 7. All pumps 5 HP and larger shall be 3-phase power.

12.5 Shutoff and Check Valves

Shutoff and check valves shall be placed on the discharge line of each pump. The check valve shall be placed between the shutoff valve and the pump. All valves must be installed in a concrete or when approved, fiberglass, valve pit separate from the wet well.

12.6 Equipment Removal

Provisions shall be made for the removal and replacement of pumps, motors, and other mechanical equipment without dewatering the wet well or disconnecting any piping in the wet well. A jib or davit crane shall be provided to lift heavy mechanical equipment from wet wells as required by the Water and Sewer Department. Lifting chains or cables shall be stainless steel.

12.7 Electrical Supply and Control

Electrical supply shall be designed to provide adequate power to pumps, alarm, and other appurtenances. Pumping stations should be provided with a dual power source, either supplied from a second power substation or by an emergency generator with an automatic transfer switch dedicated to the City with each pumping station. All generators shall be natural gas where natural gas is available or diesel powered as approved by the Water and Sewer Department. All electrical supply and control systems shall meet the requirements of the National Electrical Code. A motor control center shall be located outside the wet well and be protected by a NEMA 4X enclosure.

12.8 Alarm Systems

Alarm systems shall be installed in each pump station. The alarm shall be activated in cases of power failure, pump failure, or any cause of pump malfunction. Alarms shall consist of a sound alarm and a pole mounted light to notify personnel or area residents of problems. The volume of the sound alarm shall be adjustable. A SCADA system shall be provided and approved by the Director. The SCADA system shall provide at a minimum the following signals: Power on, Power runs status (for each pump), Pump Motor Over Temperature (for each pump), Pump Seal Failure (for each pump), Low-Low Level Alarm

Article 6: SEWER SYSTEM DESIGN REQUIREMENTS

(LSLL-P), Low Level Alarm (LSL-P), High Level Alarm (LSH-P) High-High Level Alarm (LSHH-P), High-High Level Alarm (LSHH-B) , pump run-time hours, and generator status and alarms.

12.9 Emergency Operation

Provisions shall be made to connect pump stations to emergency power in order to prevent sewage backup. Emergency power can be supplied from a secondary power substation or a generator. The emergency generator shall be a permanent diesel or natural gas generator. An automatic transfer switch (ATS) shall be provided.

12.10 Bypass Pump Connection

Each pump station shall be equipped with a bypass pump connection constructed of flanged and/or restrained joint ductile iron pipe, plug valve and a camlock fitting. The bypass pump connection shall be installed downstream of the valve vault and allow for the connection of a temporary pump.

13. Force Mains

13.1 Force Main Locations

Force mains shall be installed in rights-of-way along the center of easements dedicated to the City. Easements shall be forty (40) feet in width for the duration of the construction, then reducing to a thirty (30) foot permanent easement thereafter. Whenever possible, a minimum ten (10) foot separation between water mains and sewer force mains is to be maintained. Minimum vertical distance shall be at least 18 inches. The installation of sewage force mains and water mains in a single ditch will not be permitted.

13.2 Force Main Identification

When PVC force mains are installed, either in rights-of-way or permanent easements, a magnetic detection wire shall be placed on top of all pipelines and attached to all valves or other appurtenances to provide continuity. Tracer wire shall be Copperhead® High Strength HS-CCS HDPE 30 mil or engineer approved equal. A green, fiberglass post with "Sewer Pipeline" decal shall be provided every 200 ft along the force main. The posts shall be 4 inches wide and 66 inches tall and be Rhino 3-rail or equal.

13.3 Velocity

Force mains shall be designed to flow at a velocity of at least two (2) feet per second when volumes are equal to the ultimate average daily flow.

13.4 Design Volume

Force mains shall be designed to carry sewage volume at least equal to the ultimate tributary capacity.

13.5 Design Pressure

Force mains and fittings shall be designed to withstand all internal and

Article 6: SEWER SYSTEM DESIGN REQUIREMENTS

external pressures and surges. See Detail W-08 and W-09 for force main thrust blocks and bedding.

13.6 Air Release and Vacuum Valves

Automatic air vacuum relief valves shall be installed at locations along the force mains where high elevations may cause air locking.

14. Service Lines

Minimum Line Sizes:	6 inches
Depth:	Two (2) feet
Slope:	1%

Section 602: Materials of Construction

1. General Material Requirements

All materials shall be as specified or approved equal by the City of Commerce Water and Sewer Department and/or these standards.

2. Piping

2.1 For Gravity Flow Sewers

Piping material used for gravity flow sewers, sizes 8" through 12" shall be ASTM 3034 SDR 26 PVC or Class 350 Ductile Iron. Material for gravity sewer mains larger than 12" in diameter shall be determined by the Water and Sewer Department.

Ductile iron pipe shall be required for all sanitary sewer mains:

- a. Over or under all storm sewers
- b. Crossing water mains
- c. At all stream crossings
- d. At all utility crossings with less than two (2) feet of clearance (above or below)
- e. At locations where cover is less than four (4) feet
- f. Where slopes exceed 20%
- g. Under road and railroad crossings and inside casings
- h. Where PVC sanitary sewer pipe has more than 12 feet of cover
- i. At all other locations specified by the City

Article 6: SEWER SYSTEM DESIGN REQUIREMENTS

2.2 For Sewage Force Mains

Piping used for pressurized force mains, sizes 4" through 8", shall be AWWA C900 Pressure Class 150 or Class 350 Ductile Iron Pipe. Sizes larger than 8" in diameter shall be PC 350 Ductile Iron Pipe.

2.3 Ductile Iron Pipe

All Ductile Iron Pipe shall be in accordance with the (ANSI A-21.51 or AWWA Standard C-151) latest revision. Ductile iron pipe shall be Pressure Class 350 for 4" through 12", Class 250 for 14" through 20", Class 200 for 24", and Class 150 for 30" through 64". The pipe shall be coated on the interior with 40 mils nominal dry film thickness of Protecto 401 Ceramic Epoxy within 8 hours of surface preparation as manufactured by U.S. Pipe or "SewperCoat" with calcium aluminate as manufactured by Lafarge or approved equal. Ductile iron pipe designed and manufactured in accordance with ANSI A21.51 centrifugally cast in metal or sand lined molds. Exterior surface shall be seal coated with 1 mil thick approved asphaltic coating in accordance with ANSI/AWWA C151/A21.51.

2.4 Polyvinyl Chloride Pipe

Pipe for gravity flow systems shall be ASTM 3034, SDR 26 PVC, latest designation.

For force main construction, the pipe shall be AWWA C-900, Class 150 PVC, latest designation.

All PVC piping shall be made from compounds meeting standard code designation PVC 1120. Fittings, bells, gaskets, and lubricants to be used with PVC Pipe shall also conform to AWWA C-900 requirements. Each joint of pipe shall be marked with the nominal size, base material, material code designation, dimension ratio number, Pressure Class, designation number, Manufacturer's name or trademark, and production record code. Gaskets and lubricants shall be of proper size and shape and be furnished as required by the pipe manufacturer.

2.5 Steel Casing Pipe

Pipe shall be of steel construction of the size and wall thickness below with lengths called for on the approved plans.

UNDER RAILROADS

Pipe Dia. (Inches)	Casing Pipe (Inches)*	Wall Thickness (Inches)
4	10	0.250
6	12	0.250
8	16	0.281
10	18	0.312

Article 6: SEWER SYSTEM DESIGN REQUIREMENTS

12	20	0.344
16	24	0.375
18	30	0.469
20	30	0.469
24	36	0.531

UNDER HIGHWAYS

Pipe Dia. (Inches)	Casing Pipe (Inches)*	Wall Thickness (Inches)
4	10	0.250
6	12	0.250
8	16	0.250
10	16	0.250
12	18	0.250
16	24	0.312
18	30	0.375
20	30	0.375
24	36	0.500

*C-900, CL150 & PC 350 Slip Joint DIP Applications with Field Lok Gaskets or approved equal.

2.6 Nestable Corrugated Steel Casing Pipe

Pipe shall consist of matching half-round segments of 14 gauge corrugated galvanized steel casing pipe which when assembled become lengths of full-round corrugated steel pipe. Feasible alternatives will be considered by the Water and Sewer Department.

3. Pipe Fittings and Specials**3.1 Ductile Iron Pipe**

Specials shall be short body Class 350 Ductile Iron conforming to ANSI A-21.10 and coated internally with 40 mils nominal dry film thickness of Protecto 401 Ceramic Epoxy within 8 hours of surface preparation as manufactured by U.S. Pipe, "SewperCoat" with calcium aluminate as manufactured by Lafarge or approved equal. When directed by the Water and Sewer Department, for special connections, bell and spigot ductile iron specials shall be submitted for review. Exterior surface shall be seal coated with 1 mil thick approved asphaltic coating in accordance with ANSI/AWWA C151/A21.51.

3.2 Polyvinyl Chloride Fittings

PVC sewer fittings shall typically be SDR 26. When specific fittings are unavailable because of manufacturing restrictions, fittings shall conform to the requirements of ASTM D-3034 specification with a minimum wall thickness of SDR 35. Fittings in sizes through 8" shall be molded in one piece with elastomeric joints and minimum socket depths. Fittings 10" and larger shall be molder or fabricated in accordance with manufacturers standard pipe bells and gaskets. Gaskets shall have a minimum cross-sectional area of 0.20 sq. in. and conform to ASTM F-477 specification. PVC material shall have a cell classification of 12454-B or C as defined in ASTM D-1748. Fittings shall be manufactured by HARCO or approved equal.

4. Joints and Gaskets

4.1 Ductile Iron Pipe

Ductile iron pipe joints shall be mechanical joint conforming to ANSI A-21.11 latest designation. Gaskets shall be suitable for use in contact with sewage. Lubricants and gaskets of proper size, shape, and composition shall be used in strict accordance with the manufacturer's recommendations.

4.2 Polyvinyl Chloride Pipe

Pipe shall be furnished complete with push type bell and spigot joints conforming to ASTM D-3139, latest designation. Gaskets shall be elastomeric seals conforming to ASTM F-477 latest designation designed for joining plastic pipe.

4.3 Transition Joints

The transition between sewer pipes of different materials shall be made by special adapters made for that purpose. Transition couplings used to join Ductile Iron or ASTM D-3034 PVC sewer pipe shall be Ductile Iron, deep bell, push on joint, and air test rated. Ductile Iron material shall comply with ASTM A536, Grade 65-45-12 or 80-55-06. Bell depths shall meet the minimum socket depth requirements of ASTM F1336. Gasket grooves shall be machined. Gaskets shall be of SBR rubber and comply with ASTM F477. All couplings shall have pipe stops and a flow way tapered to allow a smooth transition between the pipes so as to not obstruct flow or inspection. Interior lining shall be Protecto 401 or approved equal. Fittings shall be manufactured by the Harrington Corporation or approved equal. Transition couplings used to join clay or Orangeburg sewer pipe shall be Fernco or approved equal and shall have concrete saddle around the fitting.

5. Manholes

Manholes shall be of precast concrete construction meeting specification ASTM C-478, latest designation or fiberglass approved by Director. Minimum inside diameter shall be four (4) feet.

Article 6: SEWER SYSTEM DESIGN REQUIREMENTS

5.1 Manhole Frames and Covers

Manhole frames and covers in non-floodplain areas shall be Class 250 Ductile Iron, Traffic Rated. Frames shall be free from scale, lumps, sand holes, plugs or other defects. Minimum frame opening shall be 22 inches. In floodplain areas, the frame and cover shall be of watertight design and/or be above the 100-year floodplain.

5.2 Manhole Steps

Manhole steps shall conform to the applicable provisions of ASTM Specification C478, latest edition, polypropylene steps with $\frac{1}{2}$ " grade 60 steel reinforcing bar or equal. Manholes steps shall be factory built into the precast sections. Steps shall be aligned during installation.

5.3 Manhole Joints

Manhole joints shall be "O" ring gasket, lock joint gasket suitable for use with sewage and shall be manufactured by Igas, Silka Seal, or equal. Manhole interior and exterior joints and walls shall be sealed using a grout mixture as specified elsewhere herein. Joints shall be tongue and groove sealed with flexible gaskets or mastic sealant. Gaskets shall be O-Ring or Type A or B "Tylox" equivalent to ASTM C443; mastic shall be "Ram-nek" with primer. The "Ram-nek" primer shall be applied to all contact surfaces of the manhole joint at the factory in accordance with the manufacturer's instructions.

5.4 Manhole Connections to Pipe

Connections to piping at the manhole shall be completed using a rubber flexible sleeve (boot) designed to be used for this purpose unless otherwise approved by the Water and Sewer Department. The sleeve size shall be as manufactured for the specific size and pipe material installed. Connections to existing manholes shall be accomplished by coring the existing manhole and installing a flexible boot as specified.

5.5 Manhole Bedding

Manholes shall be bedded on a foundation of #57 crushed stone, 8 inches thick. Manholes over twelve (12) feet deep shall be placed on a reinforced concrete slab with No. 4 bars at 12" O.C.E.W.

5.6 Manhole Brick

Brick used for any reason during manhole installation shall be best grade hard burned common brick. Absorption shall not be more than ten percent (10%) of their weight in water when submerged for twenty-four (24) hours.

5.7 Mortar

Mortar shall consist of one (1) part Portland Cement and three (3) parts sand conforming to the following specifications:

Article 6: SEWER SYSTEM DESIGN REQUIREMENTS

A. Portland Cement

B. Sand – clean, sharp, and well graded; free from clay, loam, or organic matter; pass a ¼" screen.

C. Water – clean, free from vegetable, sewage, or organic matter

5.8 Drop Manholes

The maximum allowable inside drop shall be 2.0 feet. All drops greater than the maximum allowable shall be an outside drop. Outside drop manholes shall be constructed in conformance with Detail SS-05.

5.9 Monitoring Manholes

When specifically required by the Water and Sewer Department, monitoring manholes shall be provided for commercial or industrial discharges to provide means of sampling and flow monitoring. Specific requirements will be established on a case-by-case basis.

6. Service Lines

All service pipe and fittings shall be the same as approved for SDR 26 PVC and Class 350 DIP sewer pipe only. No other pipe material will be accepted unless approved by the Director.

6.1 Service Line Connections

Service line connections to sewer mains shall be completed by using a tee or a wye installed along the sewer main. The tee or wye shall be of a material designed for their purpose and accepted by the Water and Sewer Department. Services shall extend from the sewer main to the property line of each lot.

6.2 Service Line Clean-Out

Service lines shall have a clean-out at the right-of-way using a 4" minimum PVC pipe placed vertically and extending 3' above final grade temporary capped. This temporary riser pipe shall be cut off and capped (threaded cap or equal at final grade after the service line is tied in and final grading is completed).

7. Pump Stations

7.1 Submersible Pumps

Submersible pumps, electrical cables, and accessories shall be approved by the Director. Pumps shall be manufactured by HOMA or approved equal. Pumps shall have the following features:

A. Non-clog impeller

B. The pump shall be run submerged a minimum of 6 feet under water.

C. Be capable of passing a three (3) inch sphere (except grinder pumps)

D. Be capable of dry operation without overheating

Article 6: SEWER SYSTEM DESIGN REQUIREMENTS

- E. Have dual mechanical seals with seal leak indicator light in the control panel
- F. Pump and motor casing shall be cast iron and all fasteners shall be stainless steel (Grade 316)
- G. Motor shall be selected to be non-overloading under all operating conditions.
- H. Motor winding shall have a heat sensor with auto reset to prevent overheating; three-phase motors shall have two sensors
- I. The operating speed of the pump shall not exceed 1800 rpm without special approval. The motor shall have upper and lower roller bearings. 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. A simple linear downward motion of the pump shall accomplish sealing of the pumping unit to the discharge connection elbow. Each pump shall be equipped with a stainless-steel chain or cable for easy removal and a hoist shall be provided for easy removal.

7.2 Pump Test

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

- A. Impeller, motor rating, and electrical connections shall first be checked for compliance to the customer's purchase order.
- B. A motor and cable insulation test for moisture content or insulation defects shall be made.
- C. Prior to submergence, the pump shall be run dry to establish correct rotation and mechanical integrity.
- D. The pump shall be run submerged a minimum of 6 feet under water.
- E. After operational test described in Paragraph D is complete, the insulation test described in Paragraph B is to be performed again.

A written report stating the foregoing steps have been done shall be supplied with each pump at the time of shipment.

7.3 Pump Warranty

The pump manufacturer shall warrant the units being supplied to the owner against defects in workmanship and material for a period of five (5) years or 10,000 hours under the Municipal Wastewater-Permanent Installation Warranty Policy under normal use, operation, and service.

7.4 Documentation

Operating and Maintenance Instruction Manuals and Parts Lists. Standard submittals will consist of:

- A. Pump Outline Drawing
- B. Control Data
- C. Access Frame
- D. Typical Installation Guides
- E. Technical Manuals
- F. Parts Lists

7.5 Access Frame and Cover

Aluminum access hatches shall provide full, unobstructed access to pumps, piping, valves or quick disconnect assembly. Provide aluminum frames and covers manufactured with $\frac{1}{4}$ " thick, one-piece aluminum extruded frame, with a continuous concrete anchor as part of the one-piece extrusion. The door panels shall be $\frac{1}{4}$ " thick aluminum diamond plate, designed to withstand a live load of 60 lbs. per square foot with a safety factor of 3. The doors shall be provided with stainless steel hinges with tamper-proof fasteners. All hardware shall be stainless steel. The doors shall open 90°, lock automatically in that position with a stainless-steel positive locking arm and a stainless-steel lifting handle, stainless steel locking bar, or stainless still snap-lock with removable key handle. The doors will close flush with the top of the frame, resting on a $\frac{1}{2}$ " inch wide lip around the entire inside of the frame for added support. All frames shall drain to daylight. Guide bars shall be Type 304 stainless steel pipe. Lifting cables or chains shall be stainless steel. There shall be integrated safety grates on all hatch openings.

7.6 Controls

Provide an automatic pump control center in NEMA 4X enclosure for each pump station installation. For each pump motor, there shall be included:

- A. A combination circuit breaker/overload unit providing overload protection, short-circuit protection, reset, and disconnect for all phases
- B. Across-the-line or reduced voltage starter
- C. Hand/off/automatic pump operations selector switch
- D. 120-volt control panel pilot circuitry

A 24-volt control circuit transformer with disconnect circuit breaker and overload protection for external pilot circuitry shall be included with an automatic electric alternator for two pump stations (providing alternating operation of pumps under normal conditions, or in cases of high level, allowing

Article 6: SEWER SYSTEM DESIGN REQUIREMENTS

both pumps to operate simultaneously). Pumping stations shall have three step autotransformer reduced voltage connected at the 50% tap.

A grounding type convenience outlet shall be provided on the side of the enclosure for operation of 120-volt, 20-amp A.C. devices protected by a ground fault breaker.

All electrical equipment, including but not limited to the electric meter, breaker panel, generator transfer switch, pump control panel and SCADA panel shall be mounted on a steel or aluminum frame support structure.

The support structure shall include a gabled roof (structural framing and coated metal roofing) to protect the equipment from the elements and to allow operation and maintenance personnel to stay dry during adverse weather conditions while working on any of the electrical equipment or instrumentation panels. The roof overhang shall be a minimum of 36 inches.

7.7 Monitoring and Alarms

The SCADA systems will monitor the pump station and send station signals to the existing Commerce monitoring system. The SCADA will monitor Power On, Pump Status, Pump Fault, High Wet Well Alarm, generator status, and generator faults. The system will consist of a radio modem, radio transceiver, RTU, YAGI antenna, circuit breaker, DC power supply and all other required accessories.

A high-water alarm light shall be installed that will flash when the water level in the wet well reaches a high-level condition. The unit shall consist of a flashing red light including a 100-watt bulb, red vapor proof globe and guard, and a watertight control center with reset and test switches.

8. Valves

8.1 Air Release Valves

Air Release Valves shall be of the type that automatically releases air, gas, or vapor under pressure during system operation. The valves shall have a 3" NPT inlet with a 1/2" NPT outlet and a 3/16" venting orifice for a maximum working pressure of 150 psi. Valves shall be constructed of cast iron body and cover and stainless-steel trim and float, with an adjustable Viton orifice button to ensure positive seating. Backwash accessories shall be furnished and assembled to the valve, consisting of an inlet shut-off valve, blow-off valve, clear water inlet valve, rubber supply hose and quick disconnect couplings. Air release valves shall be equal to Apco401 Sewage Valve #142 air and vacuum valve.

8.2 Plug Valves

Eight-inch and smaller valves shall be Dresser X-Centric DeZurik, ACF, or equal, with 100% (percent) opening. Ten-inch and larger shall be Dresser X-

Article 6: SEWER SYSTEM DESIGN REQUIREMENTS

Centric, DeZurik, ACF, or equal, with worm gear operator and 100% (percent) opening.

Furnish one (1) three-foot long "T" type operating wrench for valves installed.

8.3 HDL Ball Check Valve

Furnish and install Flygt HDL ball check valve. The valve shall consist of three (3) components: body, cover, and ball (one moving part). The design of the valve shall be such that it keeps solids, stringy material, grit, rags, etc., moving without the need for back flushing. In the operating mode, the ball shall not impede flow through the valve. The operating flow area shall be equal to the nominal size of the valve. There shall not be outside levers, weights, springs, dash pots, or other accessories required for a swing (clapper) type check valve. The ball shall be hollow steel with an exterior of nitrile rubber. It shall be resistant to grease, petroleum products, animal and vegetable fats, diluted concentrations of each acids and alkalines (pH 4-10), tearing, and abrasion. The body and cover shall be of gray cast iron. Flange drilling shall be according to ANSI B16.1, Class 125.

9. Valve Vaults

Valve vaults shall be provided to house valving outside of submersible pump station wet wells. Check valves, plug valves, duplex discharge transition to the force main, and a pressure gauges shall be installed within the valve vault. A minimum clearance of six inches shall be provided from an inside wall of the valve vault to a pipe's flange face or a flange edge. Appropriate thrust restraint shall be provided. The valve vault shall include a quick disconnect fitting placed after the lines have merged into a single force main for emergency bypass pumping. The valve vault shall be of precast or poured-in-place reinforced concrete. The valve vault shall have a reinforced concrete floor, slope to a sump. The sump shall drain to the wet well. The drain line shall include a P-trap to prevent the release of hazardous gases. A flap valve shall be installed on the end of the drain to prevent flooding of the valve vault by backflow from the wet well. Access shall be by an aluminum hatch, hinged and hasped, minimum size 30 inches square and the frames shall drain to daylight. Steps shall be placed in the valve vault as necessary.

