CITY OF LOGANVILLE

DEPARTMENT OF UTILITIES

WATER MAIN DESIGN & CONSTRUCTION STANDARDS

INTRODUCTION

The "Water Main Design & Construction Standards" consists of two separate parts: *Design Criteria* and *Construction/Installation Specifications* which state current policies and procedures of the City of Loganville Department of Utilities. Included herein are design regulations, submittal policies, construction requirements, inspection and acceptance procedures, and other pertinent information.

The "Water Main Design & Construction Standards" was created to provide design information for both Department of Utilities Department capital improvement projects, and private development projects; and to provide construction guidance, specifications, policies, standards and other information necessary to construct water system improvements that meet all requirements of the Department.

Changes, revisions, additions, or corrections to the "Water Main Design & Construction Standards" may be made at any time without prior notification. Anyone having purchased the standards will be notified of said revisions.

ARTICLE 1 GENERAL DESIGN

PROCEDURES

1.1 SYSTEM EXPANSION AND REPLACEMENT/IMPROVEMENT PROJECTS

This section outlines procedures for designs performed by an Engineer under a direct contract with City of Loganville.

1.1.1 Attend a "pre-design" meeting with City of Loganville to discuss project scope and parameters.

1.1.2 All designs shall be produced in a digital format meeting the Department's requirements (see Article 3).

1.1.3 City of Loganville will provide a blueprint of the ortho-photo for use in digitizing the project. If the Engineer’s CAD system has raster capabilities, a .COT or .TIFF file can be provided on Exabyte 8mm tape cartridge. At a resolution of 200 dots per inch, an ortho-photo of an area 2,500' X 2,500' occupies 25 Megabytes, making the use of floppy diskettes undesirable.

1.1.4 Conduct a field review of both sides of the road(s) for which the proposed water main is to be installed to develop plans of project area showing road centerline and edge of pavement, all side streets, creek crossings, large rock outcroppings, existing sanitary sewer manholes, existing storm drains and headwall structures, exceptional trees (30" or greater in diameter, ornamental or obviously cared for as ornamental by property owner), densely wooded areas or areas which would require substantial clearing, linear footage of sodded lawns, existing driveways and types, existing water meters, existing fences within and adjacent to the rights-of-way, power poles within the rights-of-way, existing fire hydrants and valves, and any other structures located within or adjacent to the rights-of-way which may impact the proposed construction.

1.1.5 Contact all utility companies, including but not limited to, gas or petroleum pipelines, natural gas, buried electric lines, buried phone cables, etc. to obtain locations of those utilities within the project limits of both sides of the rights-of-way, including side streets. (NOTE: Although the "One-Call" Utility Protection Center provides notification service to subscribing utilities for "design" locates, individual notification is also required by this Department to insure all available information concerning other utilities facilities are included on *the* project design.)

1.1.6 Place property lines and street numbers, land lot and district lines on the plan. If design contract includes right-of-way research, place all existing rights-of-way and prescriptive easements on the plan.

1.1.7 All projects must be submitted on 22" X 34" paper. Plans will be stamped by a Professional Engineer registered in the State of Georgia.

1.1.8 Submit a hardcopy of the preliminary plan to City of Loganville Department of Utilities. Plan will be marked up by City of Loganville Utilities Department to show existing water and sanitary sewer mains if not indicated on plan. If the design contract must include right-of-way research, City of Loganville Utilities Department will mark up all existing rights-of-way and prescriptive easements. Any required future stubs, City of Loganville Utilities Department and side of road will be indicated.

1.1.9 Meet with City of Loganville Utilities Department Director to review plan and determine the side of road on which the main is to be installed. The normal location is the north side of east-west streets, and the west side of north-south streets, however, field conditions and obstacles identified on the field review may dictate a deviation from this standard. **NOTE: Water main location must maintain 10-feet separation from existing parallel sanitary sewer mains, and 18-inch vertical separation from any existing perpendicular crossing of sanitary sewer mains.**

1.1.10 Design the proposed water line to include alignment, all creek and bridge crossings, all tie-ins, future stubs, fire hydrants and valves, and abandonment of existing water lines, if any.

1.1.11 Digital plans created from a city-furnished ortho-photo generally do not require any field surveying work. Any required field surveying not in the design contract must be authorized by the City of Loganville in writing. All approved surveying work must include at least one GPS coordinate, tying in with the City's coordinate system.

1.1.12 **If proposed water line crosses private property, a 20 foot permanent easement must be provided by responsible party**. Prepare any required easement plats (see page 1-11).

1.1.13 Submit a "check print" of the final design to City of Loganville Utilities Department for review.

1.1.14 Upon return of the "check print", make any changes noted and submit two (2) additional copies to City of Loganville Utilities Department for approval.

1.1.15 Prepare submittal package, including any required drawings, plans, or details, for application of Ga. D.O.T., or railroad permits, or any other necessary permit applications and submit to the City of Loganville for processing (see Appendix II).

1.1.16 Provide the following to City of Loganville Utilities Department for bidding purposes:

1. 1 set of reproducible of the final approved design and a digital copy of the design file on a *3V2"* HD floppy diskette.

2. Materials list and labor items list using cost data furnished by the City of Loganville.

3. A project cost estimate in Lotus 1-2-3 for Windows, or version 3.1 for DOS, if approved, on a *3V2"* HD floppy diskette.

4. A bid summary in Lotus 1-2-3 for Windows, or version 3.1 for DOS, if approved, on a *3W* HD floppy diskette.

1.1.17 If included in the design contract, perform the following:

1. Attend bid opening and prepare bid tabulation in the format to be provided by the City of Loganville and submit to City of Loganville Utilities Department Director.

2. Act as advisor and answer any questions regarding design during the construction phase.

3. Prepare and submit to City of Loganville Utilities Department as-built drawings in both digital and hardcopy format.

1.1.18 The Water Installation Standards shall be published and made available to the public at a cost of twenty dollars ($20.00) each for the "Installation Standards". The details and particular requirements of these Standards may be changed by CITY OF LOGANVILLE UTILITIES DEPARTMENT at any time. |

1.1.19 ***Prior to Final approval of the design drawings, the owner must enter a signed and notarized "Owner/Developer Agreement, "blank copies of which are provided by CITY OF LOGANVILLE UTILITIES DEPARTMENT as part of the development review package.***

1.2 PRIVATE DEVELOPMENT/SUBDIVISION PROJECTS

This section outlines procedures for designs performed by an Owner/Developer's Engineer for private developments/subdivisions.

1.2.1 Plans will generally be submitted through the plan review process (Loganville Department of Planning & Development) to be routed to City of Loganville Department of Utilities. All projects not submitted through the City's plan review process must submit a complete set of plans to the City of Loganville Utilities Department for approval (allow two (2) weeks for review and comments). Designs should only be submitted during the preliminary stage of development. No designs will be approved submitted as "concept" plans.

1.2.2 Design the proposed water line to include alignment, all creek and bridge crossings, all tie-ins, future stubs, fire hydrants and valves, and abandonment of any existing water mains, if necessary. The City of Loganville's required location for water mains within private development/subdivisions is on the north side of east-west streets, and the west side of north-south streets. **NOTE: Water main location must maintain 10-feet separation from parallel sanitary sewer mains, and 18-inch vertical separation from any perpendicular crossing of sanitary sewer mains**

1.2.3 If no water sufficient to serve the proposed development exists at the project entrance, the engineer shall design a water line of City of Loganville Utilities Department approved size, from a source specified by City of Loganville Department of Utilities, in accordance with City of Loganville Utilities Department design criteria.

1.2.4 All projects must be submitted on 22" X 34" paper. Plans shall be stamped by a Professional Engineer registered in the State of Georgia.

1.2.5 Plans will be reviewed and written comments will be provided indicated required corrections and/or changes. A sample "checklist" of specific plan requirements is available from City of Loganville Utilities Department Plan Review Section. If a betterment, or up-size of the pipe, is necessary, the City of Loganville Utilities Department will so indicate and the engineer will be responsible for designing it in accordance with City of Loganville design criteria. Plans submitted for preliminary review will not be returned to the engineer.

1.2.6 Prepare submittal package, including any required drawings, plans, or details, for application of Ga. D.O.T. permits, or any other necessary permit applications and submit to City of Loganville Utilities Department for processing (see Appendix II).

1.2.7 Four (4) or more copies shall then be submitted to the City of Loganville for final approval and if the plans are acceptable, they will be signed off by the Director of Department of Utilities, Director of Planning & Development and the City Engineer. The "Development Permit" can be signed off. City of Loganville will retain two (2) copies of the stamped plans, the others will be returned to the engineer. If the project was designed on a CAD system, *a.3W* HD floppy diskette shall also be submitted at this time (see Article 3.1.1 for compatible file format).

1.2.8 A plan bearing the original signed approved stamp must be presented by the approved water contractor in order to obtain a water main construction permit.

1.2.9 Any subdivision which is submitted and approved as one project must either be constructed as one project, or if subsequently phased out to be constructed in multiple phases or units, be resubmitted and receive approval for each phase or unit individually prior to any further construction. In the instance of multiple phases or units, separate construction permits must be obtained for each phase or unit.

1.2.10 Record drawings (as-builts) must be submitted and approved before a project can receive final acceptance, and/or Certificates of Occupancy.

1.2.11 As-built record drawings must be sharp, clear, clean, legible, and suitable for micro-filming and filing.

1.2.12 As-built record drawings shall include a site plan and any supplemental or shop drawings as may be required by the City of Loganville.

1.2.13 Four (4) sets of as-built record drawings must be submitted by the Engineer/Developer for approval.

1.2.14 Record Drawings must be stamped by a Professional Engineer or registered in the State of Georgia.

ARTICLE 2

DESIGN CRITERIA

2.1 PROPOSED WATER LINE

2.1.1 City of Loganville Utilities Department standard location for water line placement is on the north side of east-west streets, and on the west side of north-south streets.

2.1.2 For subdivisions, the proposed water line shall be located on the north side of east-west streets, and on the west side of north-south streets.

2.1.3 For existing city roads, the proposed water line will generally be located 5’ inside the right-of-way. For existing Ga. D.O.T. roads, the proposed water main must be located 5' inside the right-of-way. Unusual circumstances such as embankments, obstructions, other utilities, etc. may warrant deviation.

2.1.4 For private developments/subdivisions the water main shall be located **7'** from the back of the curb (see detail on page A-l).

2.1.5 For non-subdivision streets, the side of the road the proposed water main will be located on may be primarily determined by the location of any existing lines to be tied into at the beginning and/or end of the project.

2.1.6 For non-subdivision streets, the location may also be determined by existing rights-of-way, or lack thereof. Water main must be installed within deeded rights-of-way. Installations within "prescriptive" easements are not permitted.

2.1.7 For non-subdivision streets, generally avoid designing the location on the same side of the road as the gas lines. In projects where any existing gas lines have "active" cathodic protection for corrosion prevention, the water main **must** be designed on the opposite side of the road, and may require additional protective measures as specified by the City of Loganville.

2.1.8 For non-subdivision streets, if none of the above govern, then design the water line for the side of the road that has the fewest conflicts, i.e. rock outcroppings, trees, side roads, fences, structures, involved landscaping, embankments, prescriptive easements, etc. **NOTE: Water main location must maintain 10-foot separation from existing parallel sanitary sewer mains, and 18-inch vertical separation from any existing perpendicular crossing of sanitary sewer mains.**

2.1.9 The proposed water lines shall be shown on the plans as solid lines (see page 1-1).

2.1.10 the existing water lines shall be shown a dashed lines (see page 1-1).

2.1.11 all existing City road crossings shall be shown to be bored, and shall be noted as follows: "ALL CITY ROAD CROSSINGS TO BE BORED WITH STEEL CASING UNLESS OTHERWISE APPROVED BY THE CITY OF LOGANVILLE PRIOR TO CONSTRUCTION". All Ga. D.O.T. roads will be bored with steel casing (see detail pages A-5 & A-34).

2.1.12 **Water Mains piping material installed should be PVC AWWA C900-07 standard unless specified in certain areas. Ductile Iron Pipe is required along state highway routes or within state right-of ways, under intersections, stream crossings, crossings, over and under all cross drains and at all other locations specified by the Utilities Department. Piping Materials requirements may be changed at the discretion of the Department of Utilities.**

2.1.13 a minimum pipe size of 8" will be installed in all residential developments/subdivisions, including connection to existing mains. A minimum pipe size of 12" will be installed in all commercial developments/subdivisions, including connection to existing mains. If adequate volumes for fire flow requirements and pressures are not available at the point of connection, a larger main and/or additional improvement may be required. Determination of volume or pressure inadequacy will be hydraulically modeled and calculated by design engineer and submitted to the City of Loganville utilizing fire flow test performed by design engineer, and shall be at the sole discretion of City of

Loganville Utilities Department for approval.

2.1.14 Standard depth of cover is four (4) feet below the elevation of the edge of pavement of existing or proposed roadway surfaces, unless authorized by the City of Loganville Department of Utilities. In the event the shoulder of the roadway is below the elevation of the edge of pavement, then a minimum of four (4) feet of earth cover is to be maintained at all times.

2.1.15 a chlorination tap is to be indicated on the plan approximately 3 to 5 feet from the beginning of the project. Separate project "phases" must have chlorination taps indicated for each phase.

2.2 FIRE HYDRANTS

2.2.1 Fire Hydrants installed shall have 5” front steamer and 2 2.5” inch outlets on each hydrants.

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

2.2.3 Each fire hydrant shall be installed utilizing a fire hydrant tee and 6" isolation valve, and shall be so identified on the plan.

2.2.4 Where possible, place a fire hydrant near the end of each main. Where this is not feasible due to spacing requirements, provide a 1-inch blow-off on 8-inch mains, and 2-inch blow-off on 12-inch and larger mains, for use in flushing.

2.2.5 All existing fire hydrants on mains to be abandoned as part of the submitted project are to be labeled as follows: "Existing fire hydrant to be salvaged and returned by contractor to the City of Loganville Utilities Department".

2.3 VALVES

2.3.1 Valves shall be depicted on the plan as in the example on page 1-1.

2.3.2 In-line valves are to be generally located every 1,000 feet, or every third fire hydrant, and are to be located at intersections in such a manner to enable isolation of various streets within the development without shutting down adjacent streets.

2.3.3 For 8 inch mains within residential developments, in-line gate valves located at fire hydrants should be installed approximately 10 feet away from the hydrant on the side opposite the water source. 12 inch mains and larger shall have two (2) butterfly valves located approximately 10 feet away from either side of the hydrant (see details A-2 and A-3).

2.3.4 For future stubs, the valve is to be located approximately 20 feet (one full joint of ductile iron pipe) from the plugged end (see detail A-10).

2.3.5 All proposed valves smaller than 12 inch shall be gate valves.

2.3.6 All proposed valves 12 inch and larger shall be butterfly valves (except tapping valves), or resilient seated gate valves for 12 inch only.

2.3.7 On City of Loganville contract projects all proposed valves (with the exception of the 6 inch fire hydrant isolation gate valve) shall have a "3-M Scotch mark Electronic Marker" installed during construction (see detail A-48). Any existing valves which will remain in service as part of the project, and which are exposed in the course of constructing the project, shall also have an electronic marker installed. See page 1-1 for appropriate symbology.

2.4 TIE-INS TO EXISTING MAINS

2.4.1 Tie-ins are usually made as follows:

1. Proposed main is tied straight into existing main using a solid sleeve or transition sleeve.

2. Proposed main is tied straight into existing main using a reducer, or other fitting, and a solid sleeve.

3. Proposed main is laid parallel to existing main and is tied in using smallest degree bends possible for conditions.

4. Proposed main is laid parallel to existing main and is tied in using a tee on the proposed main and cutting in a 90-degree bend into the existing main, thus leaving a future stub on the proposed main.

5. Proposed main is laid parallel to the existing main and is tied in using a tap on the proposed main and cutting in a 90-degree bend into the existing main, thus leaving a future stub, (generally used only to tie into existing 2" mains).

2.5 HOUSE SERVICE CONNECTIONS IN RESIDENTIAL CUL-DE-SACS

2.5.1 Residential cul-de-sacs shall be designed to include a live 1-inch services to each lot not immediately adjacent to the water main from the neck of the cul-de-sac. The water main at any location shall be kept out from under any paved or concreted surfaces within the streets. The water main shall end at the neck of the cul-de-sac with a fire hydrant and a 2” main connected with valve ran around the perimeter of the cul-de-sac to allow each lot in cul-de-sac to have separate service. At the end of the 2” main a blow off provided for flushing.

2.5.2 1-inch live services shall be located at the property lines to avoid conflict with driveway construction. Water meters shall be placed on property lines opposite from sewer connections. All driveways must be a minimum of 3 ft. from property line when in Right-way easements) No taps or service lines will allowed to be under concrete or asphalt of driveways. Each service shall end at the curb-line, and shall terminate in an approved curb-stop, located within a standard meter box. Must show all location of stubs on plans. Meter boxes must be set 11 ft. from backside of the curb. Curb stop valves installed at backside of the meter box.

2.5.3 Each live service shall end at the curb-line, and shall terminate in an approved 1-inch curb-stop which shall be located within a standard meter box. Meter boxes shall be left flush with finished grade.

2.5.4 One-inch live services shall be installed utilizing materials and techniques described in Section 4.11.

2.6 EASEMENTS

2.6.1 It is the policy of City of Loganville Department of Utilities that water mains are to be installed only in dedicated rights-of-way. Decisions as to use of easements will be made by City of Loganville Utilities Department on a project-specific basis. Generally, use of easements will only be permitted along existing City roads where there is no right-of-way, or there is structural conflict within the right-of-way.

2.7 STATE HIGHWAY D.O.T PERMITS

2.7.1 If any portion of a proposed project enters a State of Georgia controlled right-of-way, then a Ga. D.O.T. permit application is required. This is to be submitted to City of Loganville Utilities Department for processing by the Ga. D.O.T. Pages must be 81/2”X 11", but drawings need not be to scale. All measurements indicated on the permit application must be submitted in metric. Generally, portions of the project design can be reduced in size match lined, if necessary, as long as the text is still legible. Compaction notes (see example in Appendix "II", page 11-4) must be

included on every page of the application drawings (see "Georgia D.O.T. Utility Accommodation Policy and Standards"). Application must include four each of the following: plan, profile, traffic control plan, and section from D.O.T. city map. See Appendix "II" for Ga. D.O.T. Permit Application Checklist, required forms, and examples.

2.8 TEXT

2.8.1 All proposed water mains shall be labeled for size and material.

2.8.2 All existing water mains shall be labeled for size, material, under which they were installed. This information can be obtained through City of Loganville Utilities DepartmentDepartment.2.8.3 For all side streets and intersections, indicate whether existing water mains are one-way fed or, if not, the location of the next in-line valve. This information can be obtained through the City of Loganville Utilities Department.

2.8.4 Any existing water mains to be abandoned as part of the proposed project shall be so noted and reflect the required symbology shown on page 1-1.

2.8.5 All fire hydrants shall reflect the required symbology shown on page 1-1, and shall be stationed to the nearest 5-feet. Information regarding depth, length of lead, and manufacturer shall be provided on the "as-built" drawing.

2.8.6 All valves shall reflect the required symbology shown on page 1-1, labeled as to size and whether gate valve or butterfly valve (GV or BFV), and stationed to the nearest 5-feet. Manufacturer's name shall be provided on the "as-built" drawing.

2.8.7 Water meter information will be provided by the City of Loganville in an ASCII format, and shall be imported into the drawing file and placed above the respective water meter symbol for account identification.

2.8.8 1" fonts or larger shall be used for most text. .2" fonts or larger shall be used for road names and rights-of-way.

2.9 LINE WEIGHTS

2.9.1 Proposed water main and right-of-way should be equivalent to a *#3* pen.

2.9.2 Existing utilities should be equivalent to a *#2* pen.

2.9.3 Edge of pavement, driveways, property lines, fences, etc. should be equivalent to a # 1 pen.

2.10 RECORD DRAWINGS (ASBUILTS)

2.10.1 Record drawings (as-builts) must be submitted to the City of Loganville before a project can receive final approval, and/or Certificates of Occupancy. (NOTE: In order to avoid delays in the "approval process" of developments/subdivisions, as-built drawings should be submitted as soon as the water main installation is complete to allow sufficient time for review).

2.10.2 Record drawings must be sharp, clear, clean, legible, and suitable for microfilming and scanning.

2.10.3 Record drawings shall include a site plan and any supplemental or shop drawings as may be required by the City of Loganville.

2.10.4 Four (4) complete sets of record drawings must be submitted by the Engineer/Developer to the City of Loganville for review and approval.

2.10.5 Record drawings must be stamped and signed by a Professional Engineer registered in the State of Georgia.

ARTICLE 3 DIGITAL FILE FORMAT

NOTE: The following section is mandatory for engineering firms designing system expansion and replacement/improvement projects. The City of Loganville prefers a digital copy of any development/subdivision record drawings for incorporation into the City G.I.S. mapping system, along with the required hard-copy documents.

3.1 FORMAT

3.1.1 Project is to be submitted as an AutoCAD release 2, 9, 10, 11, or 12 .DWG or .DXF file format, on CD floppy diskettes. No solid fill is to be used in .DXF file, as this attribute is lost during the translation. Instead, hatching or patterning may be used. See also item #8, "Compatibility with the City of Loganville Utilities Department CAD/CAE Systems", in Appendix "I".

3.2 LEVELS OR LAYERS

3.2.1 A list of utilized levels or layers, and designation of which items are located on each level will be required. A minimum of seven (7) levels will be required: right-of-way; edge of pavement; property lines; existing utilities; existing water mains; proposed water mains; and text. Logical grouping of related items under the same level is acceptable, i.e., property lines, land lot lines, and district lines.

3.3 CELLS OR BLOCKS

3.3.1 A listing of all cells or blocks and their names is required.

ARTICLE 4

CONSTRUCTION INSTALLATION

4.1 PRIOR TO CONSTRUCTION

4.1.1 At no time will any water main construction commence prior to approval of all plans, receipt of any required agreement documents, and issuance of a Construction Permit".

4.1.2 Only City of Loganville approved contractors may install water mains.

4.1.3 All water mains, valves, fire hydrants, and other appurtenances to be dedicated to or owned by the City of Loganville Utilities Department shall be installed according to the "approved" design. **All** field changes **must be pre-approved** by the City of Loganville Department of Utilities. Contractor must have a set of the "approved" design containing an original stamp and a copy of the Water Main Design & Construction Standards on site at all times.

4.1.4 Contractor shall adhere to all Federal, State, City, and local laws, ordinances, and regulations which in any manner affect me conduct of work, including, but not limited to, initiating, maintaining, and supervising all safety precautions and programs in connection with the work.

4.1.5 Throughout the construction, the Contractor shall fully comply with the applicable requirements of local. State, and Federal agencies in the control and containment of soil erosion, including post-construction maintenance of erosion control devices.

4.2 EARTH EXCAVATION

4.2.1 Work Included

The Contractor shall clear the site, make all pavement cuts, remove all trees and stumps, remove any fences or other structures which the removal thereof is necessitated by the work, make to the lines and grades indicated on the "approved" design, and complete the excavation required for the various pipe lines and structures, including any additional foundation work.

4.2.2 Additional Excavation

It is expected that satisfactory foundations will be found at the elevations indicated on the "approved" design, however, should it be found desirable or necessary to go to additional depth, the excavation shall be carried on to an additional depth as ordered and backfilled as directed.

4.2.3 Clearing and Care of Surface Materials

The sites of all excavation and grading shall first be cleared of all paving, trees, walls, fences, sidewalks, stumps, brush, rubbish, and crops, which shall be removed or disposed of in a satisfactory manner. On all lawns and other improved grass areas, the sod shall be carefully removed, kept alive, and replaced after the backfilling is completed. The Contractor shall also remove all spoil from such areas as quickly as possible after the excavation is backfilled, and shall leave the premises in as good a condition as before undertaking the work. Fences that have been removed, damaged, or broken down shall be replaced at or before completion of the work, in first class condition.

Topsoil shall be removed to its entire depth from all areas to be excavated or graded. The topsoil shall be piled in designated or approved locations where it will not interfere with construction operations. Topsoil as stored shall be reasonably free of subsoil, debris, and stones larger than two (2) inches in diameter. The stored topsoil shall be left in piles to be used for finished grading.

The removal of existing pavement shall be done in accordance with the requirements of the authority within whose jurisdiction such pavement is located.

Whenever the removal of pavements (other than gravel types) is required, the Contractor shall outline the area to be removed by making saw cuts, providing vertical kerfs in straight lines in order to permit removal in a straight line. Should pavement breakage occur beyond the original saw cut, the Contractor will be required to make a new saw cut beyond the furthest point of breakage.

4.2.4 Protection of Trees and Shrubbery

The Contractor shall be responsible for the protection of tops, trunks, and roots of existing tree that are adjacent to, or are to remain within the construction boundaries of the project site, or in parks, lawns, or other improved areas. All trees shall remain and receive protection, if necessary, in areas where there is no excavation or embankment. Existing trees that may be subject to construction damage shall be boxed, fenced, or otherwise protected before any work is started. The boxing shall be removed when directed, or at completion of the project. Heavy equipment or stockpiles will not be permitted within branch spread. Interfering branches shall be removed without damage to trunks and all cuts or scars shall be covered with tree paints.

No tree shall be removed unless absolutely necessary for the construction, as directed by the City of Loganville. On areas beyond construction right-of-way or easements, no trees or shrubbery shall be removed without the written authorization of the property owners and approval of the City of Loganville. Copies of such written authorization are to be provided to the City of Loganville prior to any removal.

4.2.5 Excavation Methods

All excavation shall be in open cut unless otherwise indicated on the "approved" design or directed by the City of Loganville. In general, topsoil may be removed by machine method. Excavation below topsoil may also be performed by machine, but shall be supplemented by such hand dressing or leveling as may be required to conform to lines and grades as given by the City of Loganville. Material so removed shall be used in backfill, making embankments, filling low areas, or as otherwise directed.

Hand tool excavation shall be used where necessary to protect existing utilities and structures.

All slopes shall be carefully cut or graded by hand to grades required by City of Loganville and shall be tamped or otherwise compacted to maintain the material in position.

The final trimming of the bottoms and sides of excavations against which masonry is to be built, shall be done just before concrete is placed.

In open or improved lawn areas, excavation should be done, if possible, utilizing a tractor-mounted backhoe and extreme care should be taken to avoid damage to adjoining lawn areas. In areas not readily accessible by machinery and where excavation is required near existing trees and shrubberies that may be damaged by excavation equipment, the trench shall be excavated using hand tools.

4.2.6 Removal of Water

The Contractor shall pump out, or otherwise remove and properly dispose of any water (including storm water), which may be found or may accumulate, as fast as it may collect in the excavation. This removal is required regardless of the source.

All necessary precautions shall be taken to prevent disturbance at, and to properly drain any areas upon which concrete is to be poured, or upon which pipe is to be laid.

There shall be located at the work site at all times during construction, proper and approved equipment with sufficient capacity for the removal of any water from the work, and in such a manner as not to withdraw sand or cement from any concrete. Contractor is also to insure that removal of any liquids will not interfere with the proper laying of masonry, pipe, or prosecution of any of the required work for the complete construction of the project.

The flow in sewers, drains, gutters, or water courses encountered during the construction shall be adequately provided for by the Contractor to insure these flows do not interfere with the prosecution of the Work, and are maintained in such a manner as to insure continuity of flow at all times.