10. Pressure Gauges

Pressure gauges shall be installed on the force main inside the valve pit and visible from ground level as follows: between each pump and its check valve and one (1) downstream of the plug valves. A corporation stop shall be installed on each tap to allow removal of the gauge.

END OF ARTICLE 6

ARTICLE 7: SEWER SYSTEM CONSTRUCTION STANDARDS

Section 701: Trenching and Excavation

1. General

The following shall establish the general construction requirements for the installation of sewerage systems installed, operated, and maintained in the service areas of the City of Commerce. It shall be understood that these standards reflect the minimum requirements necessary for final acceptance of the utility by the Water and Sewer Department.

- 1.7 It shall be the responsibility of the Developer to notify all utility companies prior to any excavation and obtain necessary utility locates through the Utility and Protection Center (UPC).
- 1.8 The Developer shall notify the City of Commerce Water and Sewer Department forty-eight (48) hours prior to beginning construction. This department may request a pre-construction conference with the Developer and his Contractor before beginning construction.
- 1.9 All construction shall be subject to inspection by authorized representatives of the Water and Sewer Department at any time, and at their request, no dirt cover shall be placed on any portion of installed facilities until it has been inspected and approved by the Water and Sewer Department Inspector.
- 1.10 It shall be the responsibility of the Developer to coordinate all construction and ensure that these standards are adhered to. Any work not meeting these standards shall be corrected immediately by the Developer after notification by the City Water and Sewer Department Representative. Should the work not be corrected after verbal notification, a written stop work order shall be issued by the Water and Sewer Department until the deficiencies have been corrected.
- 1.11 The Developer shall employ a Utility Contractor with a valid State Utility Contractor license and shall have a competent supervisor on site employed by the Contractor.
- 1.12 All construction shall be appropriately flagged prior to construction. And the Contractor shall adhere to the Traffic Control Plan.

2. Erosion Control and Sedimentation

2.4 General

The Developer shall be responsible for maintaining proper control measures on the construction site and adjacent areas for the duration of the project. Sediment control barriers, temporary sediment traps, sediment basins, grass, mulch, etc., as may be required to adequately control erosion and prevent sedimentation will be required. All measures shall be in accordance with the City of Commerce Soil Erosion and Sedimentation Control Ordinance and the Georgia Soil Erosion and Sedimentation Act. The Developer shall provide

Article 7: SEWER SYSTEM CONSTRUCTION STANDARDS

Development Department with evidence of possession of all applicable local, State, and Federal permits related to soil erosion and sediment control and land disturbance (i.e. GA EPD NPDES Notice of Intent, stream bank buffer variance, wetland permit, etc.)

2.5 Materials

All materials shall be as specified or approved equal.

D. Sediment Barriers

Barriers shall be approved silt, fencing, or stacked hay bales which will allow water seepage while filtering solids

E. Mulch

Shall be baled wheat, oat, or rye.

F. Fertilizer

Fertilizer shall be FSO-F-241, type I, Grade B, with a formulation of 5-10-5.

2.6 Execution

G. Sediment Barriers

Silt fencing shall be properly toed in. Silt fencing or hay shall be placed prior to and maintained in place until grass seed is planted.

H. Mulch

Mulch shall be applied to the grassed areas to contain grass seed.

I. Fertilizer

Fill fertilizer into the top two (2) inches of soil at a rate of 1,000 lbs. per acre. Dry areas should be watered to a depth of four (4) inches at least forty-eight (48) hours prior to seeding to obtain a loose friable seed bed.

J. Grass Seed

Seed shall be broadcast by hand or mechanical spreader. Broadcast half of seed in one direction, then broadcast other half at right angles to the first seeding pattern. Seeded area shall be rolled immediately after seeding. Erect signs to protect seeded areas from traffic until grass is established.

K. Sprigs

Sprigs shall be separated or shred and broadcast over the area prepared for planting at a rate of one bushel per 200 sq. ft. Sprigs shall then be harrowed into the ground with a harrow disc turned straight.

L. Watering

Watering shall be required to provide adequate soil moisture during the germination period as well as sprinkled throughout the construction area to maintain dust control.

Article 7: SEWER SYSTEM CONSTRUCTION STANDARDS

3. Clearing and Grubbing

3.6 General

The clearing and disposal of all trees, bushes, shrubbery, and miscellaneous debris as outlined in the project plans and specifications shall be the sole responsibility of the Developer subject to the approval of the City of Commerce Water and Sewer Department.

3.7 Clearing

Clearing operations shall be performed so as to prevent damage to existing trees and other property located on property other than that of the Developer. Safety of employees and others should be considered throughout the operation. No clearing should be performed on property not owned by the Developer without first obtaining a written permission from the Owner.

3.8 Grubbing

It shall be the responsibility of the Developer to remove all debris from fill material in areas to be excavated, areas to be stripped of topsoil, and areas to receive fill.

3.9 Disposal

All cleared and grubbed material shall be disposed of in a manner satisfactory to the Water and Sewer Department. Burning shall not be allowed unless specifically permitted by the County Fire Marshall.

3.10 Bench Marks and Monuments

All established bench marks, property pins, monuments, and other reference points shall be maintained. If destroyed or disturbed, they shall be replaced as directed by the Water and Sewer Department.

4 Traffic Control Plan

The Developer shall conduct his operations in accordance with the *Manual on Uniform Traffic Control Devices* and DOT traffic control plans so that there will be minimum interference with or interruption of traffic upon the roadway. This applies to both the initial installation and the continuing maintenance and operation of facilities. Whenever construction is conducted along a highway, utility construction signs shall be provided at 1,500 feet, 1,000 feet, and 500 feet along the affected roadway prior to construction. In the case of single lane closings, a flagman shall also be provided on each side of the construction site to direct traffic. Lane closings shall not be permitted without prior approval of the Water and Sewer Department. Traffic cones shall also be placed along the closed lane at a distance, in feet, not to exceed the maximum speed limit, in miles per hour, of the affected roadway. Road closings shall be protected by effective barricades and obstructions shall be lighted during hours of darkness. Flagmen and suitable warning signs shall be provided as may be required to properly control and direct traffic. Safety of both motorists and the general public shall be provided at all times. The Developer shall be responsible for obtaining any GDOT

Article 7: SEWER SYSTEM CONSTRUCTION STANDARDS

permits that are required and provide the Water and Sewer Department with evidence of all GDOT permits.

5. Trench Construction

5.1 Trench Description

Trench may be open cut from the ground surface where designated on the plans or approved by the Water and Sewer Department. Boring may be required to protect certain surface improvements and to satisfy requirements of the Georgia Department of Transportation and/or railroad companies. Minimum width shall be the nominal diameter of the pipe plus twelve inches and minimum cover on pipe shall be 48 inches. Bottom of the trenches shall be bedded with No. 57 stone as described in Section 701, Paragraphs 5.7 and 5.8. Bell holes of sufficient size for making perfect joints shall be provided.

5.2 Alignment and Grades

Pipe grades shall be obtained by use of a laser and double checked with a surveying level and rod. Bench Marks and other principal control points shall be furnished by the Developer. True alignment shall be required. Alignment shall be as indicated on the approved plans. When an obstruction is encountered, make necessary changes in alignment on grade as approved by the Water and Sewer Department.

5.3 Excavation

Excavation shall consist of removing earthwork for the satisfactory placement of sewers and appurtenances. This includes vegetation, brush and debris, soil, rock, pavements, etc., for the intent and purpose of constructing the work to required lines and grades, including sheeting, bracing, and dewatering of excavations, trench bed stabilization, and such other incidentals necessary to comply with plans and specifications.

All excavated material shall be placed on one side of the trench in a manner to prevent blockage of surface drainage patterns and traffic. It shall be so placed as to not endanger the work, allowing at all times free access to the trench and all existing utilities publicly or privately owned, particularly fire hydrants.

Where necessary, wood fencing or retainers shall be erected to retain the excavated material within narrow limits to prevent the obstruction of traffic and/or encroachment upon pavements or other areas restricted by property owners. Included shall be protection of hedges, walls, flower/rock gardens, shade trees, fruit trees, and vegetable gardens. Satisfactory provisions shall be made for travel on sidewalks, crosswalks, streets, railroads, bridges, private ways, railings, barriers, etc. all drains, gutters, culverts, and sewers for surface drainage shall be kept open, or if it is evident they must be temporarily closed then all requirements of the Owner must be met prior to such closing.

Excavated material shall not, in any case, be placed upon the pavement surfaces of public roads or streets, owned by the City, County, or State, unless

Article 7: SEWER SYSTEM CONSTRUCTION STANDARDS

prior approval is given by the proper authority having jurisdiction. In periods between dusk and daylight, and during inclement weather when visibility is limited, caution lights and barricades shall be placed at each end and along the excavated material. Each building, wall fence, pile, bridge, railroad, sidewalk, driveway, tree, lawn, garden or any other improvement encountered is to be properly protected from injury. In the event of damage during the work, prompt repairs satisfactory to the Water and Sewer Department and the property owner shall be made by the Contractor.

Plans direct sections where jack and bore methods are required under certain pavements and/or railroads.

5.4 Trenching

Except as specified for jack/bore procedures under pavements and railroads, all excavation shall be made by open cut unless otherwise authorized by the Water and Sewer Department. All work within rights-of-way of railroads and State highways shall be subject to an approval permit for construction (processed through the Owner) and all rules and regulations of those authorities shall be required. It shall be the responsibility of the developer to prepare the applications for the required permits and pay all permit fees.

Trenches shall be excavated to the grade shown on the plan and profile drawing. Where excessive excavation results, the Contractor shall construct special foundations or use special backfill methods. Overdepth excavation will be required to remove material unsuitable to support the pipe.

5.5 Sheet piling and Bracing

When trench sides must be kept as nearly vertical as possible, it may be necessary to sheet, brace or support the trench sides. When trench depth excavation exceeds five (5) feet, sheet piling and bracing shall be required to protect the pipe crew from injury irrespective of the visible judgement of soil conditions by the Contractor. In the event the sheet piling cannot be removed without injury to the pipe or adjoining structures, it shall be left in place or cut, and the upper part then removed. All trenching, sheet piling, bracing, side sloping, etc., shall conform to the regulations of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). Side sloping in accordance with OSHA regulations is acceptable where conditions permit. It shall be the responsibility of the Contractor to ensure that all safety measures are met.

5.6 Stabilization and Bedding

In soft ground, quicksand, or in areas where soil conditions are such that pipe alignment or grade is endangered, the trench shall be excavated below grade and then brought back to grade with stone stabilizer material. Stone stabilizer material shall be ASTM #57 crushed stone. Depth of stone shall be a minimum of 6 inches minimum or as directed by the Water and Sewer Department. Bedding materials plus soils types are defined according to the Unified Soil

Article 7: SEWER SYSTEM CONSTRUCTION STANDARDS

Classification System (USCS) in ASTM D2487 and is broken down into 5 categories suitable for this type of project.

5.7 Bedding Classifications for Ductile Iron Pipe

Pipe shall be bedded in either Class B or Class C as specified by the Developer's design engineer. See Detail SS-01 for Gravity Sewers and Detail W-09 for Force Mains.

Class B – The pipe shall be bedded with No. 57 stone bedding material placed on the trench bottom. The bedding shall have a minimum thickness beneath the pipe of 4 inches or one-eighth of the outside diameter of the pipe, whichever is greater, and shall extend up to the horizontal centerline of the pipe. Backfill from pipe horizontal centerline to a level not less than 12 inches above the top of the pipe shall be of the bedding material or carefully placed compacted native soil. Initial backfill shall be finely divided material free of debris, organic material, and stones.

Class C – The pipe shall be bedded in No. 57 stone bedding material placed on the trench bottom. Native soils may be used when approved by the Water and Sewer Department. The bedding shall have a minimum thickness beneath the pipe of 4 inches or one-eighth of the outside diameter of the pipe, whichever is greater, and shall extend up the sides of the pipe one-sixth of the outside diameter of the pipe. Initial backfill between the bedding and a plane 12 inches over the top of the pipe shall be finely divided earth free from debris and stones and shall be compacted.

Class D – is not allowed.

5.8 Bedding Requirements for Polyvinyl Chloride (PVC) Pipe

PVC sewer shall be installed in a granular embedment material as specified herein and as shown on Detail SS-01 for Gravity Sewers and Detail W-09 for Force Mains. The embedment material shall be No. 57 stone. The bedding shall be placed to the horizontal centerline of the pipe in three (3) successive applications. First, a four (4) inch minimum foundation shall be placed to proper grade prior to pipe installation. Following pipe installation, the embedment material shall be carefully placed as haunching to no more than one third of the pipe diameter. The haunching shall be sliced underneath the pipe barrel with a shovel to ensure firm base and side support. Thirdly, the embedment material shall be carefully placed to the centerline of the pipe.

Initial backfill consisting of suitable native soil shall be carefully placed and compacted to a minimum of 12 inches above the pipe. Initial backfill material shall consist of fine, loose earth containing adequate moisture for thorough compaction. The material shall be free of large stones, clods, vegetable matter, debris, and other objectionable material.

The remainder of the trench backfill shall be in accordance with the section "Backfilling."

5.9 Concrete Encasement

Concrete encasement, when required, shall completely surround the pipe and shall have a minimum thickness at any point of one-fourth of the inside diameter of the pipe or 4 inches, whichever is greater.

Force main blocking shall be 3,000 psi concrete placed between undisturbed soil and the fitting to be anchored. Blocking shall be so placed that the pipe and fitting joints are accessible. See Detail W-08.

5.10 Rock Excavation

If rock is encountered, the Contractor shall remove rock to 6 inches below grade of trench and build back the trench bottom with suitable material tamped into place. When necessary, blasting operations shall be conducted in strict accordance with all existing ordinances and regulations. Blasting shall be conducted by persons licensed to use explosives. When explosives are required to prosecute the work, the contractor shall use blasting mats or similar products to eliminate or lessen the danger from projectiles occasionally resulting from blasting rock. It shall be contractor's responsibility to incorporate the use of seismic monitoring should rock excavation, by use of explosives, occur within 150 feet of any residential, commercial, industrial, or institutional structure and within 300 feet of any miscellaneous structure. Blasting conducted near dams or bridge foundations shall incorporate the use of a seismic monitor should such blasting occur within 25 feet of said dam and/or bridge foundation. Contractor shall maintain all seismic records and blasting logs to be furnished to City upon request.

Where blasting is to be conducted along the right-of-way of a State claimed roadway, the Developer shall provide the Water and Sewer Department all necessary information to submit blasting permit applications to the Georgia Department of Transportation for approval. Blasting may be conducted only after this permit is received.

5.11 Limit of Open Trench

The length of the trench to be opened or the area of the surface to be disturbed and restored at any one time shall be limited to that which the Contractor can complete in one day's work or less in the event of apparent inclement weather. The length shall not exceed 100 feet.

It shall be the Contractor's responsibility to provide adequate barricades, warning signs, flagmen, flashing lights, etc., as necessary to safeguard the public. All trenches must be backfilled by the close of each work day.

5.12 Disposition of Water

Trenches shall be kept free of water. The Contractor shall furnish all equipment and labor necessary to remove any water found or accumulated in the trench. Other excavation shall be kept clear of water while the pipe is being laid or concrete or masonry is being placed. No pipe shall be laid in water and

Article 7: SEWER SYSTEM CONSTRUCTION STANDARDS

water must not be permitted to flow over or rise upon any masonry or pipe until the work has been accepted to prevent flow-in of silty water and thus prevent buildup of foreign matter in the pipe.

All water pumped or bailed from the trench or other excavation must be conveyed in an acceptable manner to a suitable point of discharge, i.e. a stream or ditch where it shall not cause injury to public health, damage to public or private property, damage to work under construction previously completed, damage to the street surfaces, or interference with the use of streets by the public.

5.13 Excavation Near Roads and Railroads

Special care must be exercised in trenching near roads and railroads to protect against collapsing of the roadbed structure. Each situation must be evaluated on account of varying soils. Where excavations encroaching at or near roads and/or railroads will be limited because of scheduled jack/bore methods required for installations under roads and/or railroads, the trench excavated shall be halted at least ten (10) feet from the pavement edge of a road, or more if soil conditions so indicate and no nearer than twenty-five (25) feet from the centerline of the railroad track nearest the excavation as measured at 90 degrees (right angles) to the railroad.

5.14 Subsurface Obstructions

In excavating, backfilling, and laying pipe, care must be taken not to remove, disturb, or injure any water, sewer, gas, electric, telephone, or other conduits or utilities without prior approval of the owner of the utility encountered, including private utilities.

If necessary to perform the intended work, the Contractor shall sling, shore, and maintain such utilities in operation and promptly repair any damage done to them. Before final acceptance of the work, all such utilities shall be made "equal to or better" than prior to construction.

It shall be the Contractor's responsibility to locate underground utilities. In the event of damage to the utilities, the Contractor will promptly notify the utility owner (private or public) and must assume full responsibility therefore.

If the Contractor damages any part of an existing utility, the Contractor shall immediately make repairs if qualified to repair the utility or pay at his own expense to have the utility repaired by the utility owner. the City of Commerce will charge time and materials plus 30% for overhead and administration to repair any of its utilities damaged by the Contractor.

5.15 Embankments

Whenever the sewer is to be installed in a fill area or in a cut with less than four (4) feet of cover (top of pipe to ground surface), the Water and Sewer Department will require the installation of ductile iron pipe.

6. Inspection Before Laying of Pipe

Before any pipe is laid in the trench, the pipe shall be subject to inspection. Only first quality pipe with smooth surfaces (interior and exterior) and free from cracks, flaws, blisters, etc. shall be used. Pipe contaminated with dirt deposits shall be cleaned prior to installation in the trench.

7. Pipe Installation

Pipe installation shall be performed with bell ends upgrade without any break in alignment or grade between manholes. A thorough cleaning of all dirt and foreign matter shall be made of bells and sockets before jointing. Pipe materials shall meet specifications contained elsewhere herein.

7.1 Handling

Pipe shall be carefully unloaded with a pipe unloader or crane. All materials dropped or dumped will be subject to rejection without additional justification.

7.2 Laying

Pipe shall be swept clean of trash or dirt before lowering into the trench. After the pipe has been cleaned it shall be lowered into the trench in such a manner that the pipe shall not be damaged. Each joint shall then be lined and brought to a uniform grade upon a solid trench bottom. Bell holes for couplings or bell shall be prepared with a minimum clearance of two inches. Pipe shall be laid in straight lines on uniform grades

Before stopping work each day, all open pipe ends shall be closed with a proper size plug. Pipe shall be protected from floating.

7.3 Jointing

G. Mechanical Joints

Clean spigot and bell of foreign material and apply a prepared lubricant solution before slipping gasket and gland over spigot end of pipe. The small side of gasket and the lip of gland must face the socket. Paint gasket with lubricant solution and place spigot end of pipe securely home in socket. Push gasket evenly into position in socket, slide gland into position, and tighten bolts with fingers. Tighten bolts with a torque wrench to recommend tightness by tightening bottom bolt and then top bolt. Thereafter, all bolts shall be tightened in sequence of 180° apart until all bolts are within the range of torque recommended by the manufacturer. If effective sealing is not accomplished, disassemble and reassemble after thorough cleaning.

H. Slip Joints

Jointing shall be made with rubber gaskets and lubricant furnished by the manufacture in strict accordance with the manufacturer's

Article 7: SEWER SYSTEM CONSTRUCTION STANDARDS

recommendations. Prepare field cut pipe by filing a 1/8-inch 30° bevel on the pipe end to avoid injuring the gasket.

7.4 Nestable Corrugated Steel Casing Pipe

Construct trench approximately 12 inches wider than the diameter of the pipe to be installed. Round the bottom of the trench to conform to the shape of the pipe. Remove large stones and other obstructions. Do not excavate more material than necessary. If excavation is made in unstable soil, place a 12-inch layer of gravel in trench bottom. Assemble pipe casing in strict accordance with the manufacturer's recommendations.

7.5 Connections to Existing Manholes

Plug any new line tapped into an existing manhole or sewer line as directed by the Water and Sewer Department. All connections shall be made in a neat and workmanlike manner to avoid damage to the existing structure. Core and boot suitable modification to the manhole bench shall be made to the satisfaction of the Water and Sewer Department. No saw cutting or hammering is allowed.

8. Backfilling

Backfill material above the pipe embedment shall consist of native earth free from large stones, clods, debris, or other objectionable material. In traffic areas, particularly roads and streets, parking lots and walkways, the full depth of backfill shall receive thorough tamping in 6-inch layers to a minimum of 98% standard proctor density. The Water and Sewer Department may request that soil compaction test be performed by an outside testing consultant. The developer will be responsible for payment to the testing consultant. Particular attention is directed to driveways, walkways, and areas subject to mail delivery where prompt backfilling is required to prevent inconvenience to the public.

In all areas of construction, the excavated material shall be cleared from the premises and the completed work left in a neat and acceptable condition. Included are such items as broken pavement and other matter not classified as earth.

Trenches and other excavated areas completed by the Contractor shall be kept in a good and safe condition during a one-year maintenance period following acceptance by the Water and Sewer Department and regulatory agencies.

8.1 Time

Trenches shall be backfilled as soon as practical after laying and jointing the pipe. Provisions for traffic as specified under "Trench Excavation" must be adhered to.

8.2 In Non-Traffic Areas

Initial backfill shall be placed carefully with suitable material in layers not exceeding 6 inches in thickness and thoroughly compacted with mechanical tamps to one foot above the top of the pipe. The backfill shall be rounded over the trench to provide allowance for future backfill settlement.

9. Highway and Railroad Crossings

Install in strict accordance with railroad or State Highway requirements and all applicable provisions on the plans and specifications. See Detail TYP-04.