Unless otherwise permitted, ground water encountered within the limits of excavation shall be depressed to an elevation not less than twelve (12) inches below the bottom of such excavation. This depression is to be done before pipe laying or concrete work is started and shall be so maintained until concrete and joint materials have attained initial set.

Should sewage or any other odorous liquids be encountered during the work in the excavation, the City of Loganville Utilities Department shall be immediately notified. The City of Loganville Director of Utilities Department will then determine if actions by the Contractor have caused the source of the odorous liquids to leak and will promptly notify the appropriate regulatory agencies, if necessary. In addition, City of Loganville Utilities Department will instruct the Contractor as to what actions, if any, the Contractor can and cannot perform prior to any directives that may be issued by the regulatory agencies. Any sewage will be pumped and hauled to a manhole, pump station, or water reclamation facility, as directed by the City of Loganville Director of Department of Utilities. Any other liquids will be properly disposed of as directed by the City of Loganville Director of Utilities Department and/or any regulatory agencies having jurisdiction.

4.2.7 Sheeting and Shoring

The Contractor shall be responsible for supporting and maintaining required excavations even to the extent of sheeting and shoring the sides and ends of excavations with timber or other supports. If the sheeting, braces, shores, stringers, wailing timbers, or other supports are not properly placed, or are insufficient, the Contractor shall provide additional or stronger supports as may be required, or as directed. The requirement of sheeting or shoring, or of the addition of supports, shall not relieve the Contractor of his responsibility of their sufficiency.

Trench sheeting shall be left in place until the backfilling has been completed to an elevation not less than twelve (12) inches above the top of the pipe. Unless otherwise ordered by Coty of Loganville Department of Utilities, sheeting shall be cut off at the top of the lowest set of bracing and the upper section shall be removed.

Where in the opinion of City of Loganville Utilities Department the removal of sheeting may endanger the work, such sheeting will be ordered to be left in place and the tops cut off as directed or as specified in Section 4.14.3. In removing the sheeting the work shall be done in such a manner as to prevent injurious caving of the sides. All voids left by the sheeting along trenches shall be carefully filled and rammed with suitable tools.

In quicksand or soft ground, sheeting shall be driven to such depth below the bottom of the trench as directed.

4.2.8 Trench Excavation

The maximum width of trench from an elevation of twelve (12) inches above the top of the pipe to the bottom of the trench shall be as indicated on Detail A-5.
Excavation of pipe trenches with sides sloping to the trench bottom will not be permitted.

Should trenches be excavated with more than the specified maximum widths, the City of Loganville Utilities Department may require the Contractor to furnish concrete cradles or concrete encasement for the pipe.

4.2.9 Length of Trench to be opened

The length of trench to be opened, or the areas of the surface to be disturbed or unrestored at any one time, shall be limited by the City of Loganville Utilities Department with regard both to expeditious construction, and to the convenience, safety, and comfort of citizens directly or indirectly affected by the work. New trenches are not permitted to be excavated if there are previously excavated trenches that require backfilling, or surface areas that require restoration. In any event, no additional work of any kind will be permitted if there is existing streets or roadways that require attention to return them to a safe and proper condition. IN GENERAL, NO TRENCH SHALL BE OPENED MORE THAN 150 FEET AHEAD OF PIPE LAYING AND BACKFILLING.

4.2.10 Storage of Materials

All salvageable materials may be removed from the site, together with all materials taken from the trenches, shall be stored in an approved, suitable place, or as directed by the City of Loganville. The Contractor shall be responsible for any loss of or damage to salvageable materials through careless removal or neglectful or wasteful storage of such materials.

In the storing of excavated material, which is to be used as backfill, the Contractor shall exercise care so as to avoid inconveniencing the public. If in the opinion of the City of Loganville, it is necessary to remove this excavated material from streets, or lots, the Contractor will be required to do so.

4.3 ROCK EXCAVATION

4.3.1 Work Included

The Contractor shall make the lines and grades as shown on the drawings or as directed, including excavation and removal of all rock and masonry as required, and shall dispose of all excavated materials as specified under Section 4.2, or as directed by the City of Loganville.

4.3.2 Removing Rock

In removing rock for the placement of masonry, special care shall be taken to excavate it as closely as possible to the required shape and with no projection into the neat outside line of such masonry. The surfaces of all rock foundations shall be sufficiently rough to bond well with the masonry. Before any masonry is built on or against a rock surface, the latter shall be scrupulously freed from all dirt, gravel, boulders, ice, snow, or other objectionable substances, including loose fragments of rock.

Unless otherwise directed by City of Loganville Department of Utilities, rock shall be fully taken out at least twenty-five (25) feet in advance of pipe laying, and at least 6" below the invert of the pipe, and to a width not to exceed the maximum trench width for the size of the pipe to be laid, as specified in Detail A-5.

Any additional rock excavation required, shall be approved in advance by the City of Loganville, and excavated in such manner as directed by the City of Loganville.

All pipe installed within rock excavation shall be laid upon six (6) inches of embedment material as specified under Section 4.4.

4.3.3 Blasting

Blasting will be permitted for removing rock for excavation. When blasting, the Contractor must use all possible precautions against accidents or damages due to use or storage of explosives, and assumes all responsibility/liability associated with blasting activities. Blasting shall be conducted so as not to endanger persons or property, and whenever required, or as ordered by the City of Loganville, the blast shall be covered with mats or otherwise satisfactorily confined. ONLY **LICENSED** EMPLOYEES OR SUBCONTRACTORS WILL BE ALLOWED TO CONDUCT BLASTING ACTIVITIES - PROOF OF SUCH LICENSING MUST BE PROVIDED TO THE CITY OF LOGANVILLE PRIOR TO ENGAGING IN ANY BLASTING ACTIVITIES.

Explosives shall be used, handled, and stored as prescribed by the laws and regulations of the State of Georgia, and all applicable local laws and regulations pertaining to such. All explosives shall be stored in a safe place at a sufficient distance from the work, so that no damage will occur to any portion of the work should an accident occur relating to the stored explosives.

4.4 FOUNDATION CUSHION

4.4.1 Work Included

The Contractor shall furnish all the materials for, and shall properly place at locations where deemed necessary by the City of Loganville, a cushion or foundation of well compacted crushed stone in order to obtain a firm base on which to build the structures and pipes.

4.4.2 Materials

Embedment materials shall be angular graded crushed stone, *VA*- inch to % inch in size with no more than 5 % passing a No. 8 standard sieve, in accordance with Class I materials as defined in ASTM D2321-72 Section 5.1.1.

4.4.3 Placement

The bedding material shall be placed in the bottom of the trench after it has been excavated to an elevation sufficient to permit the placing of not less than six (6) inches, or as directed. The surface of the bedding material shall be screened to form a uniform support for the pipe and appurtenances. After installing each section of the pipe, additional bedding material shall be placed on either side of the pipe to an elevation consistent with the Class Bedding indicated on the plans or specifications, or as directed by the City of Loganville. This material is to be well tamped and compacted into place so as to secure a firm, even bearing. Foundation material shall be placed for the full width of the trench bottom.

4.5 DUCTILE IRON PIPE AND FITTINGS / STEEL PIPE-CARRIER AND FITTINGS

4.5.1 Work Included

The Contractor shall furnish all materials for and shall properly install, adjust and test, and place in continuous operation at the location indicated on the approved plans, or as directed, all push-on ductile iron pipe and ductile iron fittings, all mechanical joint ductile iron pipe and mechanical joint ductile iron fittings, all flanged ductile iron pipe and flanged ductile iron fittings, and all steel carrier pipe and steel fittings, for the construction of the water mains as required for the proper completion of the work. The contractor shall also furnish all labor and equipment necessary and sufficient to relocate existing pipelines where directed.

No work may be started or continue if the Contractor's foreman or job-site representative does not have a complete set of the "approved" plans and specifications available at all times on site for reference.

Whenever the work disturbs existing conditions or work already completed, the same shall be restored in as good or better than the original condition in every detail. All such replacement and repair shall meet with the approval of the City of Loganville.

It is the intent and requirement of these "Specifications" to insure an installation, which is complete in every detail, whether or not indicated on the drawings, or specified herein. Consequently, the Contractor shall be responsible for all details, devices, accessories, and special construction which may be necessary to properly furnish, install, adjust, test and place in continuous and satisfactory operation, a complete installation.

Attention is also called to the construction procedure required. The proposed water mains shall be constructed in complete sections; each section terminating at a valve.

As each section is installed, it shall be tested and sterilized, and upon receipt of a "passed" Inspection Report from the project Inspector, the Contractor shall place the section in service immediately. Water shall be "carried forward" with the construction.

All ductile iron pipe and fittings shall be bituminous coated at the point of manufacture in accordance with AWWA Standard Specifications. Ductile iron pipe and fittings used in the construction of water mains shall be lined with Portland Cement Mortar in accordance with "Cement Mortar Lining for Ductile Iron Pipe and Fittings" (AWWA C102/A21.40). The thickness of linings for pipe and fittings shall not be less than 1/16th inch for 3-inch through 12-inch diameter pipe, and 3/32nd inch for 14-inch through 24-inch diameter pipe.

Steel pipe and fittings shall be bituminous coated at the point of manufacture in accordance with AWWA C203, and cement mortar lined in accordance with AWWA C205.

All ductile iron pipe shall be marked in accordance with AWWA C151 and ductile iron fittings shall be marked in accordance with AWWA Cl 10. All steel pipe shall be marked in accordance with AWWA C200.

4.5.2 Push-On Pipe and Fittings

All push-on ductile iron pipe shall be manufactured in accordance with and meeting the latest requirements of AWWA C151 /A21.51. Pipe shall generally be designed for Type 1 laying conditions and 5-feet of cover, however, exceptional conditions may be indicated on the approved plans and specifications, and these shall take precedence.

Wall thickness of pipe shall be as specified under Section 4.5.5

All push-on ductile iron fittings shall be manufactured having a body thickness and radius of curvature conforming to and in accordance with the latest AWWA C 110 or AWWA C153/A21.53. Design of standard fittings, whether long or short pattern, shall be as directed, indicated, or noted on the approved drawings. Design of special push-on fittings shall conform to dimensions and details as directed, indicated, or noted on the approved drawings.

4.5.3 Flanged Ductile Iron Pipe and Fittings

All flanged ductile iron pipe shall be manufactured in accordance with and meeting the latest requirements of AWWA C151/A21.51.

Wall thickness of pipe shall be as specified under Section 4.5.5

All flanged ductile iron fittings shall be manufactured in accordance with the latest requirements of AWWA C l10, 250 PSI pressure class standard. Design of flanged ductile iron fittings shall be as directed, indicated, or noted on the approved drawings. In general, use flanged fittings with long radius elbows except where space limitations prohibit use of same. Design of special flanged fittings, including wall castings, shall conform to dimensions and details as directed, indicated, or noted on the approved drawings.

4.5.4 Mechanical Joint Ductile Iron Pipe and Fittings

All mechanical joint ductile iron pipe shall be manufactured in accordance with and meeting the latest requirements of AWWA C151/A21.51.

Wall thickness of pipe shall be as specified under Section 4.5.5

The mechanical joint herein specified for mechanical joint ductile iron pipe and fittings shall meet the requirements of AWWA C111/A21.11 except as modified under Section 15D.10.

4.5.5 Pipe Wall Thickness

Ductile iron pipe with push-on or mechanical joints shall have the following minimum wall thickness:

PIPE DIAMETER (IN.)	PIPE CLASS	MINIMUM WALL THICKNESS
4	51	0.26
6	50	0.25
8	50	0.27
10	50	0.29
12	50	0.29
16	50	0.29
24	50	0.34
		0.38

(NOTE: Where proposed pipe to be provided is "Pressure Class" rather than "Thickness Class", 350 PSI Class may be substituted for Class 50 ductile iron pipe through pipe diameter 12-inch, unless otherwise specified in the project design. "Pressure Class" pipe diameters greater than 12-inch shall be provided with a wall thickness greater than or equal to the standard specified minimum wall thickness of Class 50 ductile iron pipe unless otherwise specified in the project design.) All ductile iron pipe with flanged joints shall be a minimum Class 53.

4.5.6 Steel Pipe-Carrier

Steel Pipe-Carrier shall be plain end for use with mechanical couplings. Steel Pipe-Carrier Shall only be designed for use in special highway crossings, bridge/culvert crossings, or other special applications as determined by the City of Loganville, and only where specified on the approved drawings. The pipe shall be designed as to length, thickness, and Utilities Departmental according to the intended application. Pipe shall comply with AWWA C200 and shall be lined and coated in accordance with AWWA C203, subject to the approval of the City of Loganville. Mechanical couplings shall be Dresser Style No. 38, or approved equal. Coupling adapters shall be provided between steel pipe and pipe of other materials, and shall be Dresser sleeve type, or approved equal, as recommended by the adaptor manufacturer for the specific application. Harnessed joints shall be provided where indicated on the approved drawings and at all bends, and shall be carried for a sufficient number of pipe lengths to resist displacement of the pipe, and as approved by the City of Loganville. Additional anti-corrosion measures, as recommended or specified by the manufacturer, shall be provided at connectors, couplings, rollers, restraints, etc., as directed by the City of Loganville, or as indicated on the approved plans.

4.5.7 Steel Pipe - 2-Inch Galvanized

Where indicated on the approved design, 2-inch steel water mains and service connections shall be standard weight galvanized steel pipe with joint conforming to ASTM-A120. Fittings shall be galvanized malleable iron conforming to ASTM-A47, except that nipples shall be of the same material as the 2-inch pipe.