Perform no work until satisfactory arrangements have been made and permits secured from the State Highway Department or railroad and permits obtained. Install casing pipe by jacking and boring or tunneling in strict accordance with the requirements of the Georgia Department of Transportation and FHWA or railroad. The diameter of the hole shall not exceed the outside diameter of the casing pipe. Cement grout shall be pumped around pipe where voids were developed during the installation operation. Casing pipe shall be steel as previously specified and joints shall be welded. Carrier pipe shall be ductile iron with mechanical joints as previously specified. Welds shall be performed only by qualified welders, meeting American Welding Society, and American Institute of Steel Construction Standards. Welds shall be continuous watertight and develop a greater strength than the pipe. Install on required grade. Inside and outside of welds shall have all rust, mill scale, flux flumes, oxides grease and oil removed by chipping and wire brushing immediately before apply touch-up coating. All weld areas and areas where coating has been scratched shall be recoated with coal tar material of same type and thickness as original coating. Outside shall be coated immediately after welding. The carrier pipe shall be supported within the casing by use of casing spacers sized to limit radial movement to a maximum of 1 inch. Provide a minimum of one casing spacer per nominal length of pipe. Casing spacers shall be attached to the pipe per manufacturer's recommendations or at maximum 18 to 20-foot intervals. Seal ends of casing in accordance with the Georgia Department of Transportation requirements.

10. Asphalt Concrete Paving Replacement (Where Open Cut is Allowed)

Materials and construction methods shall conform to the Georgia State Department of Transportation Standards Specifications, latest editions, and Detail TYP-03 of these standards.

10.1 Removal

Before removing pavement, the pavement shall be marked for cuts nearly paralleling pipe lines and existing street lines. All pavement cuts shall be made by sawing prior to excavation to eliminate uneven and ragged edges. Concrete pavement, and asphalt pavement on concrete base, shall be scored to a depth approximately two (2) inches below the surface of the concrete along the pavement may be broken below the scoring with a jackhammer or other suitable equipment.

10.2 Excavation and Backfill

Excavation and backfill shall be in accordance with this Section.

10.3 Base

Base shall be 8 inches of "High Early Strength" concrete in accordance with Section 430 of the Georgia Standard Specifications for Construction of Roads

Article 7: SEWER SYSTEM CONSTRUCTION STANDARDS

and Bridges.

10.4 Pavement

Pavement shall be hot mix asphaltic concrete superpave Mix Type 9.5 mm, 12.5 mm, or 19 mm and shall be in accordance with Section 400 of the Georgia Standard Specifications of Roads and Bridges.

11. Manhole Installation

Manholes shall be installed at intervals not exceeding 350 LF or as shown on the approved plans. Excavation for manholes shall be sufficient to provide six (6) inches of clearance between the outer surface of the manhole and the soil or timber sheeting, if required. All manholes shall be provided with steps placed fifteen (15) inches on center and properly aligned. Manholes receiving force main effluent must be coated with a factory applied coal tar epoxy or approved equal coating to prevent corrosion.

12. Service Lines

A sewer service line shall be provided for every existing or proposed lot or building. Services shall extend to the property line of the lot being served and normally be located within ten (10) feet of the lower corner of the lot. The depth of the lines shall be no less than two (2) feet. Services shall have a cleanout at the property line, be temporarily capped, and marked with a full-length stick of 6-inch diameter pipe at the cleanout until permanent service is established to the residence or business.

13. Sewage Pump Stations

Sewage pump stations shall be installed at locations as indicated on the approved plans.

14. Bypass Pumping

When bypass pumping is required, the Contractor shall supply the necessary pumps, conduits, and other equipment to divert the flow of sewage around the manhole section in which work is to be performed and to supply the necessary labor and supervision to set up and operate the pumping and bypassing system. The bypass system shall be of sufficient capacity to handle existing flows plus additional flow that may occur during periods of rain. The Contractor will be responsible for furnishing the necessary labor and supervision to set up and operate the pumping and flow diversion system. If pumping is required on a 24-hour basis, all engines shall be equipped in a manner to keep the pump noise to a minimum. Pumping or bypassing of raw wastewater onto the ground, to areas not intended for raw sewage (i.e. ditches, creeks, and storm sewers), or into receiving streams is prohibited.

Whenever flows in a sewer line are blocked, plugged or diverted precautions must be taken by the Contractor to protect the sewer lines from damage that might be inflicted by excessive sewer surcharging. Further, the Contractor must take precautions to ensure that sewer flow control operations do not cause flooding or damage to public or private property.

Section 702: Gravity Sewer Testing

1. General

When requested by the City of Commerce Water and Sewer Department, the Contractor shall test the integrity of the installed sewer line by one or more of the following: low pressure air test, a measurement of infiltration, mandrel test, video inspection, and/or velocity test. The tests shall be performed upon such lines selected by the Water and Sewer Department.

2. Low pressure Air Tests

2.1 Safety

The Contractor shall have the responsibility to ensure that all air plugs are installed and braced to prevent blowouts. Pressurizing equipment shall include a regulator or relief valve to avoid over pressurizing and damaging an otherwise acceptable line. No one shall be allowed in the manholes during testing.

2.2 Preparation of the Test Line

Secure the plugs in all pipe outlets, including stoppers in laterals, to resist the test pressure. Clean out all debris in the pipe. At the option of the contractor, the interior pipe surface may be wet by flushing the line in order to produce more consistent test results.

2.3 Procedure

The Contractor shall slowly introduce low pressure air into the sealed line until the internal air pressure reaches four (4) psig. The air supply shall then be throttled to maintain the four (4) psig internal pressure for at least two (2) minutes to permit the temperature of the entering air to equalize with the temperature of the pipe wall. When temperatures have equalized, and the pressure stabilized, the air hose from the air supply shall be shut off. The pressure shall then be decreased to no less than 3.5 psig. At the reading of 3.5 psig, or any convenient pressure reading between 3.5 and 4.0 psig, timing shall begin with a stop watch. If the time shown in the table below for the designated pipe size and length elapses before the air pressure drops one (1) psig, the section undergoing the test has passed and shall be presumed to be free of defective joints.

2.4 Calculation of Test Time

Air Leakage Chart (min:s): ASTM F-1417

Minimum time required for a 1.0 psig pressure
drop from 3.5 psig to 2.5 psig.
See Practice UNI-B-6-90

Size (in.)	Min. Time (min:s)	Time for Length, s
4	3:46	0.380*L

Article 7: SEWER SYSTEM CONSTRUCTION STANDARDS

6	5:40	0.854*L
8	7:34	1.520*L
10	9:26	2.374*L
12	11:20	3.418*L
15	14:10	5.342*L
18	17:00	7.692*L
21	19:50	10.740*L
24	22:40	13.674*L

Example 100 LF of 8-inch pipe; Time = $1.520 * 100 = 152.0s = 2m:32s$

2.5 Groundwater Conditions

Groundwater should be taken into consideration and calculated for. Add one (1) psi for every 2.3 feet of groundwater above the pipe.

2.6 Retest of Test Section

Any section of line which a loss of more than 1.0 psi is encountered during the period of a test may be retested at the option of the contractor. Failure of a test section of a line shall require location and grouting or other repair or replacement of the source of excessive air loss. The Water and Sewer Department shall approve the method to be used prior to any repair or replacement.

3. Measurement of Infiltration

The contractor shall furnish an adequate number of plugs of the proper size and acceptable weird to measure infiltration into the system. Infiltration greater than 25 gallons per inch diameter of pipe per mile of sewer per day will not be accepted. Any visible or audible leak must be dug up and repaired unless it is found to be in a joint and the Water and Sewer Department has authorized it to be repaired by chemical grouting. Any increase in flow between two adjacent manholes must be corrected.

Measurements of flow shall be performed on any lines with a visible flow of water.

4. Mandrel Test

At the request of the Water and Sewer Department, a mandrel test shall be performed on PVC sewer pipe to test for maximum allowable deflection. The mandrel shall be sized to test a 5% deflection. The mandrel diameter shall be 5% less than the average reference internal diameter. Minimum diameters of mandrels to be used are as follows: 8" = 7.52"; 10" = 9.46"; 12" = 11.40". The flowing procedure is recommended:

1. Completely flush the line marking sure the pipe is clean of any mud or trash that would hinder the passage of the mandrel.
2. 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.)
3. 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.

Article 7: SEWER SYSTEM CONSTRUCTION STANDARDS

4. Connect a second rope to the back of the mandrel. This will enable the mandrel to be retrieved if excessive deflection is encountered.
 5. Remove all the slack in the pull rope by gently pulling the rope at the far manhole. After the slack has been removed, place a tape marker on the rope close to the pipe opening where the mandrel will exist. If mandrel encounters excessive deflection, the marker will provide a means of measuring the travel distance of the mandrel so that the deflected area can be located.
 6. Draw mandrel through the sewer line.
 7. An increasing resistance to pull is an indication of excessive deflection. If this occurs, measure the distance from the beginning marker on the rope to the manhole. Locate the section and replace bedding or pipe if visual examination reveals damage.
 8. Retest.
5. **Velocity Test**
- On lines installed at minimum grade or at any time the City of Commerce Water and Sewer Department suspects that a problem with flow will occur, a velocity test of the suspect section may be requested.
- The contractor shall add sufficient water at a point upstream of the suspect section. After flow has reached a steady rate, dye or some type of floating object such as a ping pong ball or fishing float will be passed through the line. The float will be timed as it passes through the section. Any line in which a velocity of two (2) feet per second cannot be obtained will not be accepted.
6. **Televising of Lines**
- All gravity lines shall be televised after construction of the line. Any gravity line installed within a roadway shall be televised after installation of road subbase prior to paving. A copy of the televised line shall be provided in color on CD format including a written transcription record. The upstream and downstream manholes shall be clearly indicated before each section and the footage shall be shown continuously. The camera shall stop at each service, joint, and any other location where detailed inspection is required. Clean water shall be run through the system to flush/clean it prior to televising.

Section 703: Force Main Testing

1. Hydrostatic Test

Force mains shall be hydrostatically tested after the pipe has been laid and backfilled between joints. Each section of pipe shall be subjected by hydrostatic gauge pressure at the rated pressure of the pipe for two (2) hours. Each section of pipe shall be slowly filled with water and brought to the specified test pressure based on the elevation of the lowest point of the line or lowest point of the section under test and corrected to the elevation of the test gauge. The pressure shall be applied by means of a gasoline driven test pump connected to the pipe in a manner satisfactory to the Water and

Article 7: SEWER SYSTEM CONSTRUCTION STANDARDS

Sewer Department. The contractor shall make arrangements for metering the amount of water used during the test. The contractor shall backfill all pipe and provide all thrust blocking before hydrostatic testing. It shall be the contractor's responsibility to locate and repair any and all leaks that are found. The Water and Sewer Department may direct the contractor to leave certain joints and connections uncovered until testing has been completed. All exposed pipe, fittings, valves, and joints will be carefully examined during the open trench test. Any cracked or defective pipe, fittings, or valves discovered in consequence of this pressure test shall be removed and replaced and the test shall be repeated until satisfactory.

2. Leakage Test

The pipe shall be subjected to a hydrostatic gauge pressure of at the rated pressure of the pipe for two hours. In conjunction with the hydrostatic test, a leakage test shall be conducted at the rated pressure of the pipe. This leakage test will be conducted for two (2) hours and the maximum leakage allowed will be ten (10) gallons per inch diameter per mile per day. No installation will be accepted if the leakage is greater than determined by the formula per AWWA C600 (DIP) and AWWA C605.

Section 704: Inspections and Acceptance

1. General

Before sewage is introduced into a new system, the system must first receive final approval and acceptance from the City of Commerce Water and Sewer Department

2. Inspection for Approval

Authorized representatives of the Water and Sewer Department shall have access to the work for inspection at any reasonable time. The final inspection of all improvements shall be held before conditional acceptance of the work and before the start of the one (1) year maintenance period. When all construction in accordance with these standards has been completed, the Developer shall request by letter a final inspection and acceptance from the Water and Sewer Department. All permits and drawings will be examined at this time to ensure that the work has been completed in accordance with the approved plans and these standards.

3. Stop Work Order

Any work not meeting the requirements of these standards or the approved plans shall be corrected by the Developer. At any time, throughout construction should the work not be corrected after notification by the City, a stop work order shall be issued by the City.

4. Acceptance

After all improvements are complete, the Developer shall provide the City with a one (1) year maintenance agreement to provide from the cost of maintenance of the public improvements (water system or parts thereof). The Developer shall also issue the Water and Sewer Department a letter of conveyance, granting ownership of the completed water system to the City of Commerce.

Article 7: SEWER SYSTEM CONSTRUCTION STANDARDS

If failures occur, in the opinion of the City Engineer, to any public improvements (water systems) within a one-year period from the date of the letter of acceptance, the Developer shall be notified in writing of the defects and shall be given a reasonable time to correct the problem; otherwise, it shall be deemed a breach of the Maintenance Agreement and the City shall have the right to make the necessary repairs, either by public contract, or using City equipment, and the Developer shall be liable for the full amount of the cost of the repairs.

END OF ARTICLE 7

APPENDIX A GUIDELINE FOR APPROVAL AND ACCEPTANCE

I. PRELIMINARY REVIEW

A. Developer

1. Meets with Water and Sewer Department to discuss system and obtain standards.
2. Submits two (2) copies of preliminary plans with checklist (Appendix B) for review.

B. Water and Sewer Department

1. Reviews plans to check for compliance with Development Standards.
2. Marks plan deficiencies along with checklist.
3. Meets with Developer to discuss changes necessary for approval.
4. Returns marked up plans to the Developer so that necessary changes may be made, and plans resubmitted for final review.

II. PLAN SUBMITTAL

A. Developer

1. Pays review fees to the Water and Sewer Department.
2. Corrects plans as indicated on marked up plans.
3. Submits three (3) copies of revised plans to Water and Sewer Department for construction approval.
4. Obtains necessary easements and permits for construction.

B. Water and Sewer Department

1. Distributes design plans to department heads and engineer for review.
2. Provides design review by department heads and appropriate engineers
3. Returns design plans to developer as approved or needing modifications.
4. If modifications are required, developer must resubmit additional three (3) sets of plans to City and EPD/DOT as required. If more than one (1) submittal is required to address original mark-ups, additional review fees will be required per fee schedule (see Appendix F)
5. Receives EPD/DOT approval as applicable
6. Department heads meet again to approve design and sign final approval form and plans
7. Collects fees for inspection, enforcement, and testing for the construction phase of the development

III. CONSTRUCTION PHASE

A. Developer

1. Before construction begins, holds preconstruction meeting with all applicable department heads.
2. Secures the services of a competent Utility Contractor to perform the construction on the project.
3. Submits name and references of the Utility Contractor to Water and Sewer Department for approval. (Appendix C)
4. Upon Utility Contractor approval, begins construction.
5. Notifies Water and Sewer Department forty-eight (48) hours prior to any construction.

B. Water and Sewer Department

1. Periodically inspects construction for concurrence with the Development Standards.
2. Witnesses all testing.

IV. POST CONSTRUCTION ACCEPTANCE

A. Developer

1. Submit three (3) full-size sets of As-Built Record Drawings plus digital copies in AutoCAD format on Georgia State Plane Coordinate system using NAVD-88 elevation datum and Adobe PDF format that meet the following requirements:
 - a. Generally anything shown on the plans as designed or modified shall be recorded and more specifically stated below as applicable.
 - b. Measured depths of foundations in relation to finish first floor datum.
 - c. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - d. Field changes of dimension and detail.
 - e. Details not on original Contract drawings
2. Sewer Projects:
 - a. Manhole top & invert elevations. (outside/inside drop, concrete encasement)
 - b. Manhole location with distance reference to permanent features (2 each per manhole).
 - c. Angles of sewer lines in/out of manholes
 - d. Ground elevation at manhole.
 - e. Distance between manholes.
 - f. Calculated slopes.
 - g. Pipe size, length, material and location (restraint information).

Appendix A: GUIDELINE FOR APPROVAL AND ACCEPTANCE

- h. Location of any service laterals, as well as pipe size, length, material and location (If applicable).
 - i. Location of any force main connections and details of the connection (i.e. elevation, inside or outside drop, concrete encasement or joint restraint information) as well as force main size, length, material and location.
 - j. Location of force main fittings and valves with distance references to permanent features (2 each per appurtenance) and description of size and type of (check valves, plug valves & air release valves).
 - k. Pump station invert elevations, top elevations diameter and location.
 - l. Location- of pump station accessories (Electrical service; control panel; security light, valve vault, hoist, water service, meter, fence, gate, cross drain, etc.).
 - m. Casing size, length, material and location.
 - n. Provided sketches with detailed information drawn in a larger size either on the plans (if there is space) or on a separate sheet attached to the record drawings is always very helpful. Good blow up details for complex tie-ins, crossings of multiple utilities, assemblies for multiple bends/fittings and for jack and bores and open-cut street crossings are important to help the owner locate their lines in the future for maintenance, repairs and extensions.
3. Water Projects: (also applies to force main installations or other pressure pipe projects)
- a. Water main size, length and material with distance reference to edge of pavement or permanent features.
 - b. Water service line size, length, material and location (If applicable).
 - c. Service meter size and location (If applicable).
 - d. Locations with distance references to permanent features (2 each per appurtenance) and description of size and type for (valves, fire hydrants, blow-offs, meters, fittings & air release valves).
 - e. Casing size, length, material and location.
 - f. Booster pump station building location.
 - g. Pump station accessories locations (Electrical service, panels, security light, chemical feed & sample lines, valves, manholes, fence, gate, cross drain, etc.).
 - h. Blow up details on plans or separate sheets for complex installations (multiple fittings), jack and bore or open cut installations at intersections and busy/congested areas and for utility crossings.
4. Industrial and commercial developments: Submit three (3) set of reproducible [As-Built Record Drawings] civil site plan and details along with all applicable backflow prevention assembly inspection reports and test forms prior to activation of water service. Construction water may be provided on a temporary basis through a properly protected outlet.

Appendix A: GUIDELINE FOR APPROVAL AND ACCEPTANCE

5. Submits a letter to City of Commerce Water & Sewer Department requesting acceptance of water and/or sewer system along with 3 sets of Record Drawing plans plus digital copies and provides Water and Sewer Department with a one (1) year Maintenance Agreement upon acceptance of System to be dated on first day of a water or sewer tap issuance. (Appendix C)
6. Deeds any necessary property and easements to City of Commerce. (Appendix D)

B. Water and Sewer Department

1. Water and Sewer Department performs final inspection.
2. No service shall be provided to developing lots until all utilities proposed for the development have been installed and final approval has been made.
3. If the final inspection reveals deficiencies that need correcting, a reinspection will be required. If the corrections noted are not addressed prior to the reinspection, a \$50.00 reinspection fee may be assessed prior to the other re-inspections and acceptance.
4. Issues a letter of acceptance contingent upon Developer issuing Letter of Credit or guarantee for one (1) year maintenance agreement to begin on elate of the first water or sewer tap issuance.

Appendix B: REQUIRED REVISIONS CHECKLIST

APPENDIX B CHECKLIST SHOWING REVISIONS REQUIRED FOR APPROVAL BY WATER AND SEWER DEPARTMENT

SUBDIVISION OR DEVELOPMENT _____ PHASE _____

I. WATER LINES *** WATER MAIN LOCATION TO BE ON NORTH AND WEST SIDE OF ROADWAY WHEN POSSIBLE.

- | | |
|---|--------------------------------|
| _____ ORIGINAL STAMP & SIGNATURE OF GEORGIA REGISTERED PROFESSIONAL ENGINEER
(The P.E. seal shall be signed and dated) | _____ LOCATION MAP |
| _____ LIST OWNER/DEVELOPER-ADDRESS & PHONE NO. | _____ 24-HOUR CONTACT |
| _____ LEGEND, IF NEEDED | _____ SCALE |
| _____ SIZE OF WATER LINES | _____ NORTH ARROW |
| _____ 2 FT. CONTOURS AND/OR PERTINENT ELEVATIONS | _____ RIGHT-OF-WAY |
| _____ OVERALL LAYOUT OF SUBDIVISION OR DEVELOPMENT | _____ EASEMENTS |
| _____ LINE FOOTAGE/TYPE PIPE/NO. OF FIRE HYDRANTS | _____ GATE VALVE LOCATIONS |
| _____ STEEL CASING (List Size) | _____ STREAM BUFFER |
| _____ NO. OF LOTS OR DEVELOPMENT UNITS | _____ SEPARATE SHEET FOR WATER |
| FIRE HYDRANT SPACING (500' Apart) | |
| DETAIL SHEET (a) STREET CROSSING (b) CREEK CROSSING (c) FIRE HYDRANT (d) CONCRETE BLOCKING (e) | |
| _____ FIRE HYDRANT CUL-DE-SAC DETAIL (f) SERVICE CONDUIT DETAIL | |
| _____ FIRE FLOW EVALUATION | _____ SERVICE CONDUITS |

II. SANITARY SEWER LINES

- | | |
|--|------------------------------------|
| _____ ORIGINAL STAMPED BY GA REGISTERED PROFESSIONAL ENGINEER
(The P.E. seal shall be signed and dated) | _____ STREAM BUFFER |
| _____ LIST OWNER/DEVELOPER-ADDRESS & PHONE NO. | _____ SIZE OF LINES |
| _____ CLASS AND TYPE OF PIPE | _____ 24-HOUR CONTACT |
| _____ DISTANCE BETWEEN MANHOLES | _____ PLAN & PROFILE SHEETS |
| _____ SERVICE LINES | _____ GRADES (MINIMUM 0.40%) |
| _____ LOCATION MAP | _____ OVERALL PLAN SHEET FOR SEWER |
| _____ LEGEND AND SCALE | _____ NO. OF LOTS OR DEVELOP UNITS |
| _____ RIGHT-OF-WAY | _____ EASEMENTS |

_____ LINE FOOTAGE/TYPE PIPE/NO. MANHOLES

_____ NORTH ARROW

SEPARATE SHEET FOR SEWER LAYOUT/CONTOURS OR PERTINENT ELEVATIONS
DETAIL SHEET (a) BEDDING DETAIL CLASS (b) MANHOLE DETAIL-OUTSIDE DROP-INVERT (CONST.
SOLID CONCRETE OR PRECAST W/RUBBER BOOTS AT OPENINGS) (c) STUB OUT DETAIL (d) SHALLOW
MANHOLE DETAIL* (e) CREEK CROSSING* (f) JACK & BORE DETAIL* (g) CLEANOUT DETAIL*

_____ NOTE: EROSION/SEDIM. CONTROL DETAILS APPROVED BY COUNTY REQUIRED. *If applicable.

_____ NO LANDFILL AREAS INVOLVED

_____ EXISTING SEWERAGE CAPACITY

III. FOR ALL PROJECTS

IF LOCATED IN WATERSHED PROTECTION AREA, ARE ORDINANCE PROVISIONS COMPLIED WITH?
COUNTY APPROVALS OF EROSION AND SEDIMENTATION CONTROL PLANS AND DETAILS ARE
REQUIRED. RETURN RED-LINES AND MARK-UP SHEETS WITH REVISED PLANS FOR FINAL APPROVAL.
_____ DEVELOPER'S ENGINEER MUST SUBMIT DOT PERMIT IF REQUIRED.

_____ SESC LEVEL II CERTIFICATION

IV. FINAL APPROVAL

_____ THREE (3) SETS OF FINAL APPROVED DRAWINGS W/DETAIL SHEETS

_____ DOT PERMIT BY DEVELOPER'S ENGINEER

_____ LETTER FROM COMMUNITY DEVELOPMENT OR COPY OF GRADING PERMIT LAND LOT AND DISTRICT

PLEASE NOTE: ONE (1) SET OF FINAL APPROVED DRAWINGS MUST BE KEPT ON THE JOB SITE AT ALL TIMES.
FAILURE TO HAVE APPROVED PLANS ON THE JOB SITE WILL CAUSE WORK STOPPAGE. DEVELOPER OR HIS
ENGINEER SHALL BE RESPONSIBLE FOR "AS BUILTS" ON FIELD CHANGES OF APPROVED DRAWINGS.

City of Commerce
Form H-101

APPENDIX C REQUIREMENTS FOR PLACEMENT ON APPROVED CONTRACTORS LIST

TYPE OF WORK: () WATER LINE INSTALLATION () SEWER LINE INSTALLATION NAME OF

COMPANY: _____ PHONE: _____

ADDRESS: _____

() CORPORATION () PARTNERSHIP () INDIVIDUAL DATE ORGANIZED: _____

NAME & TITLE OF KEY PERSONNEL AND YEARS OF EXPERIENCE IN WATER AND SEWER:

REFERENCES: (List the last three projects you have completed, including name and telephone number of developer and engineer)

LIST ON SEPARATE SHEET ALL MAJOR EQUIPMENT OWNED BY YOUR COMPANY

STATE UTILITY CONTRACTOR LICENSE NUMBER: _____

NAME OF INSURANCE COMPANY: _____

PROVIDE INSURANCE CERTIFICATE

TYPES OF COVERAGE: _____

MAXIMUM COVERAGE: _____ BONDING CAPACITY _____

Appendix C: REQUIREMENTS FOR PLACEMENT ON APPROVED CONTRACTORS LIST

YOU MUST ATTACH COPY OF INSURANCE CERTIFICATE

DATE: _____

NAME OF CONTRACTOR

SIGNATURE OF REPRESENTATIVE

City of Commerce
Form H-102

(Title)

APPENDIX D Sample One (1) Year Letter of Credit

(Maintenance Guarantee)

BANK LETTERHEAD

Date

Director of Water and Sewer Operations Water & Sewer Department
City of Commerce
P.O. Box 348
Commerce, Georgia 30259

Re: (Project Number and/or Name of Development) Dear Director:

We hereby establish an irrevocable letter of credit in favor of the City of Commerce Water and Sewer Department on behalf of (insert the name of the party dedicating water or sewer lines and appurtenances thereto to the Department) in the amount of ten (10%) percent of the cost of labor and material for water and sewer lines installed. This letter of credit will expire 365 days from the date hereof.

The purpose of this letter of credit is to guarantee payment of any labor or material incurred by the Department in repairing or maintaining the water or sewer lines and appurtenances thereto that have been constructed at the above stated location.

You may draw upon this letter of credit to the amount set forth above upon presentment at the bank of the following:

1. A bill for the labor and/or materials incurred by the City for the repair or maintenance of said facilities;
2. Your draft or drafts at sight on this bank for the amount of the bill;
3. A copy of this letter of credit.

This letter of credit shall be non-assignable and non-transferable, and the proceeds shall be non-assignable and non-transferable.

This letter of credit shall be governed by the laws of the State of Georgia. We hereby agree with you that the drafts drawn under and in compliance with this letter of credit shall be duly honored upon due presentment to this bank.

Sincerely,

APPENDIX E DEED OF CONVEYANCE AND EASEMENT

STATE OF GEORGIA, JACKSON COUNTY, CITY OF COMMERCE

IN CONSIDERATION OF THE SUM OF ONE DOLLAR AND OTHER CONSIDERATIONS to them paid, Grantors, of the County of Jackson to hereby give and convey unto City of Commerce, Georgia, political subdivision of the State of Georgia, its successors and assigns, a tract or parcel of land, which is described as follows:

All that tract or parcel of land lying and being in Land Lot(s) _____ District, Jackson County, Georgia, in a subdivision known as _____ and along road rights-of-way located in said subdivision.

A free, permanent and uninterrupted easement, use, liberty and privilege of a right-of-way for twenty (20) feet in width, in, on, under and through the property of the undersigned, for the purpose of laying, maintaining and operating a line of water or sewer pipe or pipes, including all appurtenant structures, as a part of the water or sewerage system of said Authority, and for the consideration aforesaid, the undersigned hereby agrees that said Authority, through its agents, may lay such additional lines of water or sewer pipe or pipes in, on, under and through said property, and the said pipe or pipes maybe of such size and may be laid at such depth as may be determined by the Authority or its agents, and the undersigned hereby expressly agrees that said Authority shall have a construction and maintenance easement of such minimum working width (not to exceed and additional twenty (20) feet) as is reasonably necessary for the proper installation and maintenance of such water or sewer line or lines; and the undersigned further agrees that said Authority, its successors and assigns, shall have the right-of-way granted, together with the right of ingress and egress to and from the same to the extent necessary to install, inspect, repair, keep up, replace, maintain and operate said line.

This Deed is also made for the purpose of conveying all of Grantor's right, title and interest in and to any water or sewer lines or appurtenances thereto located on the above-described property. The Grantor and Grantee agree that the fair market value of the property and water or sewer lines and appurtenances thereto being conveyed by this Deed is \$ _____.

TO HAVE AND TO HOLD said land and appurtenances unto said City of Commerce, Georgia, its successors executors, administrators, and assigns, in fee simple.

Grantors warrant the title to said land against the lawful claims of all persons.

IN WITNESS WHEREOF, Grantor(s) have hereunto set its hand(s) and affixed its seal this ____ day of _____, 20____.

Appendix E – DEED OF CONVEYANCE AND EASEMENT

Signed, sealed and delivered in the presence of: _____ (L.S.)

_____ (L.S.)

Unofficial Witness

_____ (L.S.)

Notary Public

My Commission Expires: _____ (L.S.)

APPENDIX F FEE SCHEDULE

PLAN REVIEW/APPROVAL AND FEES

Plan Review/Approval Fee	\$500.00 or \$10.00 per lot (whichever is greater)
Commercial Review/Approval	\$500.00 plus \$50.00 each additional building
Fee Inspection Fee	\$200.00 plus \$5.00 per lot

Additional Items:

Pump Station Review	\$300.00
Pump Station Inspection/Start up	\$200.00
Industrial Pretreatment System	\$800.00

(Additional reviews, meetings and inspections will be charged on an hourly basis.)

Additional Review Fees:

First and Final reviews are included in the fee collected during the Review/Approval Phase.

Additional Reviews	\$200.00
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Re-Inspections:

Inspections are required for all new development additions/modifications to the City of Commerce Water and Sewer Systems. All parties are urged to coordinate inspection request and to assure that noted deficiencies are corrected prior to requesting inspections to avoid re-inspection fees. In the event that an inspection is performed and does not pass due to the job not ready for inspection, previously noted violations still not corrected will be assessed a re-inspection fee at the following rates:

Re-Inspections	\$200.00
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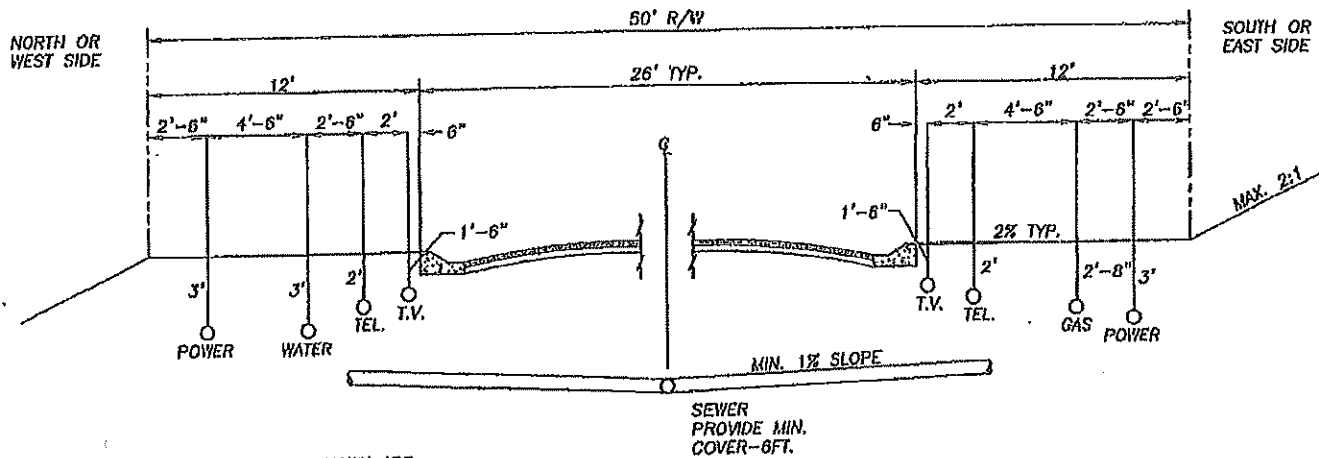
NOTE: RE-INSPECTION FEES WILL BE ASSESSED AGAINST THE APPLICANT AND MUST BE SATISFIED PRIOR TO APPROVAL OF THE PROJECT. INSPECTION REQUEST SHALL BE SUBMITTED TO DIRECTOR OF WATER/SEWER AT A MINIMUM OF 48 HOURS IN ADVANCE OF INSPECTION.

NOTE: ALL PROPOSED DEVELOPMENT PROJECTS LYING WITHIN THE CITY'S WATERSHED PROTECTION AREA MUST COMPLY FULLY WITH THE CITY'S WATERSHED PROTECTION ORDINANCE. COMPLETE DOCUMENTATION OF COMPLIANCE MUST BE SUBMITTED TO THE CITY PRIOR TO APPROVAL OF A PRELIMINARY OR FINAL PLAT, AND PRIOR TO REVIEW OF WATER AND/OR SANITARY SEWER PLANS.

APPENDIX G STANDARD DETAILS

<u>Standard Detail No.</u>	<u>Description</u>
TYP-01	Typical Utility Placement
TYP-02	Typical Utility Location
TYP-03	Typical Pavement Replacement
TYP-04	Typical Highway Crossing
TYP-05	Typical Creek Crossing
TYP-06	Proposed Pump Station Layout
W-01	Water Line Valving at Intersections
W-02	Water Meter Locations for Subdivisions
W-03	Residential Service Connection
W-04	Fire Hydrant Installation
W-05	Fire Hydrant Installation – Subdivision Standard
W-06	Typical Valve Installation
W-07	Valve Installation
W-08	Thrust Block Detail
W-09	Pressure Pipe Bedding
W-10	Line Abandonment at Valve
W-11	Terminal End
W-12	Commercial/Industrial Service Connection
SS-01	Class C and B Sewer Pipe Bedding
SS-02	Manhole Frame and Cover
SS-03	Typical Section Standard Manhole
SS-04	Dimensions for Precast Manhole
SS-05	Outside Drop Manhole
SS-06	Typical Section Standard Shallow Manhole
SS-07	Typical Section Manhole Flush with Pavement
SS-08	Typical Section Manhole Rising Above Grade
SS-09	Typical Section Vented Manhole
SS-10	Dry Sewer Line Connection
SS-11	Concrete Collars
SS-12	Sample Station Manhole Industrial Installation
SS-13	Cleanout Detail
SS-14	Air and Vacuum Valve Assembly
SS-15	Grease Trap Installation
SS-16	Standard Grease Trap Arrangement

STANDARD DETAIL TYP-01
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT

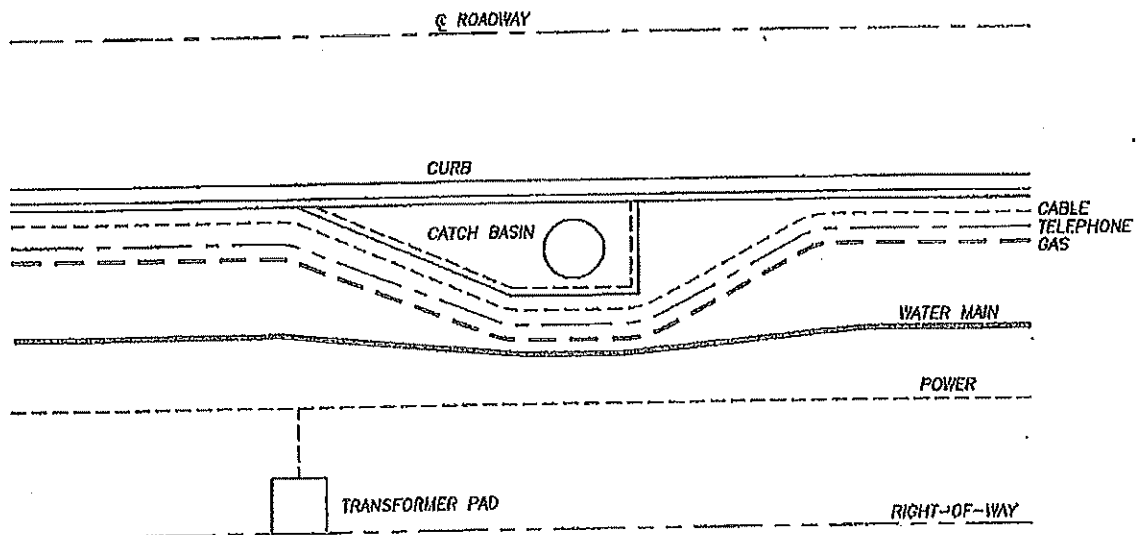


- NOTE: 1. DEPTHS SHOWN ARE MINIMUMS AND ARE TO BE TAKEN FROM TOP OF CURB ELEVATION.
2. WHEN UTILITY CONDUIT IS REQUIRED, CONDUIT SHALL BE OF SIZE AND DEPTH APPROPRIATE FOR THAT UTILITY, AND INSTALLED AT A MIN. 24" DEPTH

TYPICAL UTILITY PLACEMENT

N.T.S.

STANDARD DETAIL TYP-02
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



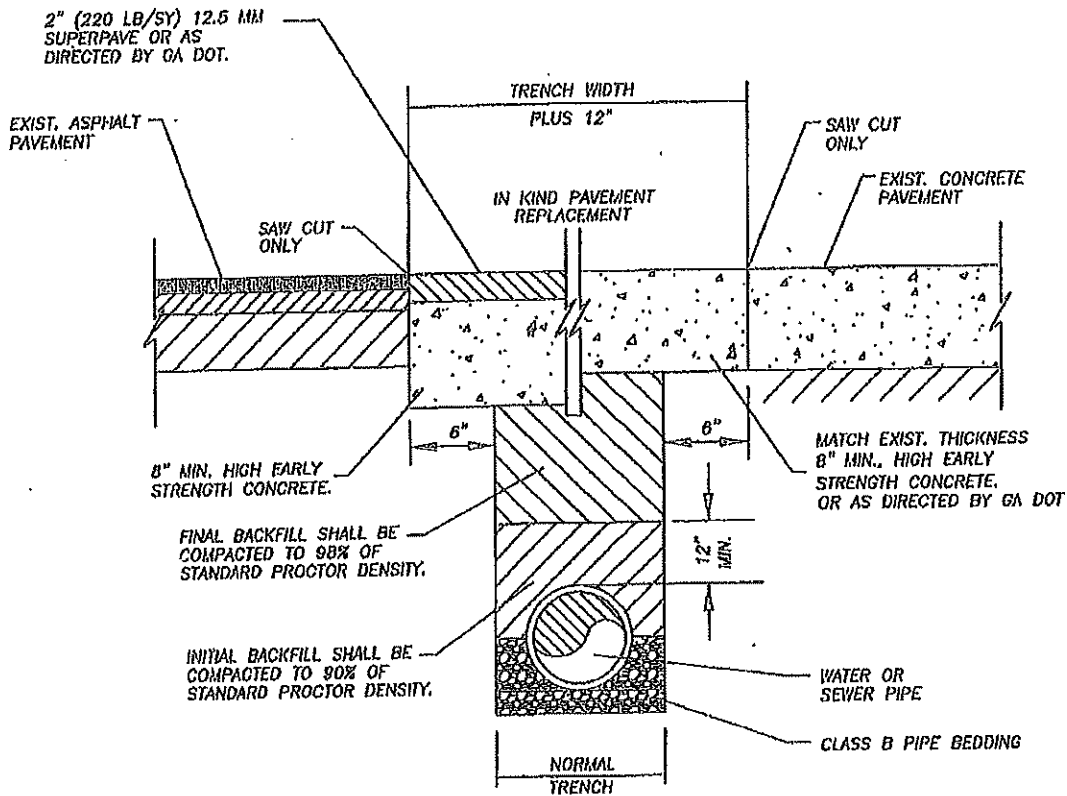
TYPICAL UTILITY LOCATION

N.T.S.

STANDARD DETAIL TYP-03

CITY OF COMMERCE

WATER AND SEWER DEPARTMENT



NOTE: FINAL BACKFILL TO BE PLACED IN MAXIMUM 8\" (LOOSE) LIFTS AND COMPACTED TO NOT LESS THAN 98% STANDARD PROCTOR DENSITY AS DETERMINED BY (ASTM D698.) ONLY CLASS B TRENCH WILL BE ALLOWED UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

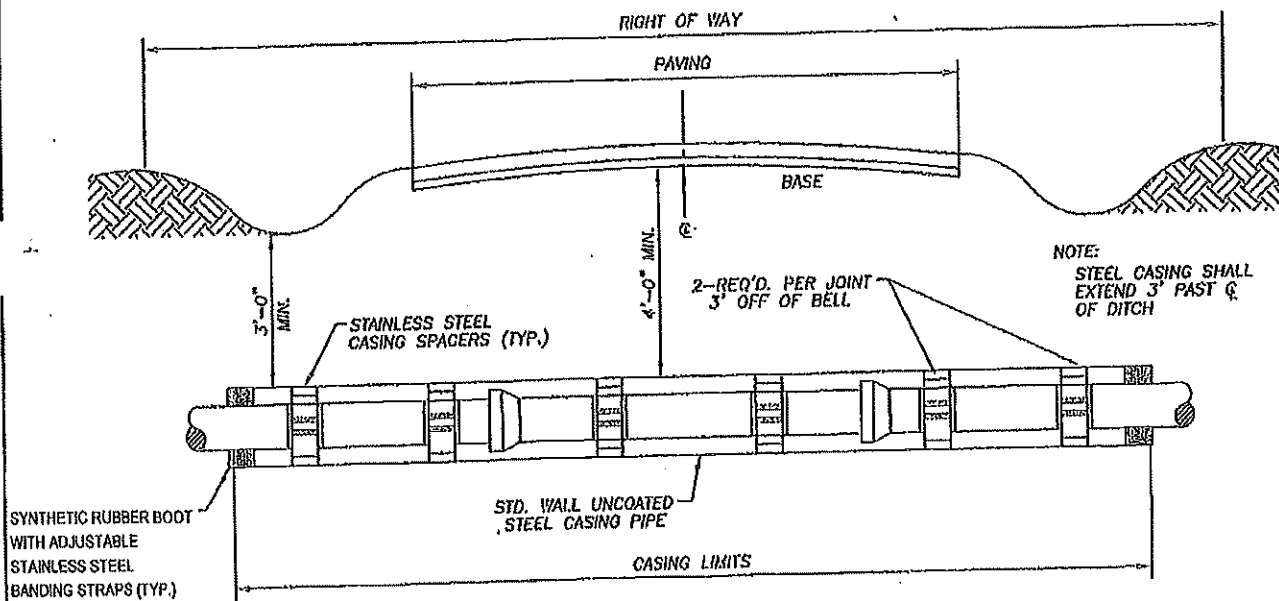
TYPICAL PAVEMENT REPLACEMENT

CLASS B TRENCH FOR

ALL PIPING

N.T.S.

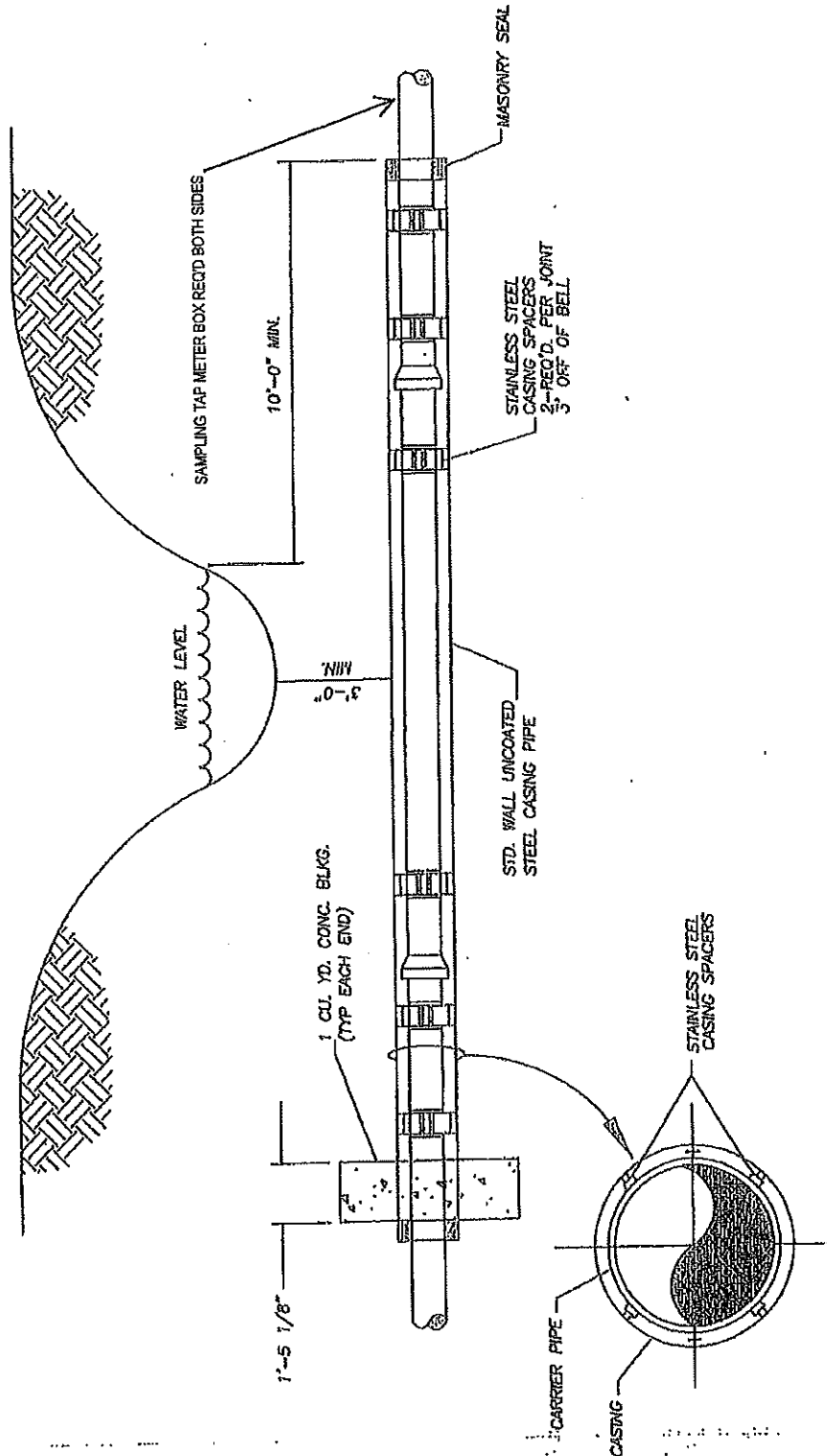
STANDARD DETAIL TYP-04
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



TYPICAL HIGHWAY CROSSING

N.T.S.