4.5.8 Flanges

Flanged ductile iron pipe twelve inches or less in length (spool pieces), shall have flanges cast solidly to the pipe barrel. Flanges on ductile iron pipe longer than twelve inches in length shall be screw type and attached to a threaded pipe section, and shall be factory fabricated. Pipe threads shall be of such length that, with flanges screwed home, the end of the pipe projects beyond the face of the flange. Flange and pipe to be faced to give a flush finish to the pipe and flange surface normal to the axis of the pipe. The flanges shall be of such design that flange neck completely covers the threaded portion of the pipe to protect same against corrosion. Flanges on ductile iron pipe and fittings are to be coated with coal tar pitch paint after machining.

Flanged ductile iron pipe and fittings to be faced and drilled in accordance with the latest requirements of AWWA C115/A21.15, Class 125, unless special drilling is specified, or required. Where cap bolts or studs are required, flanges shall be drilled and tapped accordingly.

Flanged bolt holes on each end of flanged ductile iron pipe and fittings shall accurately straddle the same horizontal and vertical center lines.

4.5.9 Push-On Joints

Push-on joints shall be made with gaskets suitably formed of high-quality vulcanized rubber, made to exact dimensions, and in the form of solid rings. Gaskets shall have a durometer hardness of approximately 65 on the large end that enters the bell fast, and approximately 85 on the other, smaller end. Composition of the rubber, its hardness, and other properties, and the design of the gasket recess shall be such that the joint is tight under all ranges from a vacuum up to a maximum rating of 350 pounds per square inch internal liquid pressure.

Sufficient lubricant shall be furnished with each order of pipe to provide a thin coating on both the gasket and the spigot-end of the pipe. Lubricant shall have no deleterious effect on the rubber gasket. Lubricant shall be of such consistency that it can be easily applied to the pipe in either hot or cold weather, and shall satisfactorily adhere to either wet or dry pipe. **ONLY LUBRICANT FURNISHED WITH THE PIPE BY THE PIPE MANUFACTURER SHALL BE USED.**

4.5.10 Flanged Joints

Form flanged joints with through, stud, or cap bolts, as required, of the size and length specified by the manufacturer to thoroughly make up the joint. Use only full face type, red rubber gaskets one-sixteenth inch thick, as manufactured by the U.S. Rubber Company, in all flanged joints.

Except as otherwise specified or noted, machine bolts, stud bolts, and cap bolts shall be made from alloy steel, complying with the requirements of ASTM Des. A193-64, Grade B7, and nuts shall be made from alloy steel, complying with the requirements of ASTM Des. A194-64, Grade 2 or 2H.

For bolts, nuts, and threads, conform to the latest requirements of the following ANSI Standards and ASTM Designations:

Semi-finished, hexagonal bolt heads and nuts, Heavy Series dimensions	ANSI B 18.2-60
Bolt threads after plating. Coarse Thread Series, Class 2A, and nut threads after plating. Coarse Thread Series, Class 2B	ANSI Bl. 1-60
Galvanizing (if used)	ASTM A153-61
Studs and nuts to be utilized underground or In contact with liquids - alloy steel. Grade B8	ASTM A193-64

Steel bolts and nuts shall be cadmium plated, Sherardized, or hot dip galvanized after the threads are cut. Threads shall be well fitting and sound after plating. Cadmium plating shall be 0.0003 to 0.0005 inches thick on the body, and 0.00015 inches thick on the threads. Connecting flanges shall be conformed to proper position and alignment without the use of external force to bring them properly together.

After each joint has been properly made, give steel bolts and nuts a phosphate type chemical wash and then paint with one coat of primer especially prepared for galvanized surfaces. After this pre-treatment has been completed, coat bolts and nuts as follows:

Give bolts and nuts that will be exposed or submerged in liquids two coats of primer as specified by The manufacturer. Paint all bolts and nuts that will be underground with two heavy coats of Koppers Bitumastic No. 50, or approved equal, coal tar pitch and paint.

4.5.11 Mechanical Joints

All mechanical joints on ductile pipe and fittings shall conform to the latest requirements of AWWA C111/A21.11 in all respects, except as otherwise specified or noted herein. Gaskets shall be of a rubber quality which is unaffected by liquids or gasses with which they will come in contact. Gland bolts shall be ductile iron.

All joints of mechanical joint ductile iron pipe and fittings shall be installed in accordance with the requirements of AWWA C600, Section 3.4, and also in accordance with the "Notes on Installation of Mechanical Joints", AWWA C111/A21.11, Appendix A. All bolts shall be tightened in alternating sequence to the recommended torque.

Whenever connections are made between mechanical joint pipe or fittings and pipe of other materials, the Contractor must use a transition gasket in the mechanical joint that is approved for said use by the City of Loganville Department of Utilities.

4.5.12 Protective Coating

After installation, the Contractor must paint all steel sleeves, tapping sleeves, threaded rods, straps, nuts, bolts, washers, couplings, or other connecting/restraining apparatus with either Roster Laboratories, Inc., "Roskote Mastic No. A-939", Koppers Company, Inc., "Bitumastic Superservice Black", or approved equivalent protective coating.

4.5.13 Storing of Materials

All tools, materials, machinery, and equipment required for the Work may be stored in a neatly, compactly stock-piled manner adjacent to the work site, in a location approved by the City of Loganville Utilities Department Director, and in such a manner as to cause the least inconvenience to the affected property owners, insure traffic safety, and so as not to endanger the general public in any way. All active, existing fire hydrants must be kept unobstructed and accessible at all times. All water and gas valves, and underground power and telephone manholes must also be left uncovered by such storing of materials.

4.5.14 Cutting of Pipe

Whenever the pipe requires cutting to fit into the line, or to fabricate joints, the work shall be done in such a manner as to leave a smooth end at right angles to the axis of the pipe.

4.5.15 Drilling and Tapping of Pipe

Where indicated on the approved design, or as required by the City of Loganville, the Contractor shall drill and tap the ductile iron pipe or fittings to receive a threaded pipe connection. Holes shall be drilled accurately, with respect to the size and location of the pipe to be received, and at right angles to the axis of the pipe or fittings. Tapping shall be carefully and neatly done by skilled workers using the appropriate tools.

4.5.16 Connections to Existing Lines

Connections to existing pipe lines shall generally be made by the use of tapping sleeves and valves, except as specifically indicated on *the* approved drawings to be otherwise, or as may be directed by City of Loganville Department of Utilities. In certain instances it may be specified or desirable to tap a "dry" line. In this circumstance a tapping sleeve and valve is required and the tap accomplished utilizing a standard "tapping machine". **Under no circumstances will the Contractor be permitted to "burn" a hole in the main using oxyacetylene tools.**

The closing of any existing mainline valves to isolate a particular pipe for a "wet cut-in" will be accomplished by the Contractor under the specific direction and presence of City of Loganville Utilities Department Inspector, and at such time as may be directed by the City of Loganville. All such shut downs must be approved in advance by the City of Loganville Director of Department of Utilities. The Contractor shall provide all labor and equipment sufficient to uncover valves and clean out valve boxes for access to any existing valves necessary to complete or repair work as part of the project. The City of Loganville Utilities Department will provide all records and information available to assist in the locating of covered valves, and will also provide assistance in the form of electronic locating equipment. This assistance shall not relieve the Contractor of his responsibility to locate any necessary valve to accomplish the Work.

THE CONTRACTOR WILL BE RESPONSIBLE FOR NOTIFYING ALL CUSTOMERS WHO WILL BE AFFECTED BY THE INTERRUPTION OF WATER SERVICE. SUCH NOTIFICATION MUST BE MADE AT LEAST 24 HOURS IN ADVANCE OF THE PLANNED SHUT-DOWN. NO SERVICE MAY BE INTERRUPTED WITHOUT CITY OF LOGANVILLE UTILITIES DEPARTMENTINSPECTOR'S PRIOR APPROVAL.

4.5.17 Built-in Pipe and Fittings

Where indicated on the approved drawings, specified, or as directed, pipe and fittings shall be carefully built in, connected to, or supported on concrete or brick masonry. In all instances such masonry work shall be performed so as to avoid covering or obstructing glands, bolts, nuts, retainers, etc., so that they cannot readily be operated after the masonry work has been completed.

4.5.18 Anchorage and Reaction Blocking

Where indicated on the approved drawings, specified, or as directed, plugs, caps, tees, tapping sleeves, offsets and bends deflecting 11-degrees or more, or other fittings or combination of fittings, shall be provided with concrete reaction blocking, metal thrust-restraint systems, or other methods of anchoring the fittings to provide the required pressure-system integrity. Such anchoring systems must be "individually" inspected by City of Loganville Utilities Department to ascertain their conformity and compliance with the specific type system required for each kind of installation which requires anchoring; size and shape as identified in Details A-18 through A-30. Concrete for reaction blocking shall be Class B as specified under Section 4.13.

4.5.19 Marking

All ductile iron pipes shall be marked in accordance with the requirements of Section 51-10, "Marking Pipe", of AWWA C151/A21.51. All ductile iron fittings shall be marked in accordance with the requirements of Section 10-9, “Marking of Fittings", of AWWA C110/A21.10.

When requested, the Contractor shall furnish City of Loganville Utilities Department with lists, in duplicate, of all pieces of pipe and fittings received on the project, including copies of shipping documents from the manufacturer and/or supplier. Said lists shall indicate the serial or mark number, weight, class, length, size, and description of each typical piece received.

4.5.20 Material Inspection

When requested, the Contractor shall furnish the City of Loganville with three (3) copies of the manufacturer's sworn affidavit of inspection and testing of all ductile iron pipe and fittings provided for the intended work. All ductile iron pipe and fittings will be subject to the inspection and approval of the City of Loganville Utilities Department after delivery of the material to the site. Broken, cracked, misshapen, imperfectly coated, unsatisfactory, or otherwise damaged ductile iron pipe or fittings are not permitted to be used in the work.

Such inspection by City of Loganville Utilities Department does not relieve the Contractor of full responsibility for the materials installed. FAILURE BY City of Loganville Utilities Department to REJECT UNACCEPTABLE MATERIALS SHALL NOT CONSTITUTE AN ACCEPTANCE OF SAID MATERIALS.

4.5.21 Unloading and Laying

Unload ductile iron pipe, fittings, and accessories from cars or trucks with hoists or by skidding. Do not skid or roll pipe handled on skidways against pipe already on the ground. Under no circumstances are said materials to be dropped off any delivery vehicle. Should any material be accidentally dropped, it shall be immediately set aside, and thoroughly inspected by the City of Loganville Utilities Department before any decision is made regarding its acceptability. If damage occurs to the lining, make repairs or replacement as directed by the City of Loganville Department of Utilities. If there is any question regarding acceptability of said suspect materials by the City of Loganville Department of Utilities, the contractor shall either remove and replace the questionable materials, or obtain a sworn statement from the manufacturer certifying the materials as "undamaged".

Use proper, suitable tools and appliances for the safe and convenient handling and laying of pipe and fittings. Take great care to prevent the coating and lining from being damaged.

Pipe may not be "strung" along the project within existing highway rights-of-way, unless specifically directed to do so by the City of Loganville Utilities Department, and only then after receiving permission from the road authority which has jurisdiction.

The Contractor shall carefully examine all pipe and fittings for defects just before laying and lay no pipe or fitting which is known to be defective. In the event that defective pipe or fittings are discovered after having been laid, the Contractor shall remove and replace with sound pipe or fittings in a manner satisfactory to the City of Loganville Department of Utilities.

It is the Contractor's responsibility to maintain a clean work site and clean materials throughout the project. All pipe and fittings shall be kept free from mud, dirt, and debris while stored on site, and shall be thoroughly cleaned before being laid. During any breaks in the laying of pipe, and when ending construction for the day, the Contractor shall install a mechanical or fitted plug in the open end of the pipe to prevent contamination of the pipeline. Should any accidental contamination occur, the pipe should be thoroughly cleaned and swabbed out, and inspected by the City of Loganville Department of Utilities, before new or further pipe installation may commence.

4.5.22 Clean-Up

A thorough clean-up of the entire project shall be made before final acceptance is given by the City of Loganville Department of Utilities. All excess rock, clearing debris, stumps and roots, pipe, fittings, and materials shall be removed from the site. All public rights-of-way and private property shall be restored in as good as or better than original condition, to the satisfaction of the City of Loganville Department of Utilities. In private developments, final plat approval or Certificates of Occupancy may be withheld until all clean-up is complete.

4.5.23 Guarantee of Work Completed

The Contractor (and Developer in private developments) shall guarantee for a period of twelve (12) months from the date of final acceptance (from date of final plat approval or Certificate of Occupancy in private developments), all water mains, appurtenances, trenches, roadway and surface restorations, landscaping, and any other areas disturbed by the construction of the project, to be free from defects, and to be installed in compliance with all regulations, specifications, plans, directions, and construction practices which govern said installations. In private developments, the conditions stated in the "Owner/Developer Agreement" shall govern.

The Contractor shall be responsible for repairs to any leaking pipe, fittings, etc. Should trenches settle during the warranty period, he shall promptly furnish and place fill to the original grade and restore any damaged landscaping. Should any leaks or trench settlement occur under new pavement, the Contractor will be held responsible for the cost of all repairs, including pavement replacement. The determination of the requirement for the Contractor to perform work under this guarantee shall be at the sole discretion of the City of Loganville Department of Utilities.

4.6 SERVICE LINE CONDUITS

The Contractor shall install service line conduits across all proposed roadways and where the drawings indicate, where rock is present, or in locations directed by the Project Inspector, for all future water connections. Conduits shall be 2-inch rigid P.V.C. "slip-joint" pipe. Conduits shall be installed with a minimum of 3-feet of cover and shall be capped at each end to prevent entry of debris. Where conduits are installed across roadways that shall be constructed using curb and gutter, the Contractor shall saw-cut a "W" in the curb immediately above the conduit location at the entry point and the point of exiting the conduit.

4.7 VALVES & WET CUT-INS

4.7.1 Work Included

The contractor shall furnish all the materials for, and shall properly set in place - at the locations indicated on the drawings or as directed - all gate valves, butterfly valves, tapping sleeves and valves, and other valve-type assemblies of the size and type specified or directed, which are necessary for the completion of the work, including all excavations required for their installation.

4.7.2 Wet Cut-ins

The contractor shall provide all labor and equipment necessary to make a cut-ins to an existing water main for the purpose of making a connection, installing a valve, fire hydrant assembly, or other fittings and appurtenances. A "wet cut-in" is defined to be the physical cutting into any existing water main which will result in the interruption of service to an existing customer, or which shall necessitate the removal of water contained within the existing main from the excavation which is caused by the cutting into the pipe.

4.7.3 Gate Valves

Gate valves shall conform to AWWA C500-86 for double-disc gate valves, or AWWA C509-87 for resilient-seated gate valves, and shall be as manufactured by American Flow Control, U.S. Pipe, Mueller, or approved equal.

Gate valves shall be hand operated, non-rising stem, with cast or ductile iron bodies, and adapted for joints as indicated in the approved design drawings, or as directed.

All gate valves shall open by turning the operating nut to the left (counter clockwise).

Gate valves shall only be used in sizes 2" through 10", (12" permitted if using resilient seated gate valves).

4.7.4 Butterfly Valves

Butterfly valves shall conform to the requirements of AWWA C504-87, and shall be as manufactured by American Flow Control, Henry Pratt, Allis-Chalmers, or approved equal.

Butterfly valves shall be hand operated with cast or ductile iron bodies, and adapted for joints as indicated in the approved design drawings, or as directed.
All butterfly valves shall open by turning the operating nut to the left (counter clockwise). Butterfly

valves shall only be used in sizes 12" and larger.

4.7.5 Resilient Seated Gate Valves

At the Contractor's option, 12" resilient seated gate valves conforming to AWWA C-509, may be substituted for 12" butterfly valves. The project Inspector shall be informed of the proposed substitution prior to installation.

4.7.6 Tapping Sleeves and Valves

The Contractor shall furnish and install tapping sleeves and valves suitable for connection to the existing water mains at locations indicated on the approved plans, or as directed. The Contractor shall also provide the tapping machine and competent supervision for the making of taps. It is the Contractor's responsibility to verify the type, size, and O.D. and class of the existing pipe before ordering the tapping sleeve and valve.

Prior to making the tap, the Contractor, in the presence of the Project Inspector, shall hydrostatically pressure test the complete tapping sleeve and valve installation at a test pressure of 150 PSI, or 50 PSI over *the* existing system static pressure, whichever is greater, **(PNEUMATIC, OR AIR-PRESSURE TESTING IS PROHIBITED).** The Contractor shall properly support the tapping sleeve and valve using bricks, blocks, wedges, or other substantial supporting materials, which will not permit the tapping valve or tapping machine to transfer any downward rotational force to the tapping sleeve. This support shall be provided before mounting the tapping machine.

Tapping sleeves shall be cast iron or ductile iron with mechanical joint ends as manufactured by American Flow Control, Mueller, or approved equal. Fabricated split steel tapping sleeves of the full-circle variety, as manufactured by Rockwell, JCM, or equal, may be used with the approval of City of Loganville Department of Utilities. When tapping an existing asbestos-concrete pipe, a stainless steel tapping sleeve, as manufactured by Ford, or approved equal, which contains a full gasketed surface within the sleeve body, is required due to variances in the manufactured O.D. of the asbestos-concrete pipe. Outlets shall be sized to permit a tap to be made using a full-size shell cutter. The existing pipe shall be thoroughly cleaned prior to the installation of the tapping sleeve. **THE USE OF STRAP-TYPE TAPPING SADDLES FOR TAPS LARGER THAN 2" IS NOT PERMITTED.**

Tapping valves shall conform to the requirements for gate valves hereinbefore stipulated, except for any modifications necessary to permit the use of full size shell cutters. If of the double-disc variety, tapping valves 16" and larger shall be installed in a horizontal configuration, and shall be supplied with a by-pass. Resilient seated tapping valves 16" and larger may be supplied without the by-pass. When using resilient seated gate valves for making taps 16" and larger, it is the Contractor's responsibility to determine the finished depth of cover that shall remain over the operating nut of the valve after installation. If finished depth of cover in a standard vertical configuration is less than 2-feet, then the tapping valve shall be supplied in a horizontal configuration with differential operator.

4.7.6.1 Backtaps

BACKTAPS SHALL NOT BE PERMITTED UNLESS **SPECIFICALLY AUTHORIZED BY DEPARTMENT OF UTILITIESED BY CITY OF LOGANVILLE DEPARTMENT OF UTILITIES.** ANY SAID AUTHORIZED DEPARTMENT OF UTILITIESED BACKTAPS SHALL BE CONSTRUCTED USING M.J. FITTINGS AND "MEGALUG" RETAINER GLANDS, AND SINGLE JOINTS OF PIPE. THREADED ROD SHALL ONLY BE PERMITTED FROM THE STEEL CASING TO THE FIRST FITTING, AND SHALL BE WELDED FOR A MINIMUM OF 8-INCHES ON EACH ROD ALONGSIDE THE CASING. **WELDING OF I-BOLTS DIRECTLY TO THE CASING FOR THE PURPOSE OF INSTALLING THREADED ROD IS NOT PERMITTED.**

4.7.7 Accessory Equipment

All valves which are to buried in the ground shall be provided with a valve box and cover. Where the depth of cover is more than 5-feet, the Contractor shall provide suitable, permanently installed valve stem extensions and guides which have been approved by City of Loganville Utilities Department prior to fabrication and placement.

METER S P E C I F I C A T I O N S

GENERAL

All cold water meters (displacement type - magnetic drive 5/8" - 2") will be an AMR meter furnished by a Neptune meter supplier and the meters shall be produced from an ISO 9001 manufacturing facility and conform to the "Standard Specifications for Cold Water Meters" C700, latest revision issued by AWWA or as otherwise stated.

TYPE

Only magnetic-driven, positive displacement meters of the flat nutating disc type will be accepted because of enhanced low flow accuracy performance.

SIZE, CAPACITY, LENGTH

The size, capacity, and meter lengths shall be as specified in AWWA Standard C700 (latest revision). The maximum number of disc nutations is not to exceed those specified in AWWA C700 latest revision.

All meter maincases shall be made of a no-lead high copper alloy containing a minimum of 85% copper that meets the ANSI/NSF 61 standard. The serial number should be stamped between the outlet port of the main case and the register. Main case markings shall be cast raised and shall indicate size, model, direction of flow, and NSF 61 certification. Plastic main cases are not acceptable.

Main cases for 5/8", 3/4" and 1" meters shall be of the removable bottom cap type with the bottom cap secured by four (4) bolts on 5/8" and 3/4" sizes and six (6) bolts on the 1" size. Intermediate meter main cases shall also be made of the same lead-free brass material in sizes 1-1/2" and 2" with a cover secured to the main case with eight (8) bolts. Meters with a frost plug, a screw-on design or no bottom cap shall not be accepted in 5/8"-1" sizes. The 5/8" meters shall have a synthetic polymer or cast iron bottom cap option.

All no-lead main cases shall be guaranteed free from manufacturing defects in workmanship and material for the life of the meter.

All meters must be adaptable to a field programmable absolute encoder register without interruption of the customer's service.

S P E C I F I C A T I O N S

It is the preference of the utility to obtain an advanced encoder-based remote metering system capable of providing electronically encoded meter information as described in the enclosed specification. Specifications for the required cold water meters.

DESCRIPTION - GENERAL

These specifications cover a self-contained solid state absolute encoder register metering system designed to obtain remote simultaneous water meter registration that is guaranteed to exactly match the registration on the register odometer. The metering information shall be obtained through a remotely located receptacle or Meter Interface Unit (MIU) using a compatible data capture system. The above system shall be configured as follows:

- Solid-state absolute encoder meter register — Direct mounting, electromagnetically encoded measuring element into an electronic solid-state odometer. Encoder shall provide value-added flow data including leak, tamper and back flow detection when connected to a compatible RF AMR MIU. Batteries and digital counters using volatile memory are not allowed. Encoder register shall display flow rate information at register.
- Remotely mounted receptacle or MIU providing a communication link for the transmission of information from the register.
- Data acquisition equipment with which the above components can be interrogated. Such equipment shall be configured
- in two types:
  - A device that captures information and displays it visually to confirm correct system installation and wiring.
  - A device that is pre-programmed with route information and is capable of storing collected data in solid-state memory. This device shall also electronically transfer the data for use by the utility billing computer.

ENCODER REGISTER UNIT

- **Registration**
  - The register shall provide at least a nine-digit visual registration at the meter.
  - The unit shall provide an 8-digit meter reading for transmission through the radio MIU.
  - The dial shall have a high resolution nine-digit LCD display for meter testing.
  - The register shall employ a visual LCD leak detection indicator as well as provide remote leak detection through an ASCII format to the RF AMR MIU.
  - Internal batteries shall not be allowed.
  - The manufacturer will guarantee that the reading obtained electronically matches the LCD odometer reading on the register and that the manufacturer will pay the difference at the current rate whenever a discrepancy appears.
  - The register should accumulate and register consumption without connecting to a receptacle or MIU.
  - The register shall display flow rate information.
- **Mechanical Construction**

The registers should be manufactured for pit set.

Pit Set

- The unit must be constructed in a roll-sealed copper shell and glass lens assembly.
- The register shall be attached to the meter case by a bayonet attachment. Fastening screws or nuts shall not be required. A tamper-proof seal pin shall be used to secure the register to the main case.
- The register shall be removable from the meter without disassembling the meter body and shall permit field installation and/or removal without taking the meter out of service.
- Provision shall be made in the register for the use of seal wires to further secure the register.
- Terminal connections must be permanently potted so that the terminal cover cannot be removed.

- **Electrical Construction**

- The solid-state absolute encoder register shall incorporate an Application Specific Integrated Circuit (ASIC) and firmware designed to verify accurate measurement, information transmission and data integrity.
- Connection shall be made to the register by three screw-type terminals sonically inserted into the register top. Access to the terminals shall be available to all models of register with the exception of a permanently potted version. A port cover shall be provided to cover the terminals after they have been wired.

- **Meter Reading Information**
  - The solid-state absolute encoder register shall provide to the reading equipment an eight-digit meter reading. An identification number of up to ten digits shall only be provided with each reading when read using a probed reading device.
  - The solid-state absolute encoder register shall provide additional value-added information remotely when connected to a radio MIU (i.e. detailed leak detection data, days of leak state, days of no consumption, and back flow indication). This information shall be communicated through the encoder protocol and RF MIU to the route management software to allow the seamless integration of data into a CIS package.

REMOTE RECEPTACLE

- **Mechanical Construction**
  - Where indicated, a remote receptacle must be provided for attachment to a pit meter lid with another unit also designed for attachment by wall mounting.
  - The materials employed shall be corrosion resistant, resistant to ultraviolet degradation, unaffected by rain or condensation, and compatible with rugged service and long life.
  - The pit receptacle shall be installed into the meter lid either using two screws provided by the utility or mounted in a single 1-3/4” hole while not extending more than 4.5” into the pit.
  - The pit-mounted receptacle shall be provided with a minimum length of six feet of wire connected and sealed at the receptacle without terminal exposure.
  - The remote receptacle shall not contain a battery unless it is a radio MIU.

BOLTS

All main case bolts shall be of 300 series non-magnetic stainless steel to prevent corrosion.

Corporation Stops

Corporation stops provide the connection for the service line to the main. By utilizing a corporation stop, a service can be connected to the main without taking the main out of service. Services shall be a minimum of eighteen inches (18") from all pipe joints, fittings and valves. Corporation stops are also used in air and vacuum valve and large butterfly valve installations. Corporation stops are made in standard sizes 3/4", 1", 1-1/4", 1-1/2" and 2". Tapered threads other than the inlet thread of corporation valves shall conform to ANSI/ASME B1.20.1. Two spiral wraps of three (3) mil PTFE (Teflon) tape shall be wrapped clockwise around the inlet threads on the closed corporation stops. Liquid sealants or other lubricants shall not be used.

The corporation stop shall be placed at 45 degrees from the top center of the water main.

The ¾” and 1” corporation stops shall be at least one foot from any other corporation stop. Corporation stops larger than 1” shall be at least five (5) feet from any other corporation stop.

The water main connection shall be made using a corporation stops such as shall Hays No. 5200, curb stops shall be Hays No. 5060, adapters shall be Hays No. 5600, No.5605, or No.5615 or

Mueller H-15000, Mueller H-15008 or Division of Water approved corporation stop. Double strap saddles, for the purpose of tapping the main shall be Dresser Style No. 91, or Smith-Blair Style No. 313, and shall be tapped for Mueller threads. Corporation stops shall not be installed on the top one-quarter of the water main and shall be located no closer than 24 inches to any other corporation stop, valve, bend, tee or joint.

Curb Stops

Curb stops are required all meters. Curb stops are set on the service line on the inlet side of the meter box provide a means to shut off the service line. Placement of the curb stop and meter box outside the front property line is preferred.

Curb stops shall not be installed under concrete or asphalt unless approved by the City Engineer and shall have a traffic approved curb box.

All curb stops must be located one foot from the edge of the proposed or existing sidewalk toward the curb, or 2 feet inside the right of way or easement line when no sidewalk is present or proposed.

All curb stops shall be installed with clockwise operation to turn-off service and counter-clockwise operation to provide service. The lug must be perpendicular to the property it serves when in the “on” position.

All curb stops shall be operated by a single quarter-turn.

. The curb stop shall be a minimum of 12” deep.