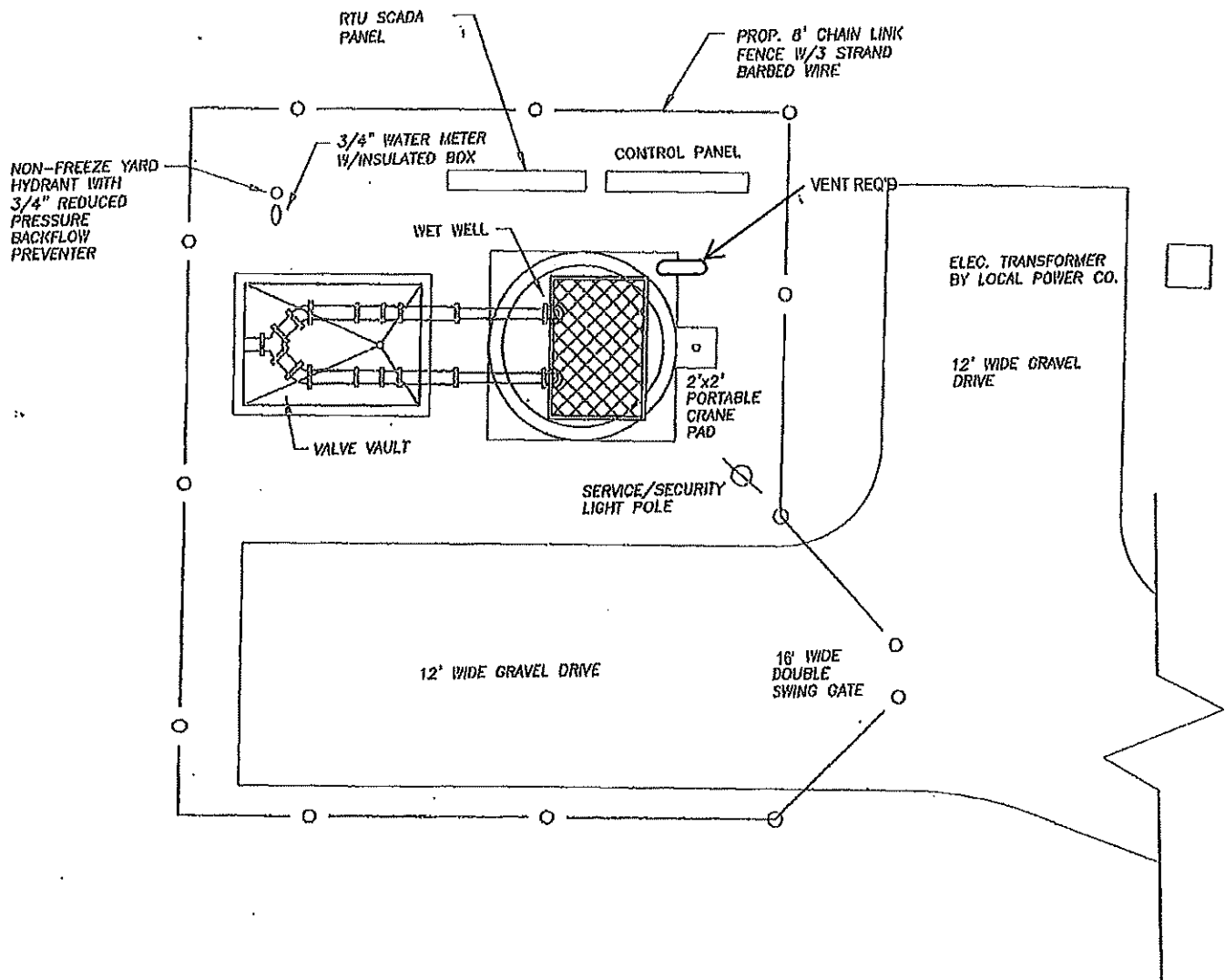
STANDARD DETAIL TYP-05
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



TYPICAL CREEK CROSSING

N.T.S.

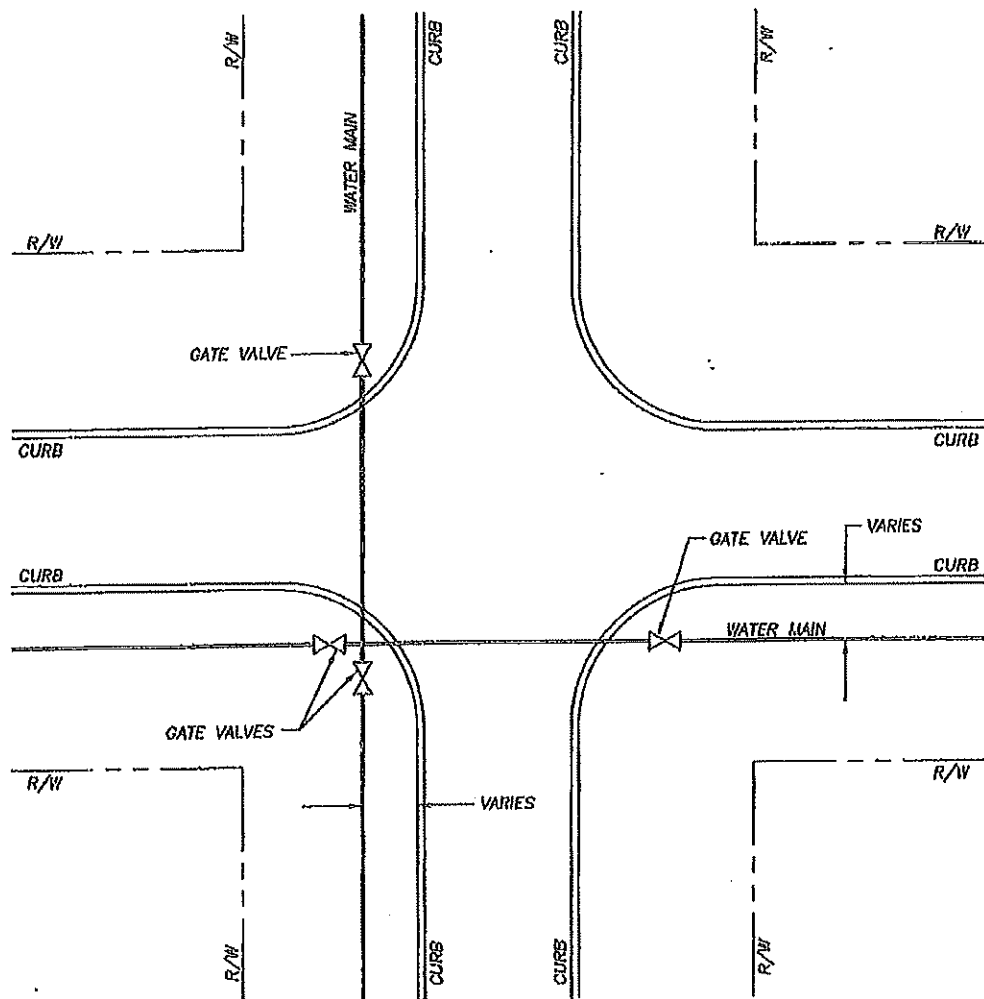
STANDARD DETAIL TYP-06
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



PROPOSED
PUMP STATION LAYOUT

N.T.S.

STANDARD DETAIL W-01
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



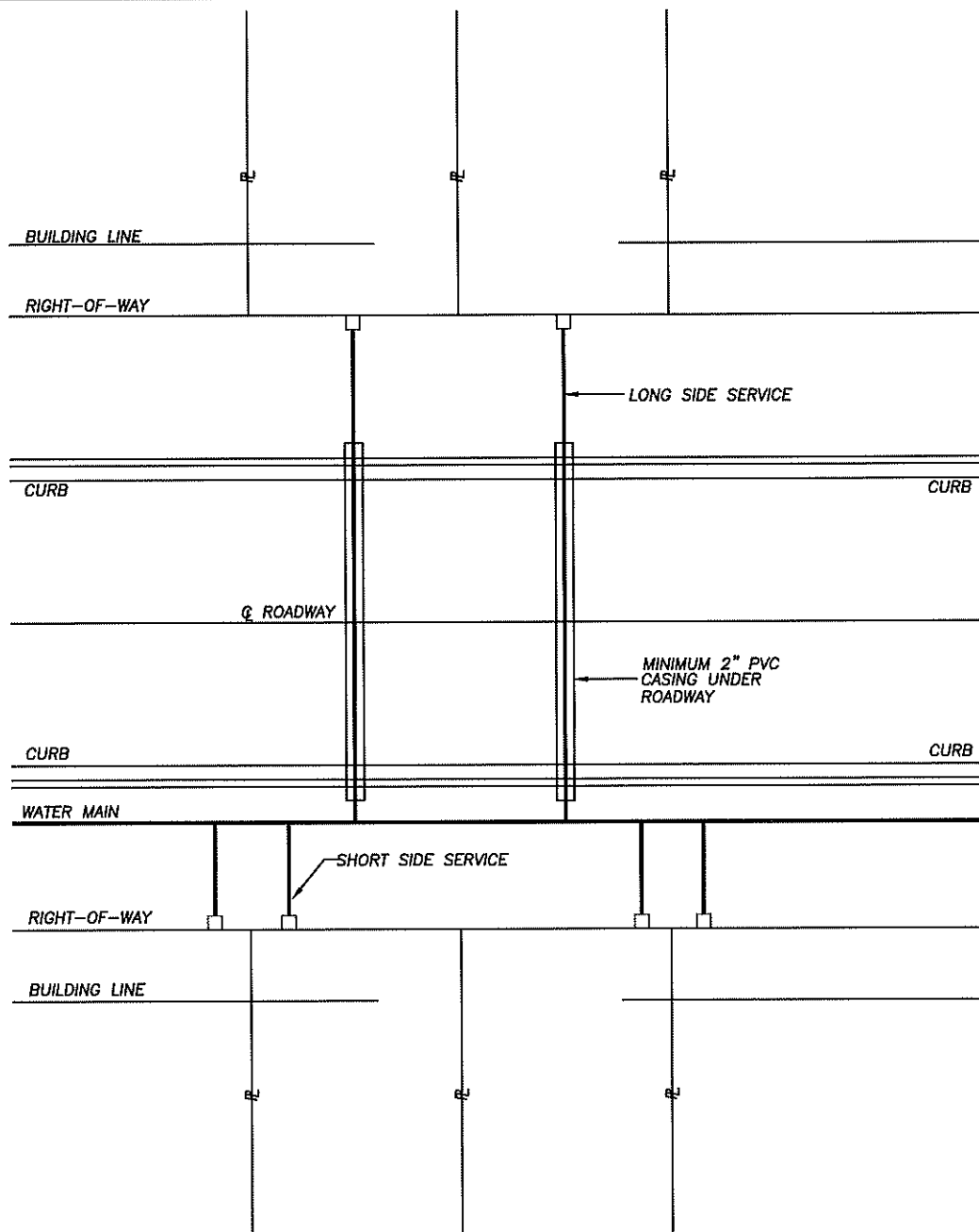
NOTE:

1. VALVES ARE TO BE LOCATED WITH IN RIGHT-OF-WAY OF ROADWAY.
2. GATE VALVES ARE NOT REQUIRED ON DEADEND LEGS LESS THAN 1000 LINEAR FEET IN LENGTH UNLESS OTHERWISE SHOWN ON THE PLANS.
3. VALVES SHALL NOT BE LOCATED IN DITCH LINE.

WATER LINE VALVING AT INTERSECTION

N.T.S.

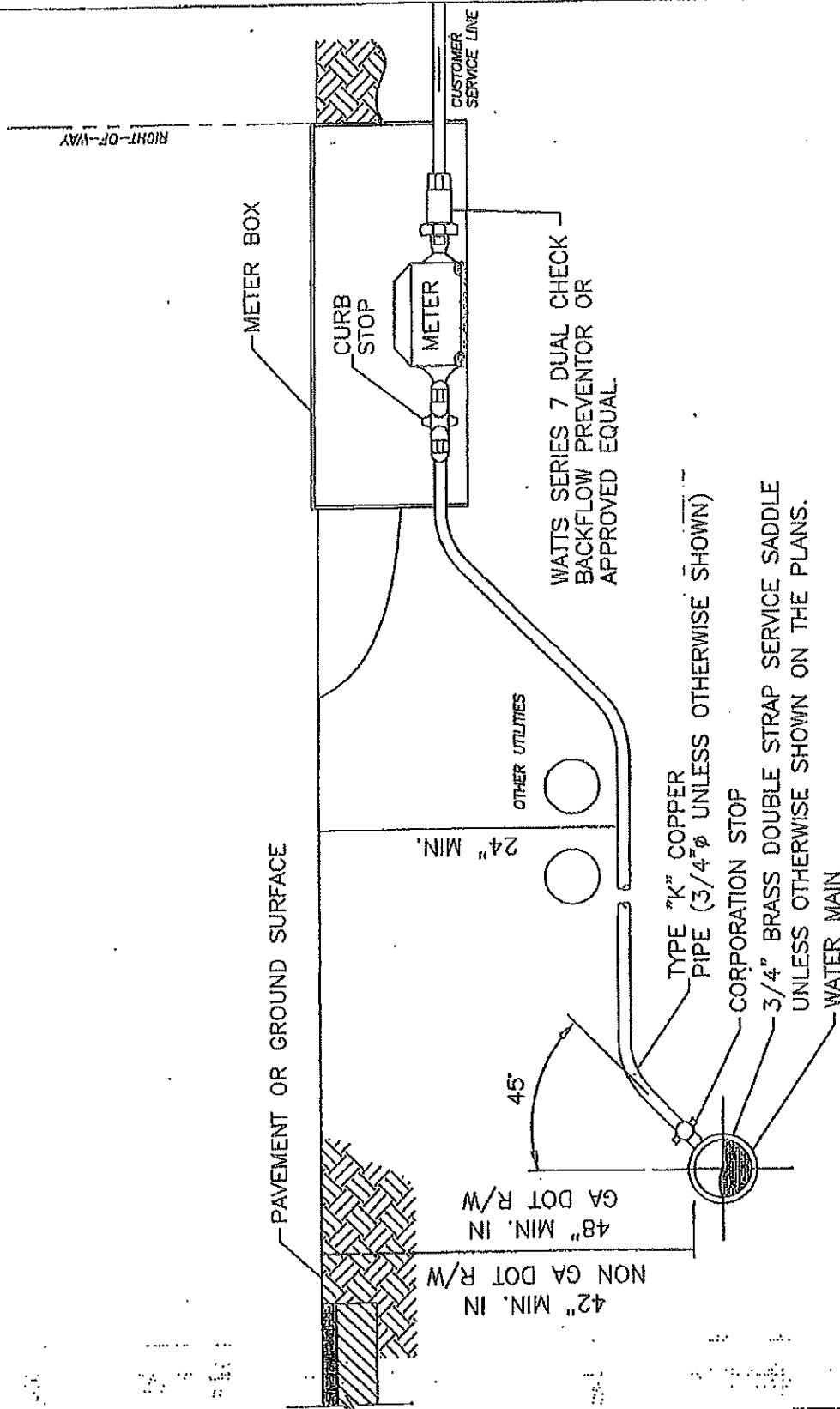
STANDARD DETAIL W-02
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



WATER METER LOCATION
FOR SUBDIVISION

N.T.S.

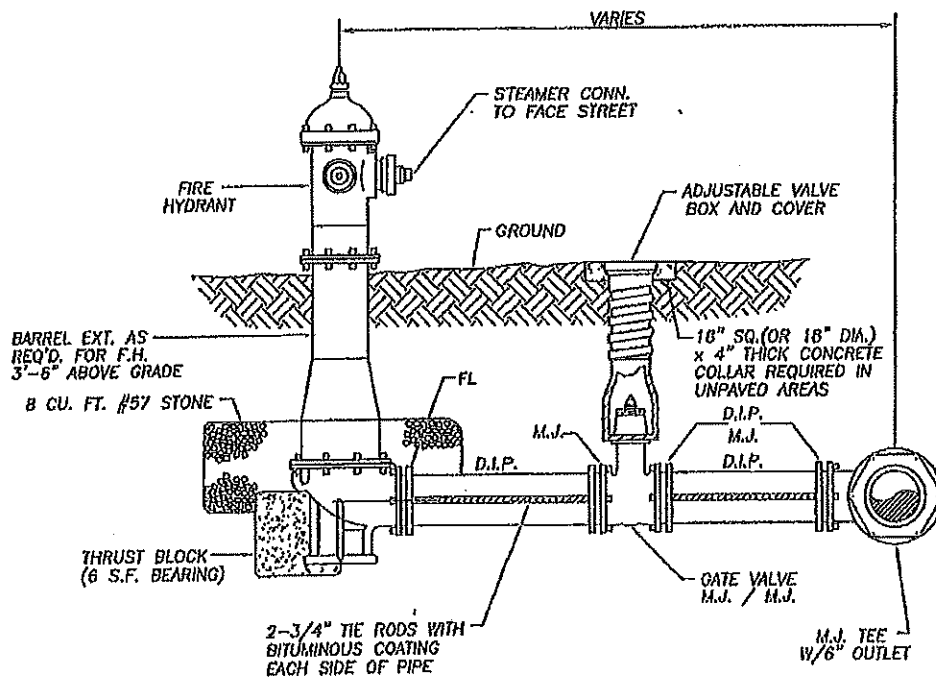
STANDARD DETAIL W-03
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



RESIDENTIAL SERVICE CONNECTION

N.T.S.

STANDARD DETAIL W-04
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



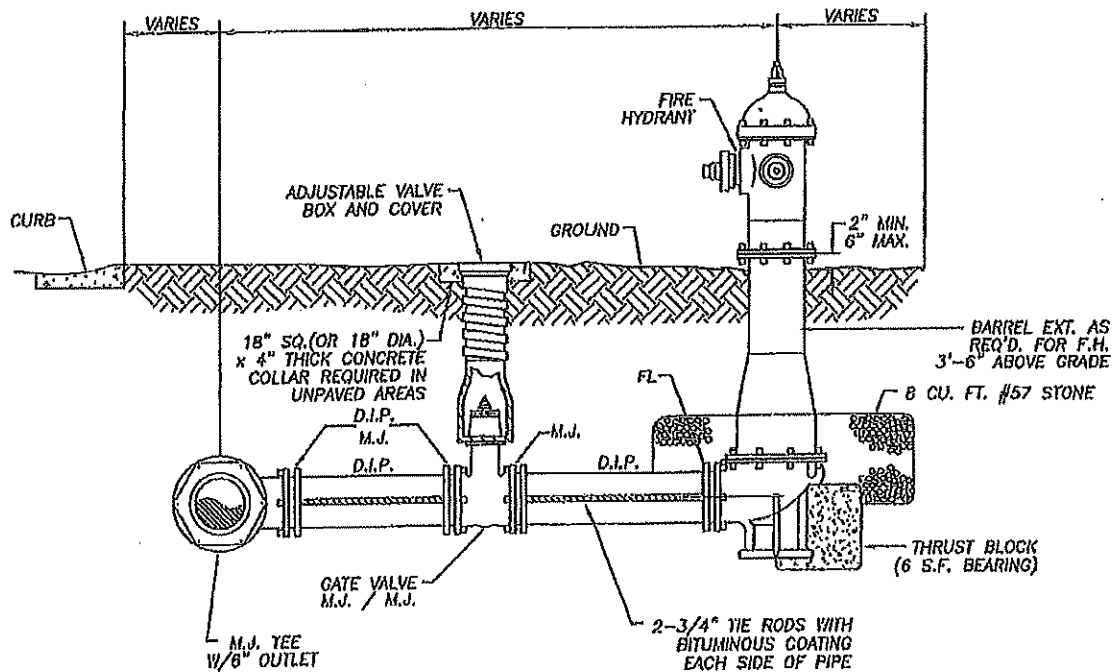
PROFILE - RODDED LEADER

FIRE HYDRANT INSTALLATION

N.T.S.