4.7.8 Valve Markers

Valve markers shall be furnished and installed with each valve on the proposed project, with the exception of fire hydrant branch valves. The markers shall be Class A concrete of D.O.T. specifications, 4" square by 5-feet long, and shall be of the same construction as that of highway right-of-way markers. The words "Water Valve" shall be cast vertically into the marker beginning 2" from the top of the marker. There shall also be a 1 1/4" brass plug cast into the marker 1" below the letter "E" of the word "Valve", which shall be stamped in the field by the Contractor, after installation, with the distance, in feet, from the valve marker to the valve box. The markers shall be installed as close to the right-of-way line opposite the valve as is possible, with the brass plug facing the valve. The marker shall be located so as to avoid damage by traffic. The top of the marker shall generally be set about 24" inches above finished grade. The marker may be somewhat lower in areas where it may be considered obtrusive, such as lawns, however, at no time shall the marker be installed at less than 18" above finished grade. (See also Article 4.8)

4.7.9 Installation and Placement

All valves shall be set accurately and carefully to the lines and grades given on the approved design, or as directed, and shall be joined to the pipe utilizing such approved joints as hereinbefore specified for ductile iron water mains.

Tapping sleeves and valves and insert valves shall be installed in accordance with the manufacturer's recommendation.

Valve boxes shall be centered plumb over the operating nut of the valve with the cover flush with the surface of the finished pavement, finished grade after landscaping, or as directed. The valve box shall not be in direct contact with the bonnet of the valve, and shall be supported in such a manner as not to transmit shock, stress, or load directly to the valve. A formed or pre-cast concrete collar shall be placed around the collar of the valve box as indicated in Detail A-8. **VALVE BOXES ARE TO BE OF THE ADJUSTABLE "SLIP-TYPE". SCREW ADJUSTING**

VALVE BOXES ARE NOT PERMITTED.

Where indicated on the approved design, or as directed, the Contractor shall provide concrete thrust collars, restrained joints, or other restraining mechanisms for valves 24" and larger to prohibit movement of the pipe when the valve is closed.

4.7.10 Testing

All valves shall be tested at the point of manufacture in accordance with the specific AWWA standard for that size and type of valve. After the valves have been set in place, the Contractor shall hydrostatically field-test each valve as part of the hydrostatic test of the main. Any valve not proved to be bubble-tight shall either be repaired to make it so, or be removed from the line and replaced. Valves repaired or replaced shall be re-tested for leakage prior to acceptance by City of Loganville Department of Utilities.

4.7.11 Shop Drawings

If directed, the Contractor shall provide the Director copies of all shop drawings or "cut sheets" for the proposed valves, prior to their installation.

4.7.12 Painting and Other Coatings

All valves, where not constructed of brass or bronze, or of finished steel, shall be coated at the point of manufacture in accordance with the AWWA Standard Specifications for Painting Ductile or Cast Iron Water Pipes and Fittings. Resilient seated gate valves shall only be provided with a bonded epoxy coating. Machined surfaces shall be given a suitable coating of grease or other protective material.

4.8 ELECTRONIC MARKERS

4.8.1 Required Installation

Water mains being constructed under contract with City of Loganville Department of Utilities, or being constructed as part of a "betterment" agreement with City shall comply with the requirements under this section. All installations wholly contained within a proposed development, and not part of any contract with City, shall be exempt from this requirement.

4.8.2 Specifications

The Contractor shall provide "Scotch Mark" Electronic Markers as manufactured by the 3M Company. Markers shall be tuned specifically for "WATER" utility use.

Mid-range markers (3M ^1257) shall be used to mark valves, appurtenances, casings, stub outs, or other facilities as indicated on the approved project design, or as directed by City of Loganville Department of Utilities, for depths of cover less than four (4) feet.

Full-range markers (3M ^1252) shall be used to mark valves, appurtenances, casings, stub outs, or other facilities as indicated on the approved project design, or as directed by City of Loganville Department of Utilities, for depths of cover greater than or equal to four (4) feet.

Markers shall be installed in accordance with the manufacturer's instructions or at the direction of City of Loganville Department of Utilities. At no time shall the marker be installed so as to allow direct contact between a metal surface and the marker. Markers for valves are to be installed exactly one (1) foot from center of the valve operator nut to center of the marker, to the north of the valve, and at a depth no greater than three (3) feet. (See Detail A-48)

Location and operability of all installed markers will be verified by City of Loganville Utilities Department using a 3M Marker-Locator probe after backfill and grading is complete, and prior to project acceptance. Any markers which are not locatable shall be replaced and tests re-run until successful results are obtained.

4.9 **FIRE HYDRANTS**

4.9.1 Work Included

The Contractor shall furnish and install at the locations indicated on the approved design, or as directed, all fire hydrants necessary or required for the proper completion of the work.

4.9.2 Fire Hydrant Specifications

Fire hydrants shall be manufactured in full compliance with the AWWA Standard for Dry-Barrel Fire Hydrants, AWWA C502-85, and as herein amended. **Only the following fire hydrants are approved for use by City of Loganville Department of Utilities:**
U.S. Metropolitan 250. East Jordon Iron Works

Type - Three-way, post type, dry top traffic model with compression main valve opening against and closing in the direction of normal water flow.

Size - Internal main valve diameter shall be a minimum of 41/2”.

Identification - Each hydrant shall have the name of the manufacturer, the year when made, and the nominal valve size in legible, raised letters cast on the barrel or bonnet.

Dry Top Bonnet - Each hydrant shall be constructed with a moisture-proof lubricant chamber which encloses the operating threads and which provides automatic lubrication of the threads and bearing surfaces each time the hydrant is operated. This assembly shall be comprised of a top "0" ring serving as a dirt and moisture barrier and a lower "0" ring which will serve as a pressure seal.

Operating Nut - The operating nut shall be of regular pentagon shape measuring 1” point to flat, (National Standard), and shall open by turning counter-clockwise.
Nozzle caps shall have the same cross-section as the operating nut, and shall come with heavy duty, non-kinking chains. Chains shall be securely affixed to the hydrant barrel and permit free turning of the nozzle caps.

Traffic Design - The hydrant barrel sections shall be connected at the ground line in a manner that will prevent damage to the hydrant when struck by a vehicle. The main valve rod sections shall be connected at the ground line by a frangible coupling. The stand pipe and ground line safety construction shall be such that the hydrant nozzles can be rotated to any desired position without disassembling or removing the top operating components and top section of

the hydrant standpipe.

Main Valve - The main valve shall be made of synthetic rubber and formed to fit the valve seat accurately.

Main Valve Seat - The main valve seat shall be of bronze and its assembly into the hydrant shall involve bronze to bronze thread engagement. Two "C" ring seals shall be provided as a positive pressure seal between the bronze seat ring and the shoe. The valve assembly pressure seals shall be obtained without the employment of torque compressed gaskets. The hydrants shall be designed to allow the removal of all operating parts through the hydrant barrel by means of a single disassembly wrench without excavating.

Drain - The drain mechanism shall be designed to operate automatically with the operation of the main valve and shall allow momentary flushing of the drain ports. A minimum of two internal and two external bronze lined drain ports shall be required in the main valve assembly to drain the hydrant barrel.

Inlet Connection - The cast iron inlet elbow shall have a 6" mechanical joint connection complete with accessories.

Extensions - Barrel extension sections shall be available in 6" increments complete with rod, extension coupling, and the necessary flanges, gaskets, and bolts so that extending the hydrant can be accomplished without excavating.

Nozzles - No lead will be allowed in nozzle construction as a component of the metallic content.

Testing - All fire hydrants shall be tested in strict accordance with AWWA C502-85 at the point of manufacture.

4.9.3 Installing Fire Hydrants

Hydrants shall be installed at the locations indicated on the approved design in a manner to provide complete accessibility, and so that the possibility of damage from vehicles or injury to pedestrians will be minimized. The Contractor shall install the proper "bury" fire hydrant or shall use the proper length extensions to insure that each fire hydrant is installed with the frangible couplings at the proper elevation above finished grade in accordance with the manufacturer’s recommendations, (See Detail A31 /A32). Place gravel around the "weep" holes and base of hydrant as shown. **All pipe connecting the fire hydrant to the main line shall be ductile iron.**

The connection of the hydrant to the supply main must be through either a ductile iron tee or a tapping sleeve and shall include an outlet valve at the point of connection. In certain instances where long-side fire hydrants are specified, an additional branch valve may be required adjacent to the hydrant. If approved in advance, lengths of ductile iron pipe containing factory fabricated mechanical joint bosses may be utilized for fire hydrant connection to the main line, however, such approval will not be justification to install hydrants at locations other than as designed because the bosses do not fall within the original design location, unless otherwise approved by City of Loganville Department of Utilities.

4.9.4 Painting, Coating, and Lubricating

All iron parts of the hydrant inside and outside shall be thoroughly cleaned and all surfaces below the ground line shall be factory-coated or painted with an asphalt or bituminous base paint or coating.

The outside of the hydrant above the ground line shall be thoroughly cleaned and painted in the factory with two coats of Koppers Primer 621, or approved equal. After installation, each hydrant shall be painted with two field coats of **silver** Glamortex Enamel as manufactured by the Inertol Company, or approved equal.

All bronze, threaded and contact moving parts shall be lubricated during shop assembly, and protected by a coating of rust proof compound to prevent damage in shipment and storage.

4.10 RELOCATION AND RE-CONNECTION OF EXISTING HYDRANTS, VALVES, AND LARGE METERS

4.10.1 Work Included

The Contractor shall, where required, disconnect, relocate and reconnect existing hydrants, valves, and large meters. The work shall be done in accordance with the following items:

Reconnecting and/or relocating existing hydrants, shall include disconnection from existing mains, plugging and blocking openings in the mains, and reconnecting to the new mains in accordance with installation instructions identified elsewhere in these specifications.

Salvaging hydrants and valves shall include transporting and delivering such hydrants and valves for salvage to locations designated by City of Loganville Department of Utilities.

Relocating existing 3" and larger water meters and double-check backflow preventers shall include removal of the existing metering or backflow prevention device and vault, and reinstallation of these items to locations identified on the approved design. If construction phasing requires such, existing devices and vaults shall be carefully removed and stored, and properly reinstalled in the work where indicated or required.

If a wet cut-in is required for the relocation, the Contractor shall request City of Loganville Utilities Department Inspector to perform a "trial shutdown" to verify that an existing line is actually shutdown before the work is permitted to take place. **All shutdowns which affect any existing customer service must be authorized and coordinated by the City of Loganville Director of Department of Utilities.**

4.10.2 Existing Materials and Appurtenances

Existing valves and hydrants which, in the opinion of City of Loganville Department of Utilities, are suitable for re-use shall be thoroughly cleaned and, if necessary, shall have their internal parts reworked, and shall be properly placed in the work where indicated or required. Outlets on hydrants shall be re-oriented, if necessary.

The Contractor shall perform the disconnecting, relocating, and reconnecting carefully so as to avoid damaging the materials or appurtenances. Materials or appurtenances damaged in the course of performing the relocation or re-connection shall be replaced or repaired by the Contractor at his own expense and to the satisfaction of City of Loganville Department of Utilities.

4.11 HOUSE SERVICE CONNECTIONS

4.11.1 Work Included

The Contractor shall furnish all materials, and equipment for the proper installation of new services, relocation or replacement of all water house service connections, service lines, water meters and meter boxes and lids which are indicated to be so addressed on the approved design, or as directed by City of Loganville Department of Utilities. If in the process of conducting the work, the Contractor determines that additional house services or connections will be affected by the proposed design, or discovers house services which were hereto previously unknown, the Contractor shall immediately notify City of Loganville Utilities Department Director for direction concerning the services. New service connections to water mains shall be made in accordance with

the approved design, or if, in the opinion of City of Loganville Department of Utilities, such are necessary for establishing proper service to the customer. Service lines shall be of the same type material from beginning to end, unless the appropriate insulator is installed at the junctions of dissimilar metals and unless approved by the City of Loganville Water Division. All service lines must be the same size as, or smaller than, the tap. No service line shall be connected to the tap until the main line has been chlorinated.

Contractor will install meter boxes and curb stops. The curb stop shall be placed inside the front of the meter box to allow proper connection of the meter and allow access to properly operate the curb stop during installation of meter. Meter boxes will be flush to the finish grade of development and have silt fence placed around meter box to prevent any future disturbances or damage. Once Meter boxes have been properly installed and inspected, Meters and backflows shall be installed by the City of Loganville Water Department in a horizontal position and housed in a meter box or vault. Water meters shall be placed on property lines opposite from sewer connections. All driveways must be a minimum of 3 ft. from property line when in Right-way easements) No taps or service lines will allowed to be under concrete or asphalt of driveways. Each service shall end at the curb-line, and shall terminate in an approved curb-stop, located within a standard meter box. Must show all location of stubs on plans. Meter boxes must be set 11 ft. from backside of the curb. Curb stop valves installed at backside of the meter box. ***(Note: When request for meter sets to be performed, if site or meter boxes are not ready for Installation City of Loganville Water Department will not be permitted to set meter until corrections are made. There will be a 30.00 site connection fee for each additional request for meter sets.***

Prior to backfilling the ditch, the service line must be inspected and approved by the City of Loganville Division of Water. This ditch inspection is required before a meter will be installed at the property.

The Contractor shall make all relocations of existing house services from existing mains to water mains constructed as part of the approved project, as indicated on the approved design, or as directed by City of Loganville Department of Utilities, whether or not the existing mains are to be abandoned as part of the project. When the existing mains are to remain in service, or when directed, the Contractor shall abandon all portions of the existing service by excavating the service connection at the existing main and closing the corporation stop for each service to be abandoned.

The Contractor shall make all pavement and sidewalk cuts, excavation, sheeting, shoring, boring, backfilling, sidewalk and pavement repairs, and landscaping and re-grassing/reseeding required for the installation of house service connections. This includes any disturbed areas associated with long-side services on both sides of roadways. Said work is to be accomplished as specified elsewhere in these Standards.

4.11.2 Special Attention

All Domestic water service lines and Fire lines are required to have separate connections to the water main. This requirement may be waived at the discretion of the Fire Marshal or the Director of Public Utilities.