STANDARD DETAIL W-05
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT

SUBDIVISION STANDARD

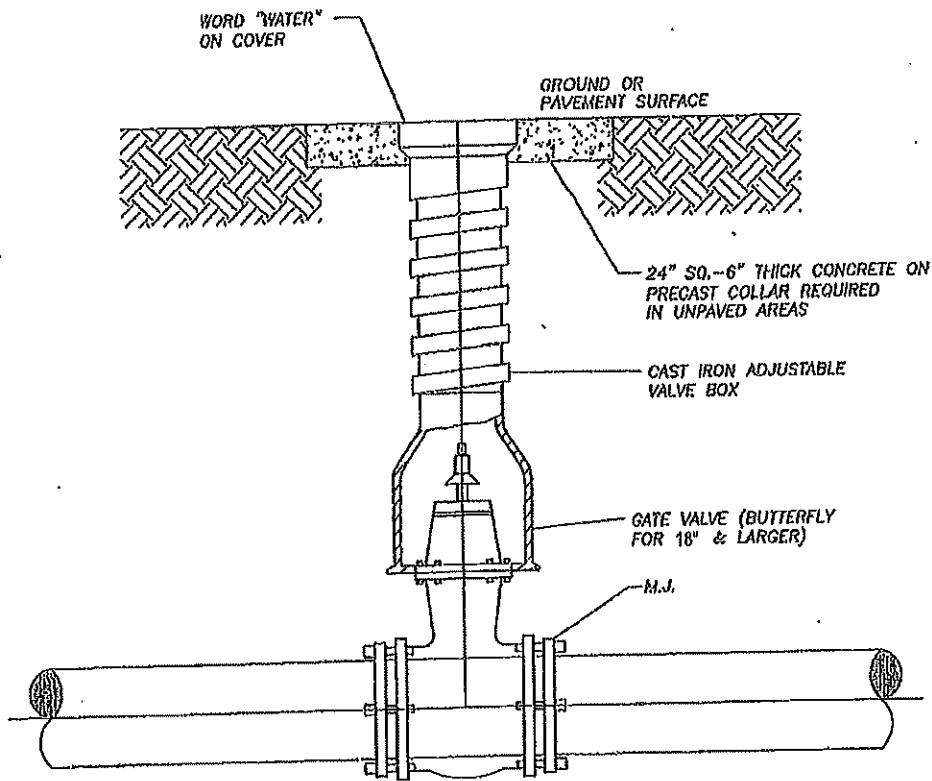


PROFILE - RODDED LEADER

FIRE HYDRANT INSTALLATION

N.T.S.

STANDARD DETAIL W-06
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



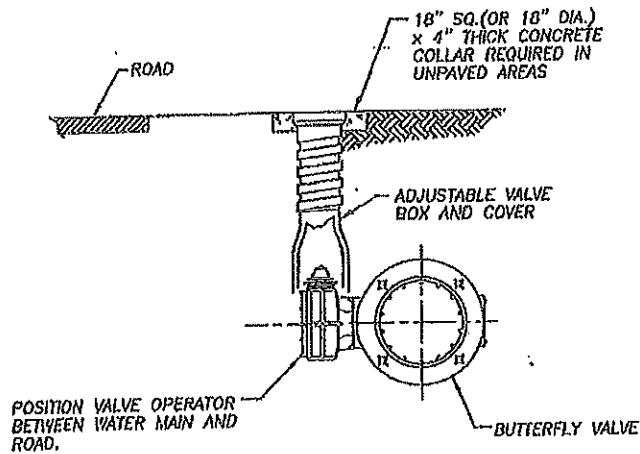
NOTE:

WHERE VALVE MARKERS ARE REQUIRED, INSTALL PRECAST REINFORCED CONCRETE SQUARE POST, MINIMUM 4" SQUARE AND 42 INCHES LONG, AND SET SO FAR AS TO LEAVE 10 INCHES EXPOSED ABOVE GRADE AND ENGRAVED WITH THE WORD "WATER" IN 2" HIGH LETTERING.

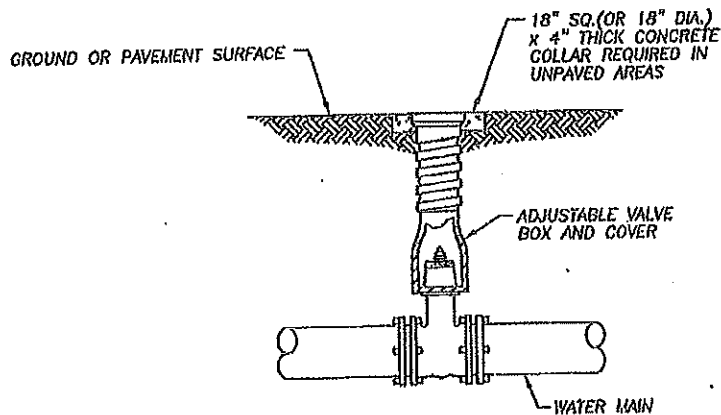
TYPICAL VALVE INSTALLATION

N.T.S.

STANDARD DETAIL W-07
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



BUTTERFLY VALVE DETAIL



GATE VALVE DETAIL

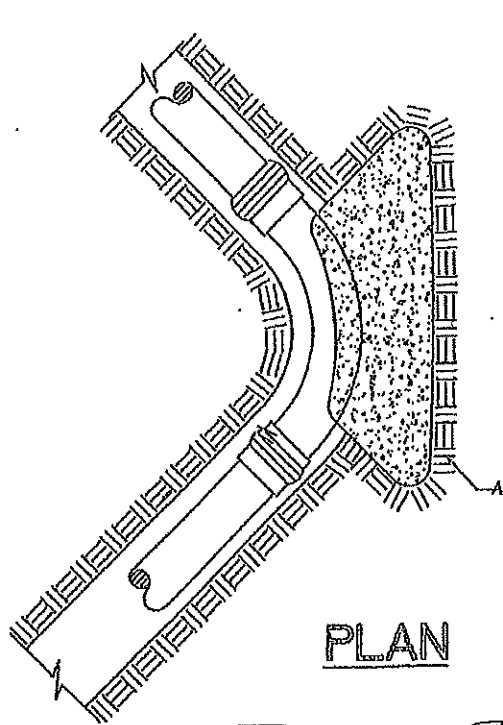
VALVE INSTALLATION

N.T.S.

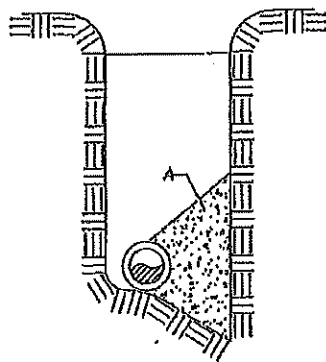
STANDARD DETAIL W-08

CITY OF COMMERCE

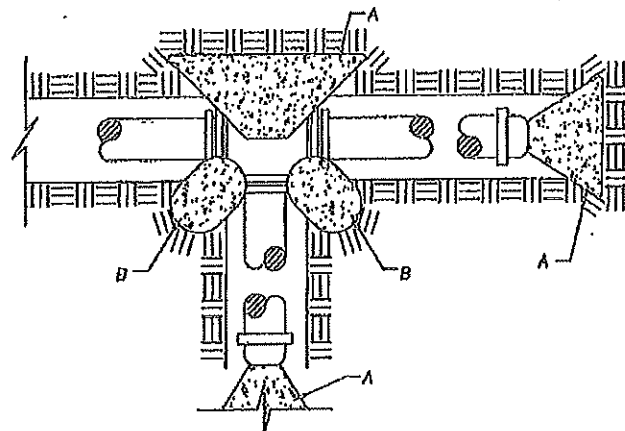
WATER AND SEWER DEPARTMENT



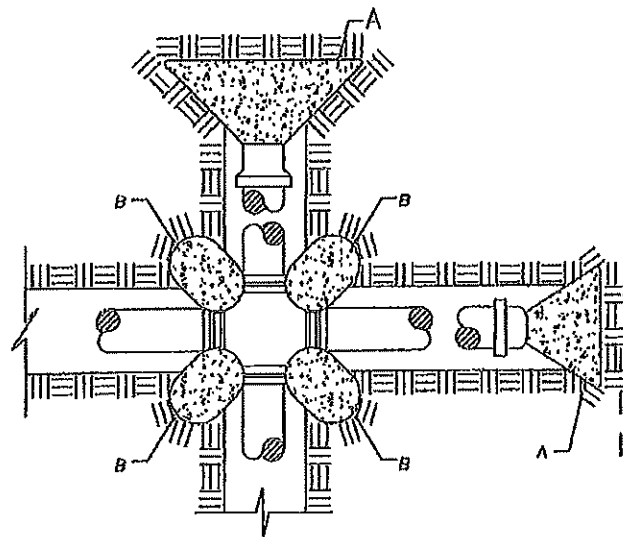
PLAN



TYP. SECTION



TEE W/ 1 OR 2 PLUGS



CROSS TEE OR CROSS TEE
W/ 1 OR 2 PLUGS

NOTES:

1. POUR THRUST BLOCKS AGAINST UNDISTURBED MATERIAL. WHERE TRENCH WALL HAS BEEN DISTURBED, EXCAVATE LOOSE MATERIAL & EXTEND THRUST BLOCK TO UNDISTURBED MATERIAL.
2. ON BENDS & TEES, EXTEND THRUST BLOCKS FULL LENGTH OF FITTING.
3. PLACE BOARD IN FRONT OF ALL PLUGS BEFORE POURING THRUST BLOCK.
4. CONCRETE SHALL BE 3000 P.S.I.
5. BLOCKING SHALL BE CONSTRUCTED AS PER AWWA STANDARD C600-SECTION 12.3 OR LATEST REVISION.

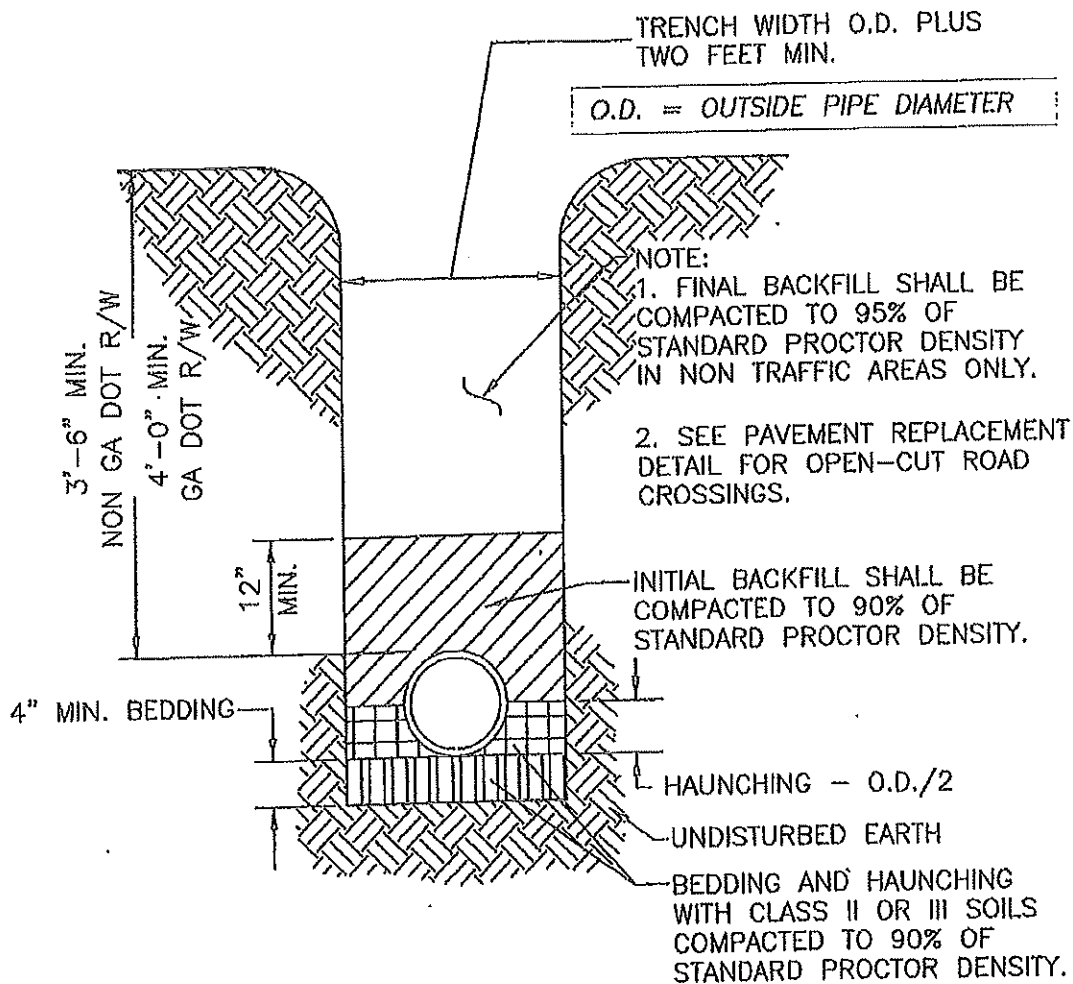
PIPE SIZE	2"	4"	6"	8"	10"	12"
A*	1	1.5	3	6	9	12
B*	1	1	2	4	5	8

* CHART NO.'S ARE SQ. FT. BEARING ON UNDISTURBED MATL.

THRUST BLOCK DETAIL

N.T.S.

STANDARD DETAIL W-09
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



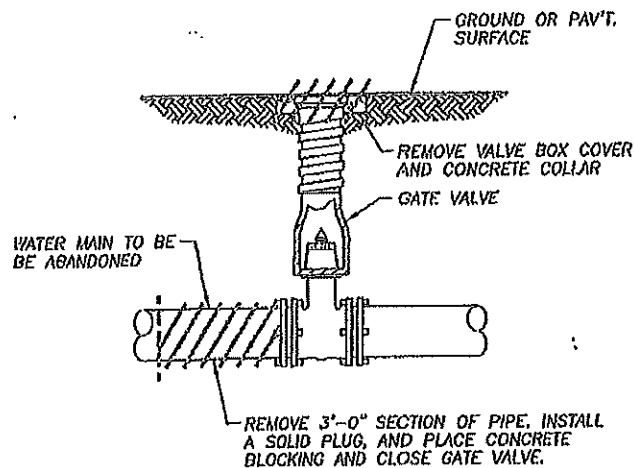
PRESSURE PIPE BEDDING

N.T.S.

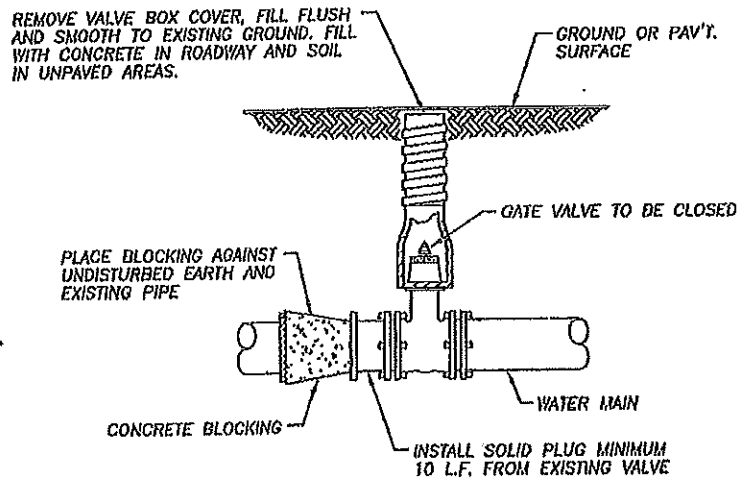
STANDARD DETAIL W-10

CITY OF COMMERCE

WATER AND SEWER DEPARTMENT



EXISTING SECTION



REVISED SECTION

LINE ABANDONMENT AT VALVE

N.T.S.

PIPE DIA.	"A"	"B"
20"	2'-0"	2'-0"
16"	1'-6"	1'-6"
14"	1'-6"	1'-6"
12"	1'-6"	1'-6"
10"	1'-0"	1'-0"
8"	1'-0"	1'-0"
6"	1'-0"	1'-0"
4"	1'-0"	1'-0"

18" TRENCH 18"

42" MIN. COVER

PIPE

FINISH GRADE

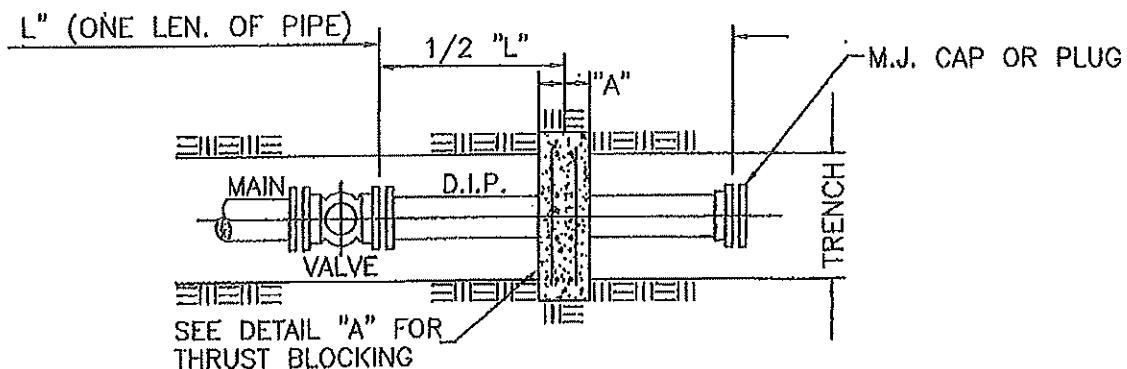
M.J. RETAINER GLAND
1 REQ'D 10" & UNDER
2 REQ'D 12" & OVER W/
3" MIN. SPACING

CONC THRUST BLOCK

#4 BARS - 6" O.C.
EA. WAY - EA. FACE

MAIN

N.T.S.



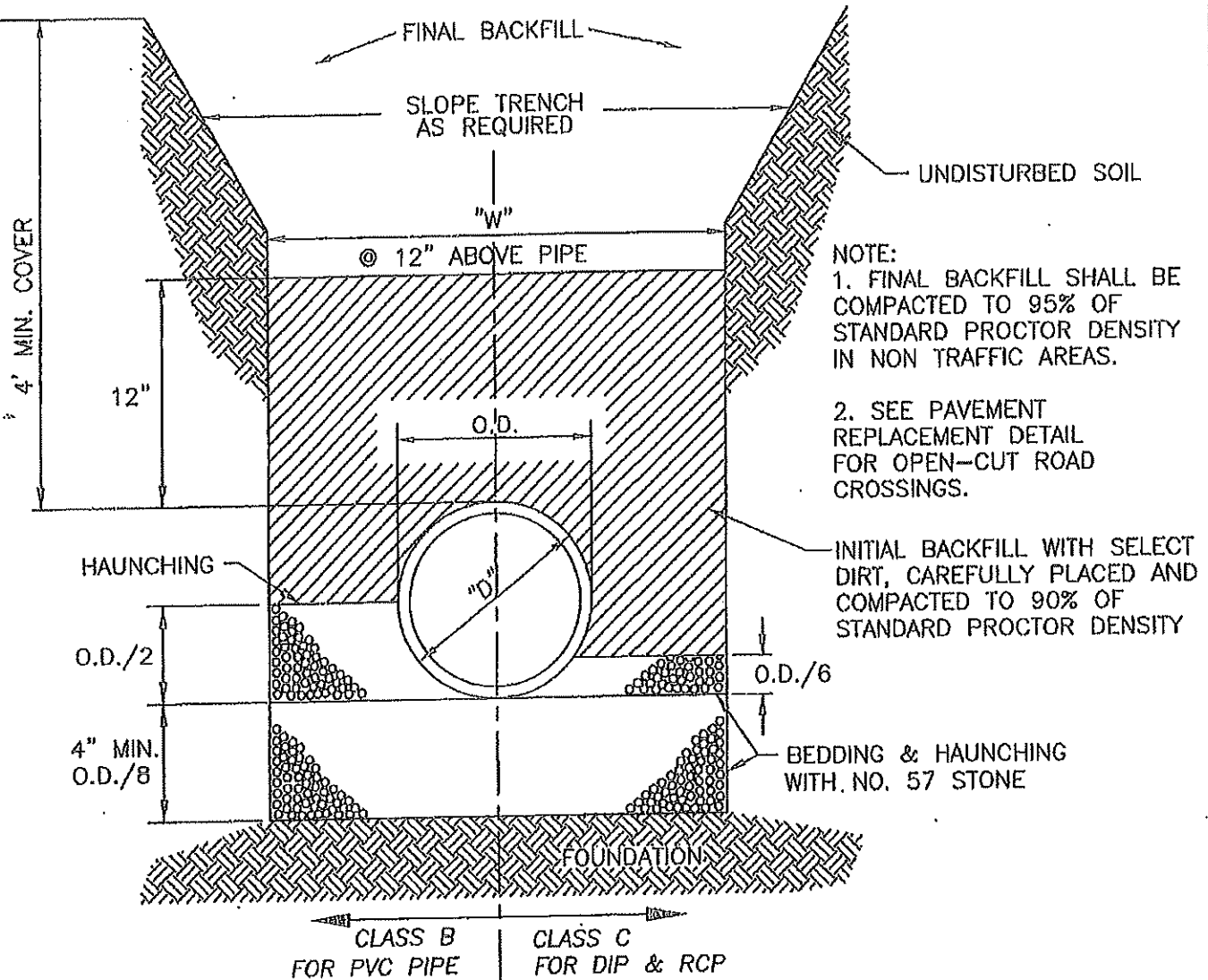
N.T.S.

STANDARD DETAIL SS-01

CITY OF COMMERCE

WATER AND SEWER DEPARTMENT

"D" = NOMINAL PIPE DIAMETER
 O.D. = OUTSIDE PIPE DIAMETER
 "W" = O.D. PLUS TWO FEET MIN.
 O.D. PLUS FOUR FEET MAX.