All temporary relocations or replacements of house service connections necessary to prosecute the work shall be made at the Contractors expense. Any replacements made necessary due to negligent or careless operations by the Contractor shall be accomplished immediately if customer service is affected, shall be of first class workmanship, and shall be completed using only approved materials, as indicated elsewhere in these Standards, or as directed.

NOTE: HOUSE SERVICE CONNECTIONS SHALL NOT BE CONNECTED TO NEW MAINS UNTIL SUCH MAINS HAVE BEEN STERILIDEPARTMENT OF UTILITIESED AND A "PASSED" BACTERIOLOGICAL SAMPLE HAS BEEN OBTAINED, AS PROVIDED IN SECTION 4.16 OF THESE SPECIFICATIONS.

4.11.3 Specific Replacement Conditions

Where indicated on the approved design, or when directed, connection, relocation, or replacement of an existing water service shall comply with the following:

If existing service line is 1" or less, and either galvanized, polyethylene, or

polybutylene pipe, which is greater than 10 years old or which shows evidence of significant corrosion internally or externally, the entire service line from the main to the meter shall be replaced.

If existing service line is 1 1/2” or 2" and is either galvanized pipe which is greater than 10years old or which shows evidence of significant corrosion internally or externally, or is PVC or polyethylene pipe, the entire service line from the main to the meter shall be replaced.

411.4 New Service Installations in Residential Cul-de-sacs:

Where indicated on the approved design, the Contractor shall install live 1-inch services within residential cul-de-sacs. Services shall be installed to all lots within the cul-de-sac not immediately adjacent to the water main out from under paved surfaces. The water main shall end at the neck of the cul-de-sac with a fire hydrant and a 2” main connected with valve ran around the perimeter of the cul-de-sac to allow each lot in cul-de-sac to have separate live service. At the end of the 2” main a blow off provided for flushing.

Live 1-inch services shall be installed at the property lines and opposite from the property line from the sewer stub-out to avoid conflict with driveway construction (All driveways must be 3 ft. from property line when in Right-way easements) No service will allowed to be under concrete or asphalt of driveways. Each service shall end at the curb-line, and shall terminate in an approved curb-stop, located within a standard meter box.

After installation, the Contractor shall mark the location of the live services, by saw-cutting a **"W"** in the curb adjacent to each service.

Live services shall have all corporation stops fully open at the time of pressure testing the main to insure integrity of the service. The project Inspector will confirm by turning on each curb-stop during the pressure test.

4.11.5 Materials

Service Lines

The service line consists of all pipe, valves, and fittings between the control boxes (curb box), through the meter and ending at the customer’s plumbing.

The following are the specifications for service lines:

PE 3408/**3608 IDR** - ***POTABLE WATER PIPE – BLACK***
SPECIFICATIONS:
PE 3408/**3608** Resin listed in PPI TR4
1600 psi Hydrostatic Design Basis
` 800 psi Hydrostatic Design Stress/ PE 3408/3608 utilizes .5 design factor
NSF Standard 14 and Standard 61- AWWA C901, ASTM D 2239
Cell Classification per ASTM D3350 = 345464C
Pressure Ratings:
All pressure ratings are a maximum PSI @ 73.4ºF.
If temperatures exceed 80ºF, contact Charter Plastics for a working pressure de-rating.
Joining:
Charter Plastics Black IDR pipe is made to ASTM D2239 Standards for inside diameter controlled pipe. It should be joined with barbed insert fittings and clamps. Double clamping is Recommended on 1-1/2” and 2” pipe in all pressures and on all sizes of 200 and 250 psi. You may also use special OD Compression fittings that are designed for ASTM D2239 pipe Sizes. Charter recommends roughing the end of the pipe with sandpaper prior to sliding on the Fitting.

Service lines shall be of the size that is adequate to supply the requirements of the property being served. The minimum size line shall be three-fourths inch (3/4").

For all 2” and smaller service lines, the line material from the corporation stop to the meter shall be Division of Water approved ultra-high molecular weight polyethylene tubing. Fittings shall be high quality copper brass with approved compression type joints.

For all service lines 4” and larger, Division of Water approved ductile iron must be used from the tapping valve to the meter. All ductile iron service pipes shall have City Of Loganville Division of Water-approved mechanical or push-on type joints.

Properties where underground vessels are being used or have been used for the storage of petroleum or other health hazard materials **MUST** use Division of Water approved soft copper tubing. In addition, any property within 50 feet of a property with such underground vessels must also use approved soft copper tubing for the water service line.

All service lines must be installed 12 to 24 inches below grade. The service line may be placed deeper than 24 inches to allow for surface grading after installation. **All Service lines must have tracing wire from the main to the foundation of the development.**

If the service line cannot be buried to the required depth due to underlying rock or man-made structures or utilities, the service line must be wrapped with insulating tubing such as Armor flex.

Polyethylene service lines (3/4” to 2”) for slab, crawl space and bi-level structures must be placed under the footer and sleeved.

Service lines shall be of the same type material from beginning to end, unless the appropriate insulator is installed at the junctions of dissimilar metals and unless approved by the City of Loganville Water Division.

All service lines must be the same size as, or smaller than, the tap.

No service line shall be connected to the tap until the main line has been chlorinated

Prior to backfilling the ditch, the service line must be inspected and approved by the City of Loganville Division of Water. This ditch inspection is required before a meter will be installed at the property

Appurtenance such as corporation stops, curb stops, adapters for copper and galvanized steel service lines shall meet the requirements of ASTM Designation B-62 for bronze construction, and AWWA C-800 for threads. Adapters shall be furnished as required for connecting copper and galvanized steel pipe. Corporation stops shall be Hays No. 5200, curb stops shall be Hays No. 5060, adapters shall be Hays No. 5600, No.5605, or No.5615. Double strap saddles, for the purpose of tapping the main shall be Dresser Style No. 91, or Smith-Blair Style No. 313, and shall be tapped for Mueller threads.

NOTE: THE USE OF SOLDERED JOINTS OR FLARE-JOINTS FOR COPPER PIPE AND FITTINGS IS PROHIBITED.

4.11.6 Meter Back Flow Check Valves

Backflow or cross-connection control is intended to prevent the contamination or pollution of the public and Consumer’s potable water system. Back Flow Check valves are required on all meters where any condition might exist that could cause a flow of water from the property to the main.

Cross-connection control devices allow for the protection of the public water supply by isolating within the consumer’s water system any contaminants or pollution which could backflow through the service connection.

Cross-Connection Prohibited

No water service connection shall be installed or maintained to any property where actual or potential cross-connections to the public potable or consumer's water system may exist unless such actual or potential cross-connections are abated or controlled to the satisfaction of the Division of Water Administrator.

No connection shall be installed or maintained whereby water from an auxiliary water system may enter the public Potable or consumer's water system unless the Division of Water Administrator approves such auxiliary water system and the method of connection.

There shall be no arrangement or connection by which an unsafe substance may enter the public water supply.

VIOLATIONS

Non-compliance with any of the backflow prevention requirements may result in certain penalties including discontinuation or denial of water service until the consumer has eliminated the actual or potential risk of cross-connection to the satisfaction of the City of Loganville Department of Public Utilities.

4.11.7 Meter Settings

Contractor will install meter boxes and curb stops. The curb stop shall be placed inside the front of the meter box to allow proper connection of the meter and allow access to properly operate the curb stop during installation of meter. Meter boxes will be flush to the finish grade of development and have silt fence placed around meter box to prevent any future disturbances or damage. Once Meter boxes have been properly installed and inspected, Meters and backflows shall be installed by the City of Loganville Water Department in a horizontal position and housed in a meter box or vault. ***(Note: When request for meter sets to be performed, If site or meter boxes are not ready for installation City of Loganville Water Department will not be permitted to set meter until corrections are made. There will be a 30.00 site connection fee for each additional request for meter sets.)*** The installation of the water meter shall conform to the following unless otherwise approved by the Director of Department of Utilities:

All meters not installed within the right-of way will require an easement dedication ten feet wide and extending three feet (3') behind the meter.

The meter shall be installed in a meter box, pit, or vault which will allow free and easy access and adequate room for installation, inspection and maintenance and will provide protection from freezing.

All meter boxes, pits or vaults shall have a 1-3/4" round opening to allow for the antenna to attach properly to the meter.

All fittings shall be brass or copper. A pressure regulator (Watts 25 AUB or equivalent) shall be installed on all services before the meter is installed.

4.12 JACKED CASING

4.12.1 Work Included

The Contractor shall furnish all material, labor, tools, and equipment necessary for the complete installation of a jacked steel casing, free-bore, or installation of steel casing by open-cut method, as may be indicated on the approved plans, or as directed by City of Loganville Department of Utilities, including, but not limited to bore pit excavation, sheeting, shoring, plating, and safety barriers for the protection of workers, traffic, and general public. In general, the work shall include steel pipe casing, excavation, backfill, restoration of site, sheeting, grout, brickwork, earth augers, jacking machine, welder, and other accessories necessary for a complete installation as specified or directed.

The Contractor shall be fully responsible for protecting against surface subsidence, damage or disturbance to adjacent property and facilities from his construction methods. If loose material is encountered and cave-ins occur or are anticipated, all jacking/auguring will be suspended, shoring provided, and all voids filled or pressure grouted. Supplemental measures and alternative methods must receive City of Loganville Utilities Department approval before jacking/augering operation re-commences. Any settlement or upheaval of the existing roadway pavements during the jacking and boring operation, and throughout the warranty period for the overall project, shall be repaired/restored by the Contractor immediately upon notification by the City of Loganville of the pavement failure.

All jacking/auguring operations must be performed in compliance with the rules and regulations of the City, State of Georgia Department of Transportation, or other authorities having jurisdiction.
Any sheeting placed for the jacking/auguring operation must be completely removed by the Contractor prior to backfill.

4.12.2 Maintaining Traffic and Public Safety

All working operations of the Contractor, his subcontractors, and/or their agents or employees must be subordinated to the free and unobstructed use of the highways, and structures encountered in the prosecution of jacking and boring operations.

The Contractor shall proceed with the work in such a manner as will permit regular transaction of business by commercial operations adjacent to the project site without delay or danger to persons or property, permit free access to and from private residences, and will allow the safe flow of traffic and pedestrians around the work site. The contractor shall employ the use of barricades, barriers, warning signs, signals, lights, and if necessary, watchmen, for the protection of the general public. The Contractor, when directed by the City of Loganville, shall suspend all operations relating to jacking and boring until necessary safety precautions have been met.

The Contractor shall submit for approval, when requested by the City of Loganville and/or highway Departments, all working drawings and schedules of procedure proposed to be followed in the prosecution of jacking and boring operations.

Working drawings shall show in detail the size and location of bore pits, together with all sheeting and shoring to be used in supporting embankments and trench walls, and all other structural details together with large scale plan and profile of the proposed jack and bore installation. Drawings shall also indicate the location and proximity of any adjacent structures or underground utilities which could be affected by the operation.

Schedules shall set forth the sequence of the various operations together with the time proposed to begin and complete the phases of the work.

The Contractor shall not proceed with any portion of the jack and boring operation until he has received approval of the Drawings and Schedule by the City of Loganville and/or highway Departments.

4.12.4 Jacked Casing

The Contractor shall jack a steel casing pipe as indicated on the approved design, using a special earth auger machine. The wall thickness of the steel pipe shall be a minimum .375 (%) inch, with the pipe having sufficient strength to withstand superimposed loads and jacking stresses. The casing shall be jacked to the line and grade indicated on the approved design.

Each joint of the casing pipe shall be fully welded around its entire circumference to the adjacent joint prior to being jacked.

Following completion of the jacking operations, the water pipe shall be inserted within the casing and its invert supported by wood skids as indicated in Detail A-34. Pre-fabricated casing spacers are acceptable in lieu of wooden skids, pending pre-installation approval by City of Loganville Department of Utilities. The ends of the casing shall be sealed with brick bulkheads using brick and mortar.

4.12.5 Free-Bore

Where permitted or directed by the City of Loganville, the Contractor shall use a special earth auger machine to bore a hole to the line and grade as indicated on the approved design. Said hole shall be of a constant diameter, which shall not exceed more than four inches the bell diameter of the proposed carrier pipe to be inserted in the borehole. If the annular space between the earthen hole and the carrier pipe exceeds six inches, then the Contractor shall fill such space either by pressure grouting or pumping in a flow able fill to eliminate possible settlement.

At no time will free-bores in excess of forty (40) feet be permitted.

4.12.6 Steel Casing (Open-Cut Installation)

Where permitted or directed by the City of Loganville, the Contractor shall place the steel casing directly in an open cut ditch for subsequent installation of a carrier pipe after backfill. Except for the method of installation, all requirements of Section 4.12.4 relating to steel casing specification shall apply. Ditch preparation, backfill, and compaction shall be as required for direct-bury ductile iron pipe.

4.13 CONCRETE

4.13.1 Work Included

The Contractor shall famish all materials for, and shall place all concrete masonry in the structures indicated on the approved design, and other such concrete masonry as may be found necessary for completion of the work.

There shall be two classes of concrete; Class A for foundation, cast-in-place manhole and vault sections, brace and thrust blocking, concrete pipe cradles, footings, and steel reinforcement structures; and Class B for concrete encasement and concrete fill. The Contractor shall provide concrete which on tests in standard cylinders shall have a compressive strength of not less than three thousand (3,000) pounds per square inch in twenty-eight days for Class A; and not less than two thousand (2,000) pounds per square inch in twenty eight days for Class B concrete.

Slump shall range from three to five inches for Class A concrete, and four to six inches for Class B concrete; except that where vibration equipment is used slump shall not exceed three inches.

The Contractor shall provide a standard cone of metal for making slump tests, and a supply of suitable containers for making standard six inch by twelve inch cylinders for testing the compressive strength of the concrete.

No admixtures will be permitted unless specifically approved by the City of Loganville Utilities Department Director prior to placement.