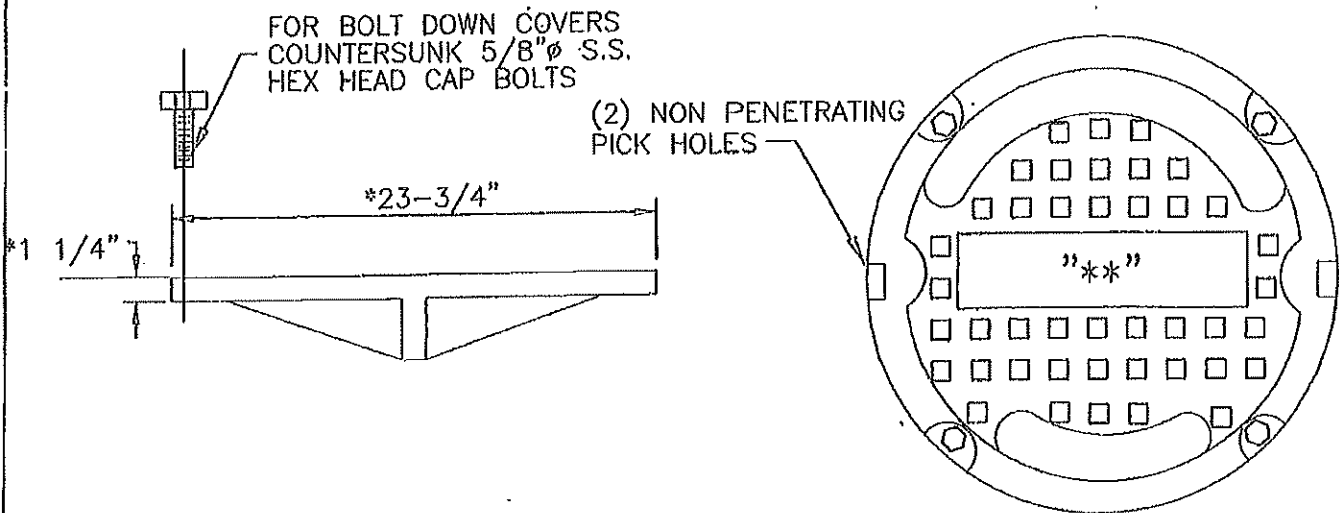


CLASS B AND C

SEWER PIPE BEDDING

N.T.S.

STANDARD DETAIL SS-02
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



COVER

NOTES:

USE USF 360-E RING AND COVER SERIES OR APPROVED EQUAL
 TOTAL WEIGHT, 300 LBS. (APPROX.)

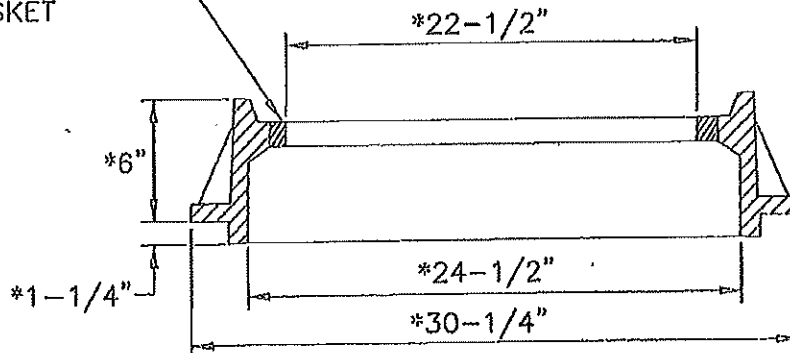
MIN. COVER WT. 130 LBS. (APPROX.)

USE USF 367 FOR BOLT DOWN COVER OR APPROVED EQUAL

* DIMENSIONS BASED ON USF 360-E RING AND COVER

** "SANITARY SEWER", "STORM SEWER", "WATER", ETC.

ROUND NEOPRENE
 GASKET

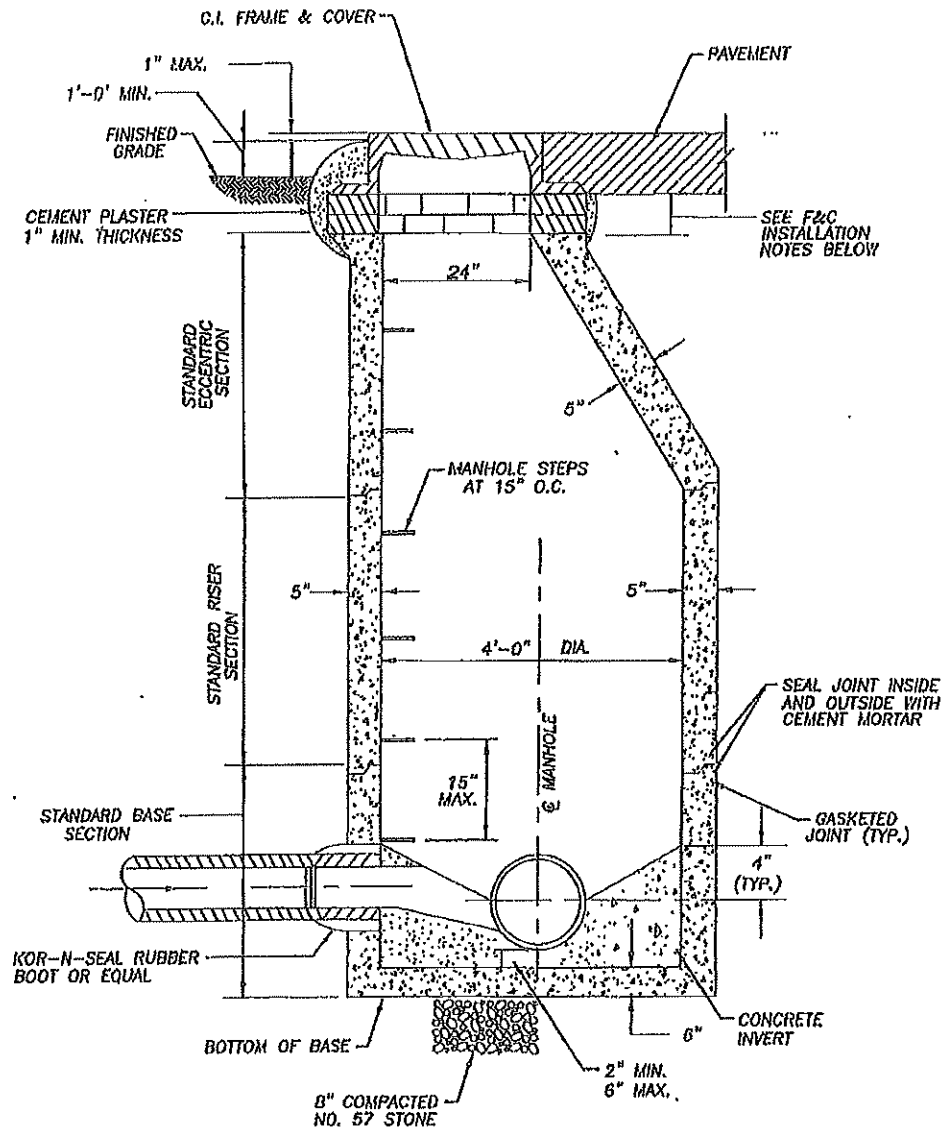


FRAME

MANHOLE FRAME AND COVER

N.T.S.

STANDARD DETAIL SS-03 CITY OF COMMERCE WATER AND SEWER DEPARTMENT



FRAME AND COVER INSTALLATION NOTES :

1. COVER TO BE SET FLUSH WITH PAVEMENT AND SHALL MATCH SLOPE OF STREET
2. ADJUSTMENT OF FRAME AND COVER TO GRADE SHALL BE ACCOMPLISHED WITH A PRECAST CONCRETE LEVELING RING (ONE RING MAX.) OR HEADER-COURSE BRICK. IN NO CASE SHALL VERTICAL ADJUSTMENT EXCEED 12-INCHES.
3. INSIDE SURFACE OF LEVELING COURSE SHALL BE COATED WITH CEMENT PLASTER (1-1/2" MIN. THICKNESS).
4. FRAME SHALL BE IN CEMENT MORTAR BED (1-1/2" THICKNESS).

TYPICAL SECTION STANDARD MANHOLE

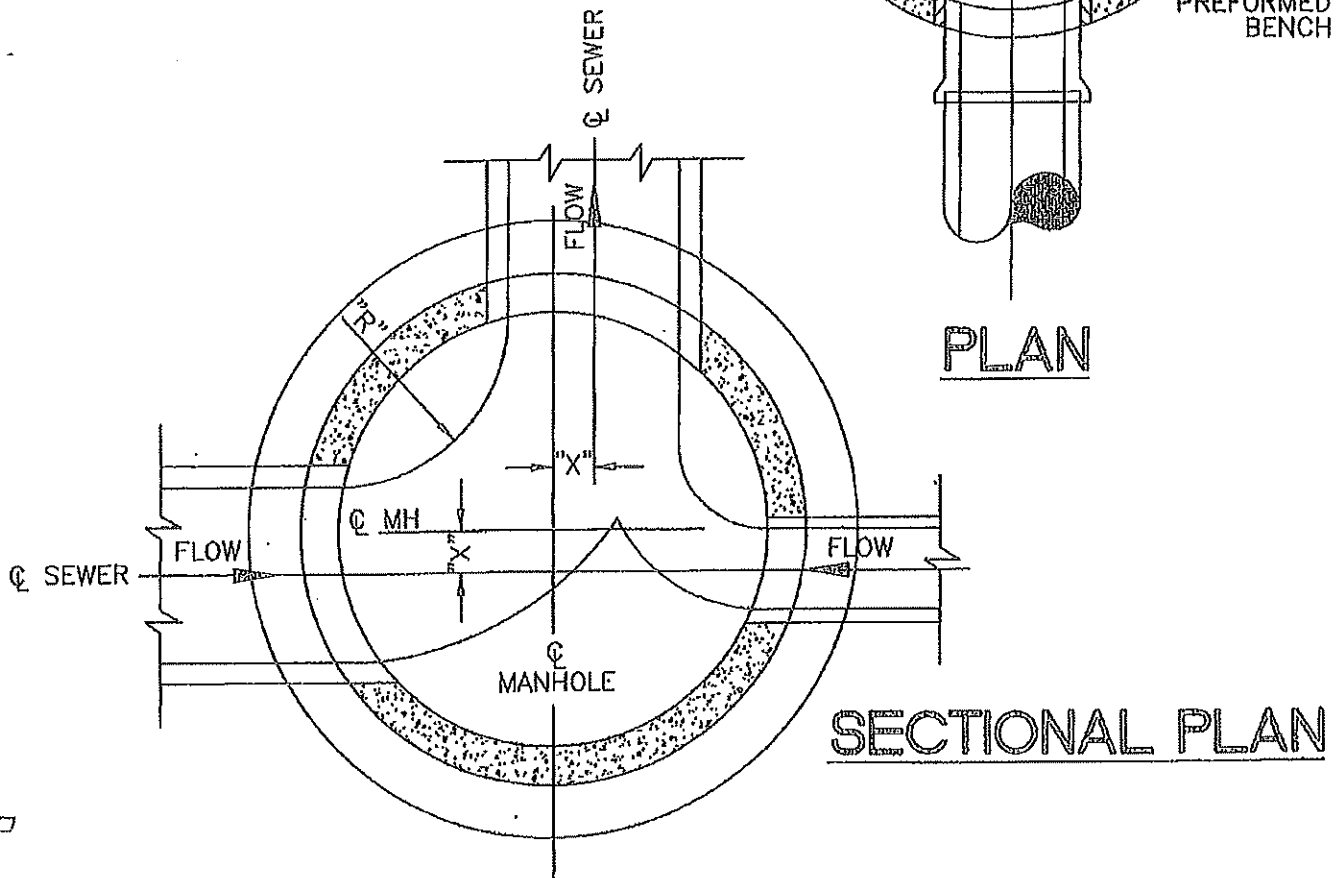
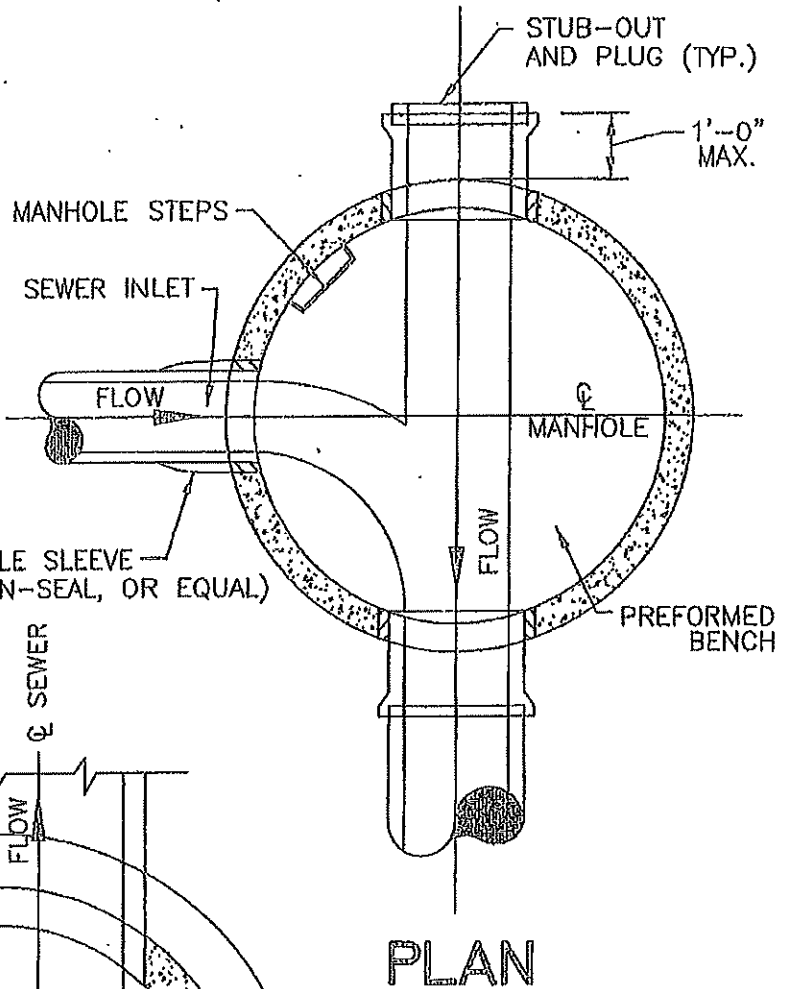
N.T.S.

STANDARD DETAIL SS-04

CITY OF COMMERCE

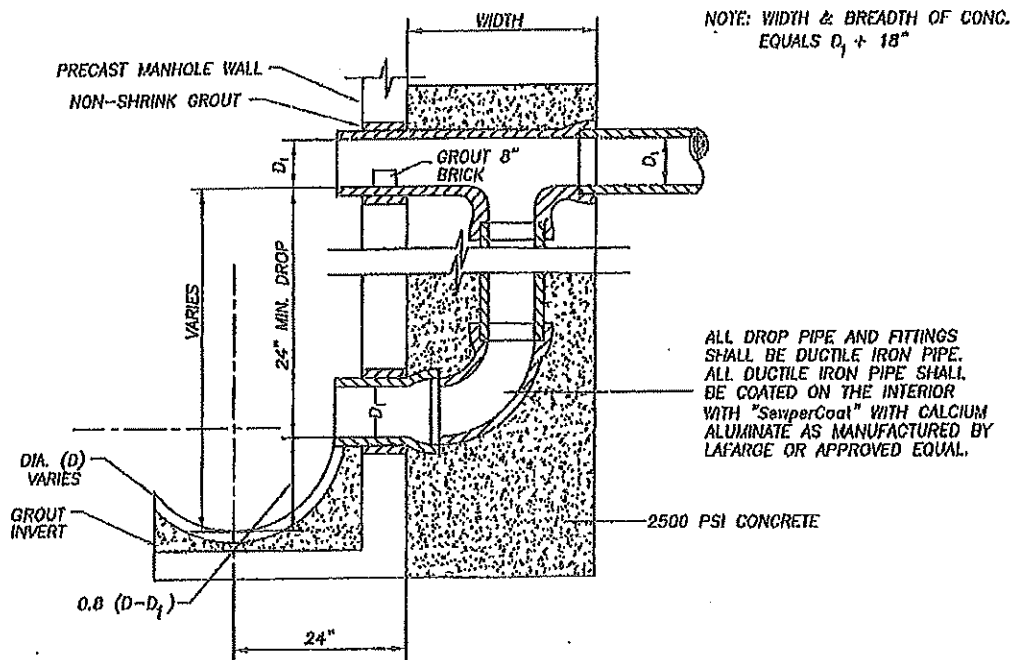
WATER AND SEWER DEPARTMENT

STANDARD PRECAST MANHOLES GOVERNING DIMENSIONS			
PIPE SIZE	M.H. DIA.	"R"	"X"
8"THRU12"	4'	1'-0"	0"
15"	4'	1'-3"	6"
18"	4'	1'-4"	8"
21"	5'	1'-9"	9"
24"	5'	1'-6"	9"
27"	6'	2'-0"	1'-0"
30"	6'	1'-9"	8"
36"	PIPE-BED PIPE M.H. BASE AND ELBOW UNIT		



DIMENSIONS FOR PRECAST MANHOLES
N.T.S.

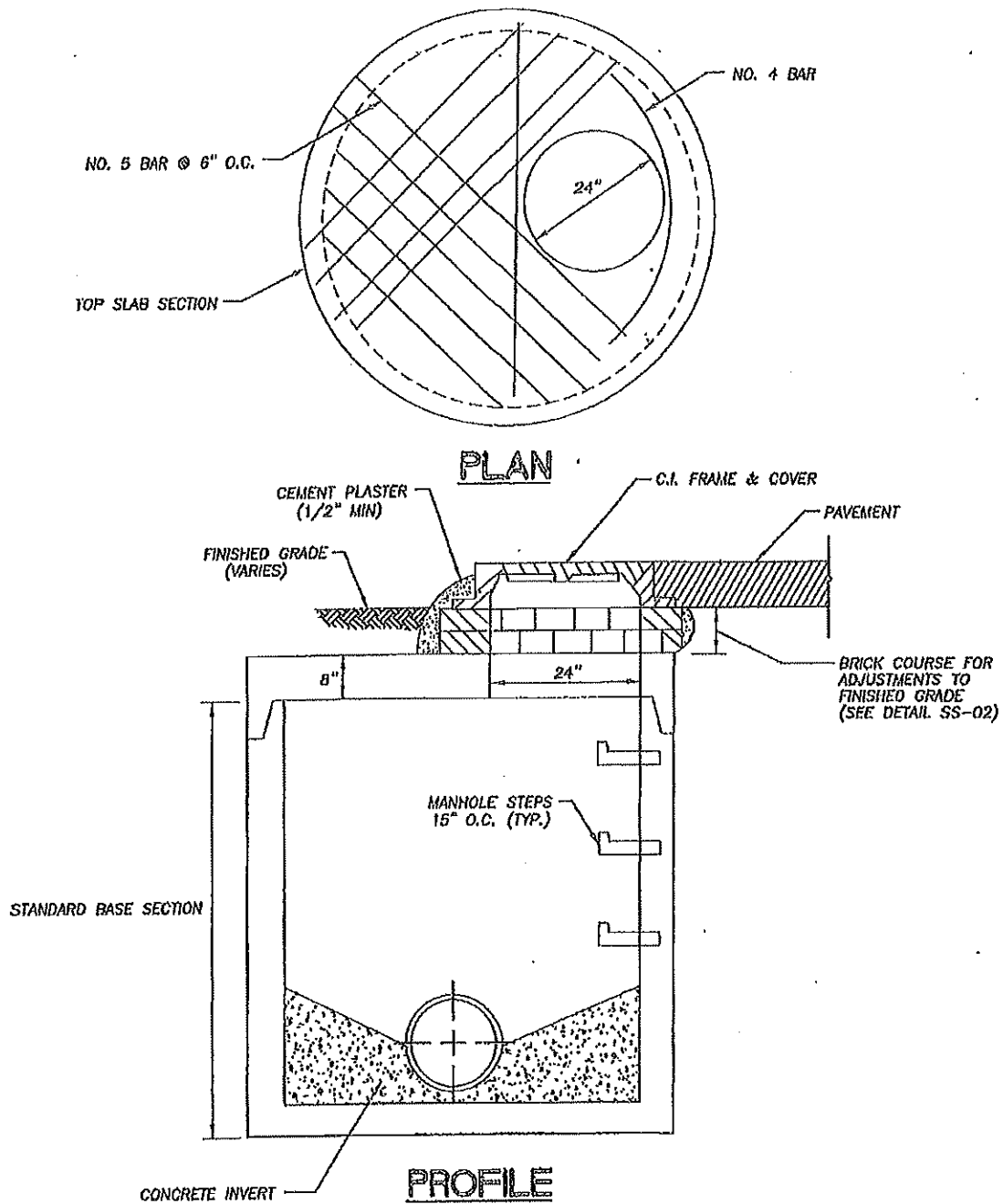
STANDARD DETAIL SS-05
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



OUTSIDE DROP MANHOLE

N.T.S.

STANDARD DETAIL SS-06
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



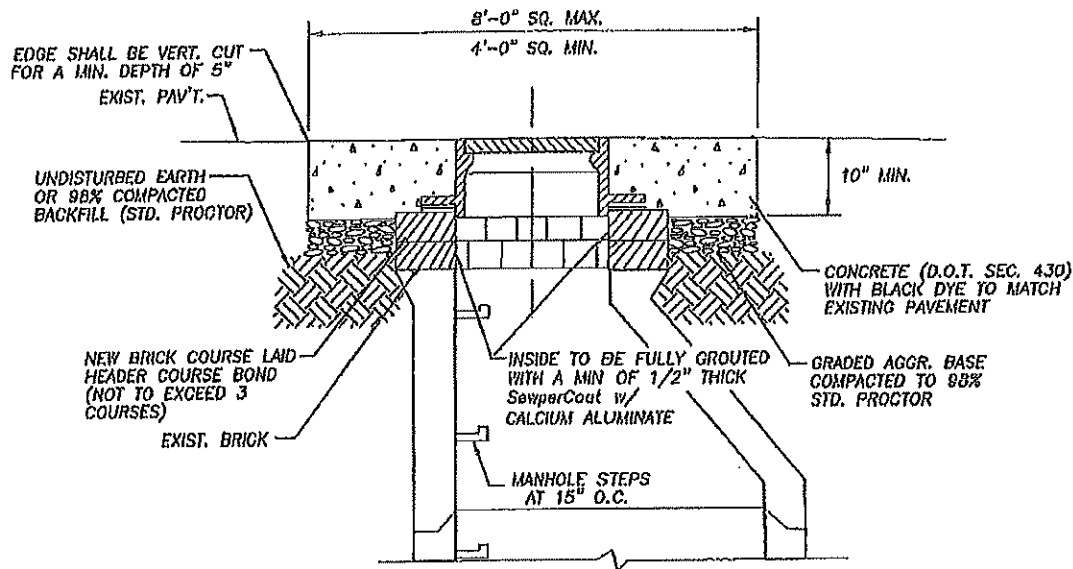
TYPICAL SECTION
STANDARD SHALLOW MANHOLE

N.T.S.

STANDARD DETAIL SS-07

CITY OF COMMERCE

WATER AND SEWER DEPARTMENT



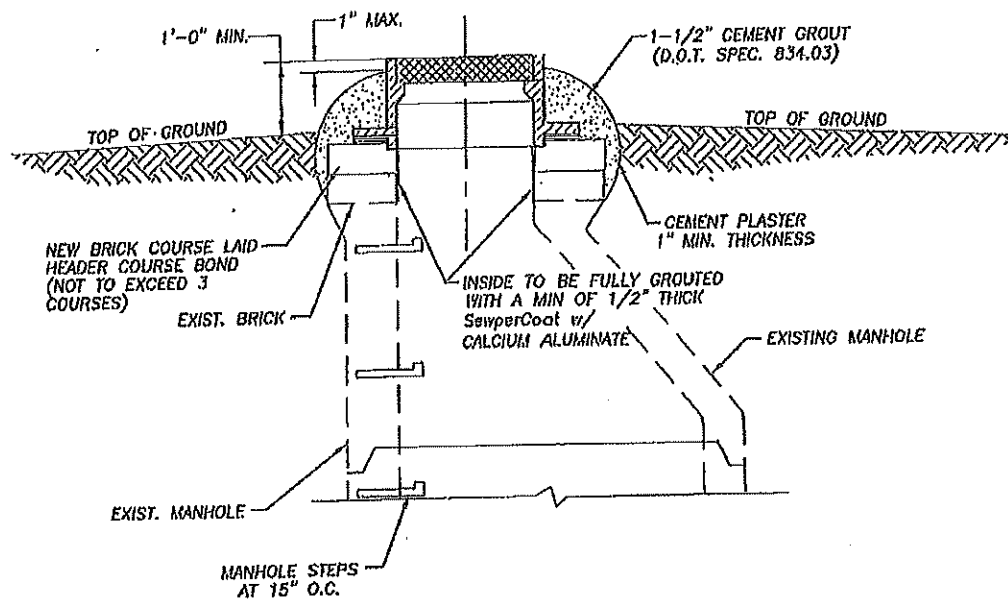
NOTES:

1. CONCRETE FOR COLLAR SHALL BE A MIN. OF 10" THICK AND SHALL EXTEND FROM THE MIDDLE OF THE LAST NEW COURSE OF BRICK TO THE TOP OF THE RING AND COVER.
2. IF REPLACEMENT OF THE FRAME & COVER IS NECESSARY, USE USF 360-E RING AND COVER SERIES OR APPROVED EQUAL TOTAL WEIGHT. 300 LBS. (APPROX.) MIN. COVER WT. 130 LBS. (APPROX.) USE USF 367 FOR BOLT DOWN COVER OR APPROVED EQUAL

TYPICAL SECTION MANHOLE FLUSH WITH PAVEMENT

N.T.S.

STANDARD DETAIL SS-08
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT

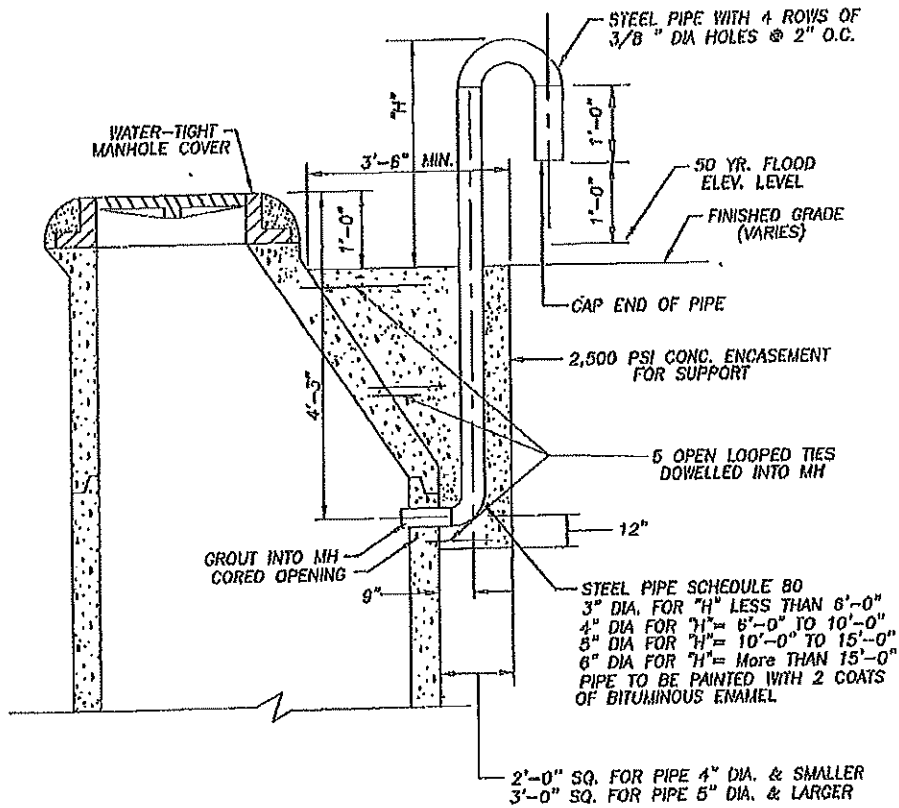


NOTES: 1. IF REPLACEMENT OF THE FRAME COVER IS NECESSARY, USE
USF 360-E RING AND COVER SERIES OR APPROVED EQUAL
TOTAL WEIGHT. 300 LBS. (APPROX.)
MIN. COVER WT. 130 LBS. (APPROX.)
USE USF 367 FOR BOLT DOWN COVER OR APPROVED EQUAL

TYPICAL SECTION MANHOLE
RISING ABOVE GRADE

N.T.S.

STANDARD DETAIL SS-09
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT

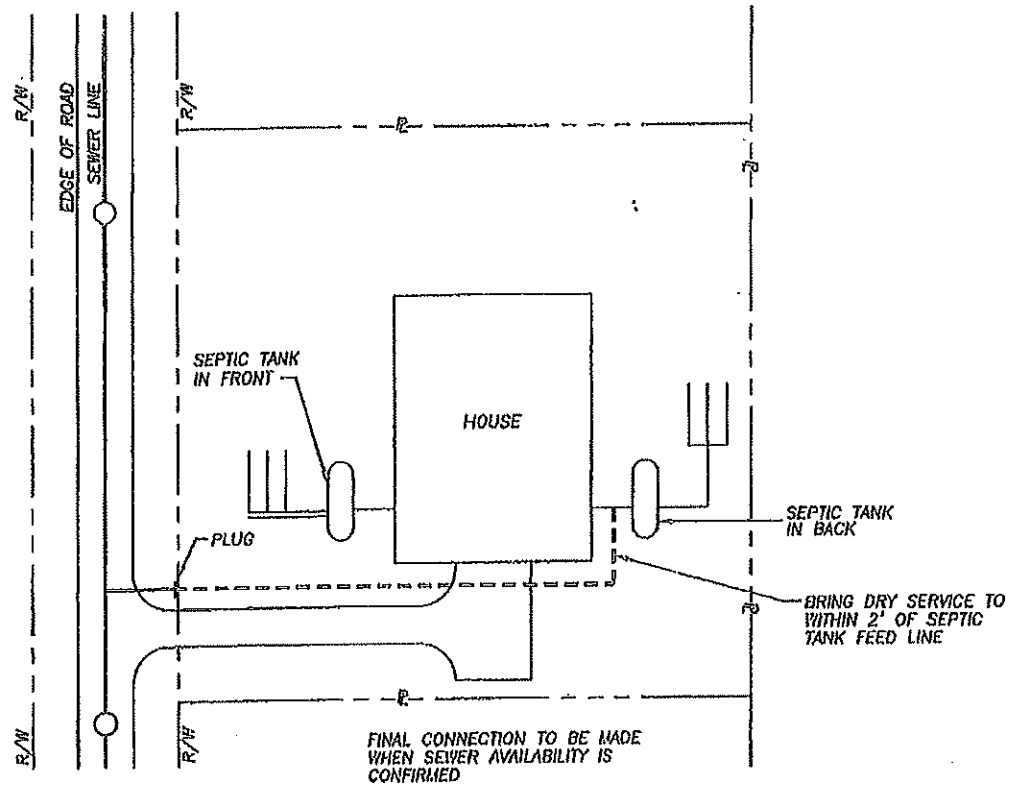


CONNECTION TO MANHOLE TO CONSIST OF STEEL PIPE AND
 CLASS "D" CONCRETE COMPLETE

TYPICAL SECTION
VENTED MANHOLE

N.T.S.

STANDARD DETAIL SS-10
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



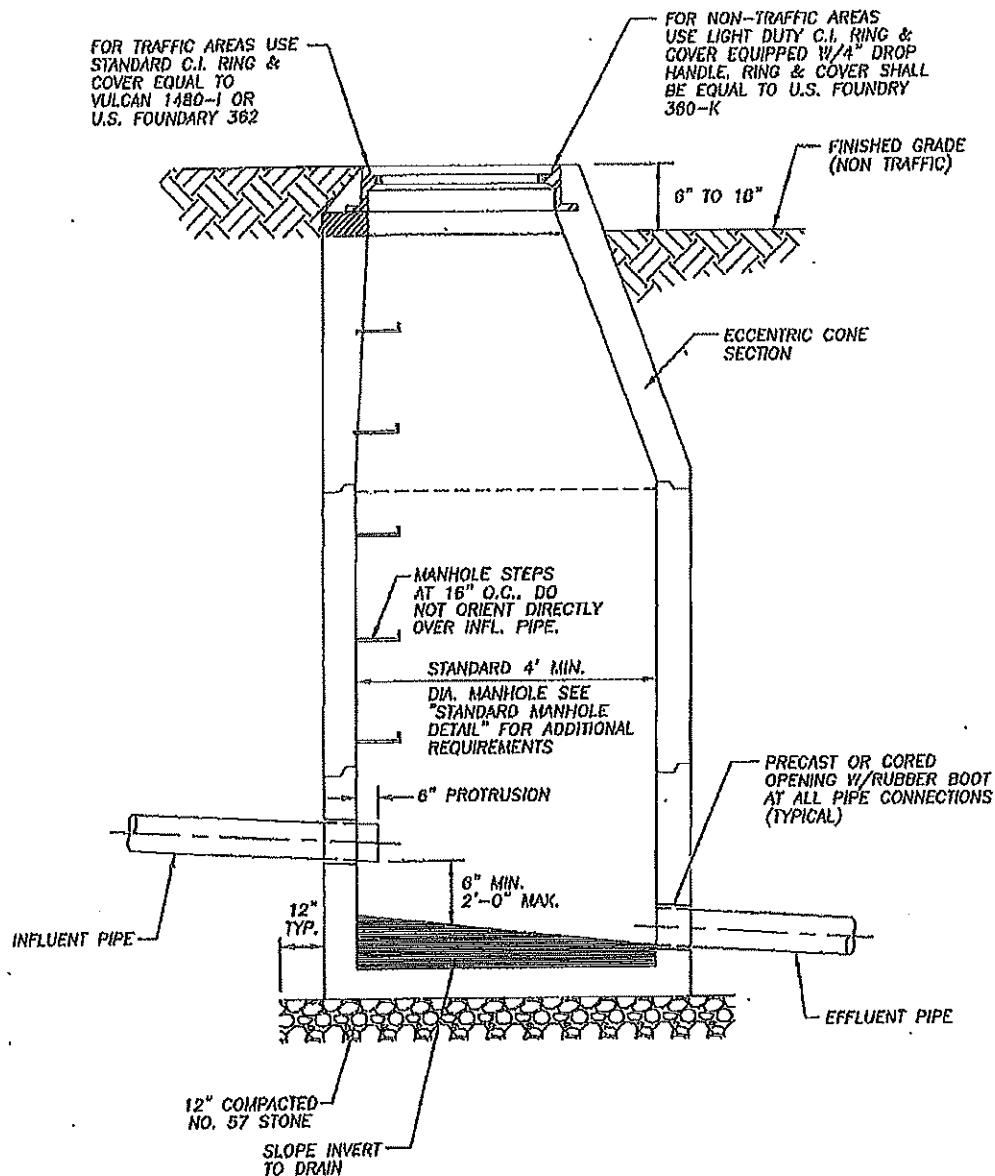
DRY SEWER LINE CONNECTION

N.T.S.

STANDARD DETAIL SS-12

CITY OF COMMERCE

WATER AND SEWER DEPARTMENT

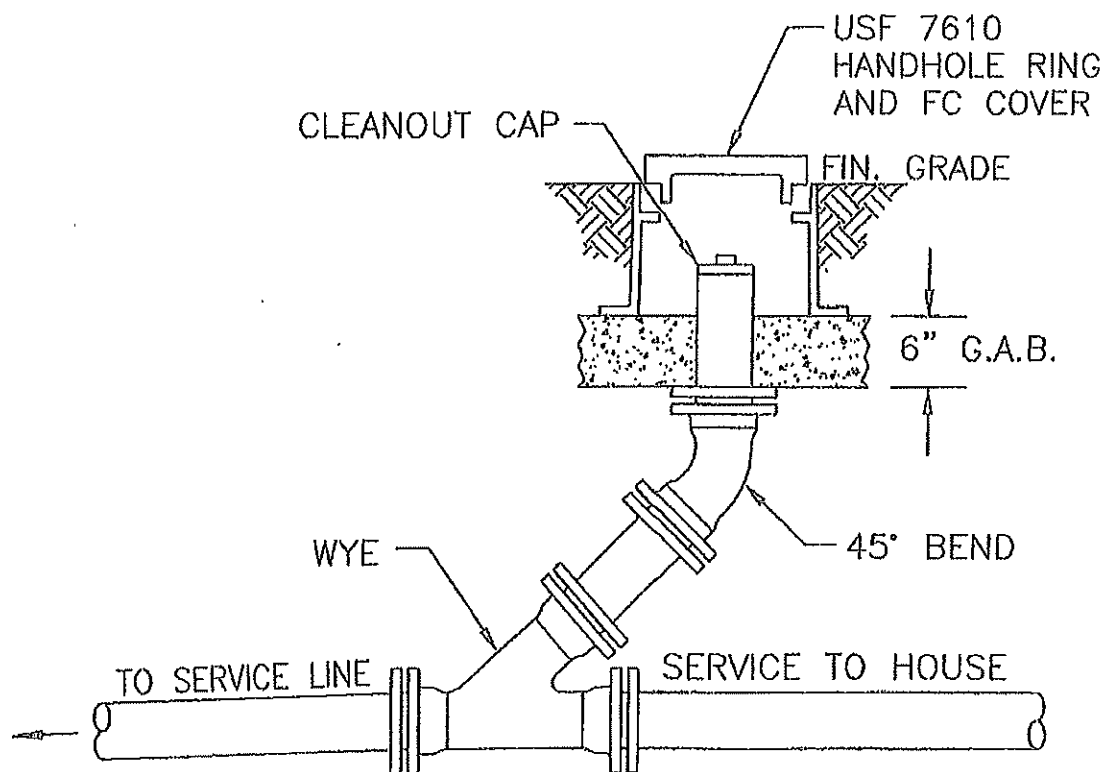


SAMPLE STATION MANHOLE

INDUSTRIAL INSTALLATION

N.T.S.

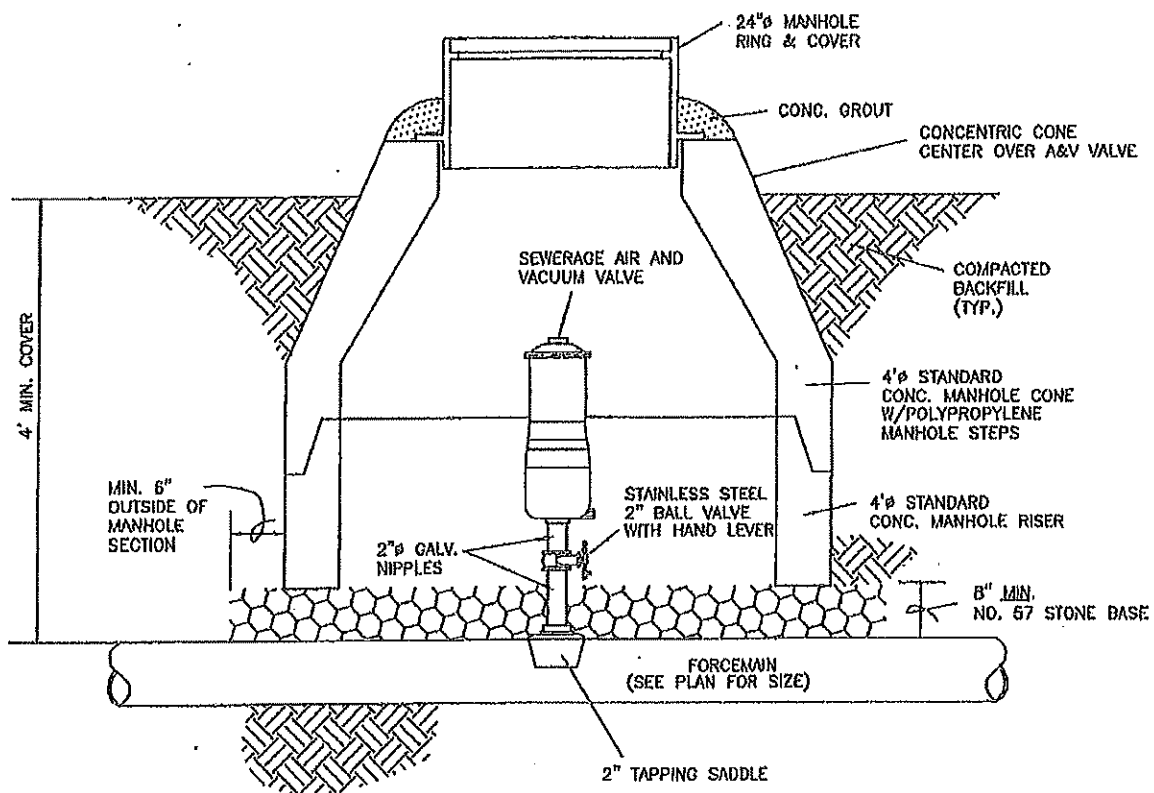
STANDARD DETAIL SS-13
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



CLEANOUT DETAIL

N.T.S.

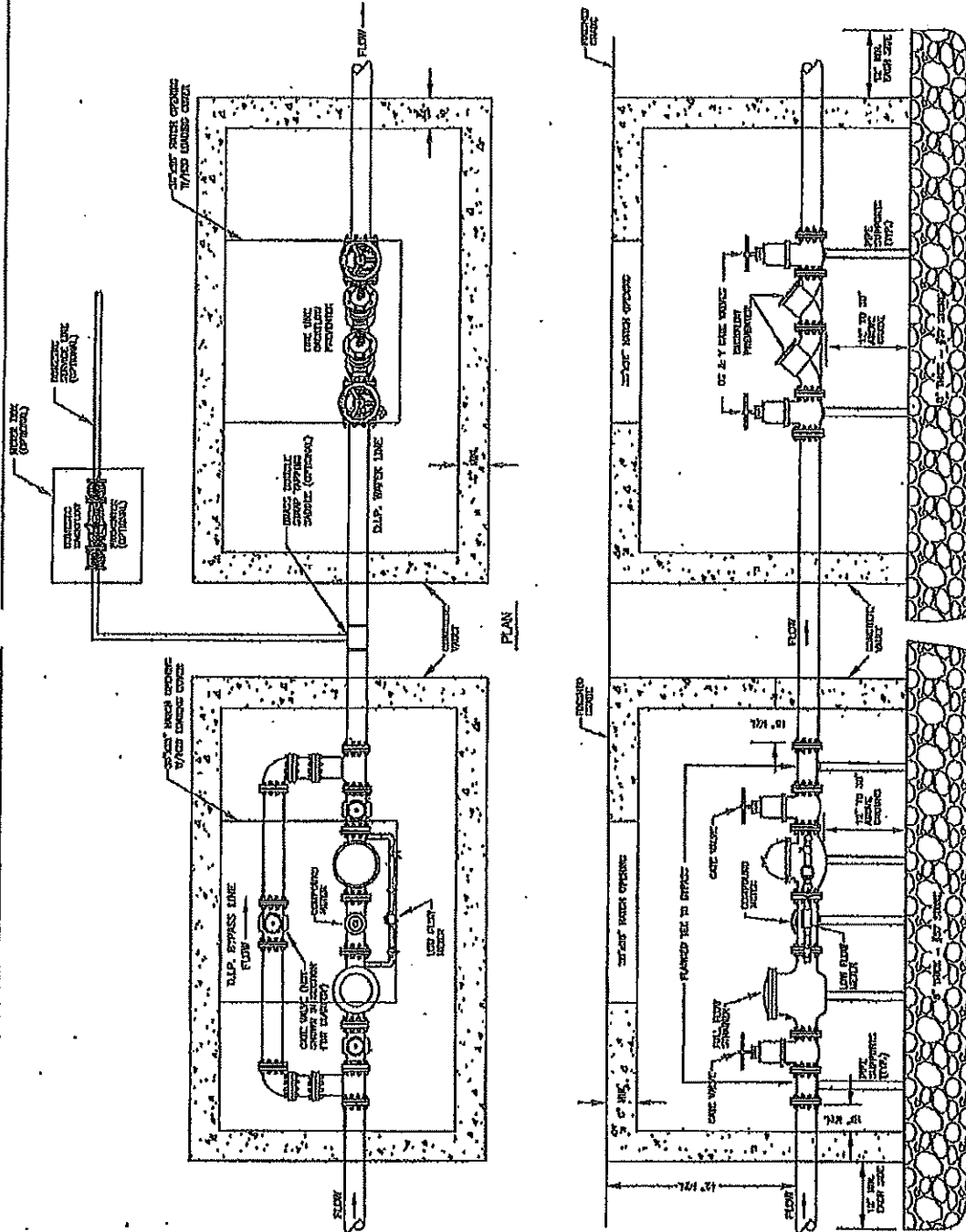
STANDARD DETAIL SS-14
CITY OF COMMERCE
WATER AND SEWER DEPARTMENT



AIR AND VACUUM VALVE ASSY.
TYPICAL INSTALLATION

N.T.S.

STANDARD DETAIL W-12 CITY OF COMMERCE WATER AND SEWER DEPARTMENT



SECTION

COMMERCIAL/INDUSTRIAL SERVICE CONNECTION

N.T.S.