4.13.2 Placement

Provision shall be made by the Contractor for transporting the concrete rapidly from the place of mixing to the work, and with as little jiggling as possible so that the tendency of the water to rise to the top may be reduced to a minimum. The concrete shall be placed before it has had time to obtain its initial set, and under no circumstances shall it be re-tempered and used in the work.

4.13.3 Placement in Water Prohibited

Concrete shall not be laid in water, nor shall water be allowed to rise on or flow over freshly placed concrete until the concrete has set for at least twenty-four hours.

4.13.4 Freezing and Inclement Weather

Concrete placed in cold weather shall be heated with an approved device to a temperature that will permit it to be transported by standard conveyance on the work site and placed in the forms at a temperature of not less than fifty degrees Fahrenheit.

4.14 LUMBER LEFT IN PLACE

4.14.1 Work Included

When in the opinion of City of Loganville Department of Utilities, proper protection and support of the pipe or structures may be adversely affected by the continuation of the work, the Contractor may be ordered to leave in place such sheeting, sheet piling, bracing, and shoring as may be considered necessary to provide the proper protection.

Where sheeting and bracing is left in place in accordance with the orders of the City of Loganville, all projecting planks shall be cut off two feet below the surface of the ground. If so ordered, the upper portion of the lower set of sheeting shall be cut off so as to permit the complete filling in of the space below the timbers of the upper set of sheeting.

4.15 BACKFILLING

4.15.1 Backfilling Structures

Backfilling of structures shall proceed as various structures or parts of structures are completed. The Contractor shall refill the space outside and around the wall with material excavated from the site and stored for this purpose. Immediately adjacent to the structure, the backfill material shall be placed in twelve inch layers and compacted to avoid future settlement. This filling shall be carried to such height as will bring the finished grade to the required elevations.

4.15.2 Trenches

Backfill in trenches where pipe has been laid shall be placed continuously by hand in layers not exceeding six inches in thickness and carefully and thoroughly consolidated by tamping simultaneously on both sides of the pipe to a height of twelve inches above the top of the pipe. This backfilling and compacting must be done promptly and before any

Backfill material is deposited directly from a machine bucket, loaders, trucks, or other mechanical equipment. Once utilizing a machine bucket for backfilling, the bucket must be lowered into the trench to deposit the material in such a manner as to avoid the shock of falling earth which could injure or damage the pipe or structure. Under no circumstances should the material be allowed to fall from the machine or loader bucket directly onto the pipe or conduit in the trench.

Except as otherwise ordered by the City of Loganville, all forms, bracing, and lumber shall be removed from the trench before backfilling.

Bottoms of trenches in earth must be shaped or molded and compacted to the contour of the outside of the pipe, using bedding materials, as directed, or where indicated on the approved design, to give full support to the lower segment of the pipe. This shall be done in such a manner as to prevent any subsequent settlement of the pipe. Boulders or loose rock which might bear against the pipe will not be permitted in the trench bottom, or in the backfill within two feet above the top of the pipe. Bottoms of excavations which are of loose granular soils

shall be compacted by vibratory compactor prior to laying of pipe.

Where foundation conditions are such that proper bedding cannot be provided, such as in quicksand, the Contractor may be directed by the City of Loganville to provide foundation cushion, concrete cradles, or other special provisions as may be required for the proper support of the pipe.

Only after the backfill has been placed and hand-compacted to at least twelve inches above the top of the pipe, may the work proceed in the placement of the remaining backfill material, which must be carefully placed and compacted. In streets, other surfaced areas, or where directed, the backfill shall be placed and compacted in lifts not to exceed twelve inches in thickness. All precautions must be taken to avoid having any unincorporated material which may result in future settlement in these areas. Compaction shall be accomplished by approved mechanical tampers. The number of men tamping shall at no time be less than the number of men backfilling, and if necessary, additional men shall be kept in the trench to spread the material.

Material shall be compacted to a density of not less than 95 % as determined by a modified proctor ASTM Des. D1557-70. When directed, the Contractor shall arrange to have such compaction tests conducted by an independent testing firm; the number and locations to be determined by the City of Loganville.

Materials used for backfilling shall be free from all perishable organics or other objectionable materials, and shall contain no stones larger than twelve inches in its longest dimension.

No clay backfill shall be used in pipe trenches under roadways or other paved areas. In such paved areas where clay is encountered, trenches shall be backfilled with run-of-the-bank gravel.

If, in the opinion of the City of Loganville, the original excavated material is unsuitable for use as backfill, such as perishable matter, refuse, building materials, wire, brush, stumps, ashes, large stones, muck, or other soft materials, the Contractor shall properly dispose of the objectionable materials, and shall furnish, haul, and place borrow material suitable for proper backfill.

Backfilling shall not be done in freezing weather, except by permission of the City of Loganville, and shall not be done using frozen materials or upon frozen materials.

All backfilling shall be left with smooth, even surfaces, properly graded, and shall be maintained in such condition until final completion and acceptance of the work, notwithstanding applicable warranty periods. Where directed by the City of Loganville, the Contractor shall mound the backfill slightly above the adjacent ground to allow for settlement.

4.15.3 Embankment over Pipes

Where indicated on the approved design, or where authorized by City of Loganville Department of Utilities, for the crown of the pipe to come close to or extend above the surface of the ground, the Contractor shall cover and protect the pipe by an embankment. This embankment shall be at least three feet deep over the top of the pipe, at least four feet wide at the top, and with side slopes not less than 1 horizontal to 1 vertical extending to the surface of the undisturbed ground. Provisions shall be made to allow for surface drainage.

The materials of which embankments are to be constructed shall be the same as those permitted for backfill, and shall be free from objectionable materials as defined in Section 4.15.2. The earth shall be placed in layers not exceeding twelve inches in thickness, which shall be compacted by hand tamping, or by other methods approved or directed by the City of Loganville. The embankments shall not be built during freezing weather or with frozen materials. The surface shall be brought to the true lines and grades as indicated on the approved design, or as directed, and shall be raked smooth and left free from rubble, stones, dirt clods, or gravel. Placing of fill or embankment over and around structures shall be done evenly on all sides to avoid unbalanced loading or overturning action.

4.15.3.1 Concrete Protection Cap

Where indicated on the approved design, or where authorized by the City of Loganville, to permit less than three feet of cover over the top of the pipe, the Contractor shall construct a concrete cap over the top of the pipe for protection of the pipe for the entire length where the pipe has less than the minimum cover. The concrete cap shall be Class B concrete, a minimum of four feet wide, four inches thick, and shall be placed no less than one foot above the top of the pipe, but should not extend above the ground at any point. At no time shall a concrete cap be utilized as a substitution for an embankment as required under Section 4.15.3.

4.15.4 Erosion Control

The Contractor shall fully comply with the applicable requirements of local. State, and Federal agencies in the control and containment of soil erosion. The Contractor shall install/construct all necessary measures or devices in accordance with Best Management Practices, as may be indicated on the approved design, as may be directed by City of Loganville Department of Utilities, or as directed by other agencies having jurisdiction, to control and contain all soil erosion within the construction limits, with no exception. Necessary measures and devices may include, but not limited to, reinforced silt fencing, hay bales, and/or rock check dams. Such measures shall be maintained by the Contractor until such time as a satisfactory vegetative cover is established, and final acceptance of the work is obtained from the City of Loganville Water Quality Control, notwithstanding any required warranty period. The Contractor shall be held fully responsible and liable for any damages and/or penalties arising out of his failure to install or maintain an adequate soil erosion control program at all times during the project.

4.15.5 Disposal of Material

The Contractor will be required to remove from the site of the work all earth in excess of that required to backfill the excavation or to create necessary fill. This shall be done immediately after the backfill is completed to the satisfaction of City of Loganville Department of Utilities. All material removed shall become the property of the Contractor, and he shall make his own arrangements for its disposition, subject to the City of Loganville's approval. All surplus material, shot rock, organics, clearing debris, stumps, and other such material as City of Loganville Utilities Department may deem unfit for use as backfill, shall be disposed of by the Contractor, and shall be done in such manner so as to give a minimum of inconvenience to the public.

Any material which may spill or drip from the vehicles while being transported on public streets, drives, or other paved surfaces, shall be immediately removed by the Contractor and those surfaces cleaned to the satisfaction of City of Loganville Utilities Department.

4.15.6 Borrow

When acceptable excess material is not available from other parts of the Project for backfill, required fills, embankments, etc., the Contractor shall obtain the necessary "borrow" material at locations off the site of the work from locations approved by the City of Loganville. Locating such acceptable "borrow" sites shall be the sole responsibility of the Contractor.

All materials to be used as borrow shall be approved by the City of Loganville. Borrow material for backfilling trenches under roadways or other paved areas shall be run-of-the-bank gravel reasonably free from loam or other foreign material.

4.16 INSPECTIONS, TESTING & DISINFECTION

All taps, meter sets, and inspections must be scheduled during regular working hours a minimum of Two working days (forty-eight [48] hours) in advance. All taps inspections, meter sets must be scheduled by calling 770-466-1306 or 770-466-0911. All final inspections must be scheduled by calling 770-466-1306. All installations by Contractors must meet these STANDARDS AND SPECIFICATIONS.

Unnecessary recall inspections or meter installations are subject to a $30.00 assessment

4.16.1 Testing

Pipes, fittings, and appurtenances shall be laid in such a manner as to leave joints watertight. After the pipe is laid, each section, as may be determined or defined by City of Loganville Department of Utilities, shall be properly and adequately flushed, all air removed, and then tested under a hydrostatic pressure of 150 PSI as measured at the lowest elevation of the test section. Where static pressure exceeds 100 PSI, the test pressure, as measured at the lowest elevation of the test section shall equal to the static pressure plus 50 PSI. If elevation differentials, within a test section, vary by more than 45 feet, then the section shall be broken into shorter lengths by the insertion of additional valves.

All stub-outs shall be flushed and included in the pressure test. Each stub-out shall be properly plugged, braced, and tested with the stub-out valve open. Following a successful pressure test, all stub-out valves shall be left in the "closed" position.

All testing of water mains, fittings, and appurtenances shall be conducted in the presence of the City of Loganville Utilities Department Inspector, and under his direction. To facilitate the testing, the Contractor shall furnish: 1) a pressure gauge for measuring the pressure on the water main; 2) a corporation cock in the main for pressure pump connection; 3) suitable pump, piping, appliances, labor, and other items necessary to conduct the pressure test;
4) A valve wrench and labor to accompany the City of Loganville Utilities Department Inspector to verify that all valves, including fire hydrant branch valves, are fully open during the pressure test. Each section of pipe shall be filled slowly with water and the specified test pressure shall be applied by means of a pump connected to the pipe in a satisfactory manner. The pump shall operate by pumping water from a separate reservoir into the main to be tested, until the specified test pressure is attained. The City shall furnish all water necessary for flushing and testing of the main. The Contractor shall provide whatever means necessary to transport or convey the water from a designated source to the main.

NOTE: THE USE OF FIRE HYDRANTS AS A CONNECTION FOR EITHER HYDROSTATIC TESTING OR INJECTION OF CHLORINE SOLUTIONS FOR DISINFECTION IS EXPRESSLY PROHIBITED.

Before applying the specified test pressure, **all** air must be expelled from the pipe. To accomplish this, it may be necessary for the Contractor, to install additional ^\" service taps at the highest elevations, including any intermediate points, of the section of the pipe to be tested, or at locations directed by City of Loganville Department of Utilities. Any such taps installed, must be removed by the Contractor prior to final acceptance of the main.

The test pressure shall be maintained for a minimum of two hours to allow for thorough examination for leakage, and permit the City of Loganville Utilities Department Inspector to confirm that all air has been removed, and that all valves within the test section of pipe are fully open.

4.16.2 Chlorination and Disinfection of Pipe Lines and Appurtenances

Before being placed in service all new water main pipe lines and accessories shall be disinfected by chlorination. All chlorinating equipment, materials, labor, and supplies shall be furnished by the Contractor.

Prior to chlorination, all mud, dirt, debris, or other foreign matter shall be removed from the pipe line by a thorough flushing through fire hydrants or other approved means. Each valved section of newly laid pipe shall be flushed independently. This shall be done prior to the pressure test to insure removal of any trapped air within the pipe.

A chlorine gas/water mixture shall be applied by means of a solution feeding pump. If approved by City of Loganville Department of Utilities, the chlorine gas may be fed directly from a chlorine cylinder through a standard "chlorinator" capable of regulating the rate of flow and effective diffusion of gas within the new pipe. The rate of chlorine gas/water mixture flow shall be in such proportion to the rate of water entering the pipe, that the chlorine dose applied to all of the water contained within the newly laid pipe shall be at least fifty (50) parts per million.

If approved by City of Loganville Department of Utilities, a mixture of calcium hypochlorite of known chlorine content, comparable to commercial products known as "HTH", "Perchlor", or "Masochlor", mixed with water may be substituted as an alternate for liquid chlorine. If a calcium hypochlorite and water mixture is used, then it should first be made into a paste and then thinned to a slurry. The slurry mixture shall then be injected or pumped into the new pipe and accessories. The dosage of calcium hypochlorite shall be such as to provide at least fifty (50) parts-per-millions of available free chlorine to all of the water within the new pipe.

The preferable point of application of the chlorinating agent should be at the beginning of the pipeline extension, or any valved section of it. Application shall be through a corporation stop tapped into the newly laid pipe by means of a tapping saddle.

USE OF FIRE HYDRANTS AS A POINT OF APPLICATION OF THE CHLORINATING AGENT IS SPECIFICALLY PROHIBITED.

Water from the existing distribution system, or other source of supply, shall be controlled so that the chlorinating agent is applied to the new pipe at a slow rate.

Back pressure, causing a reversal of flow in the pipe being treated, shall be prevented.

During the process of chlorinating the newly laid pipe, all valves or other appurtenances shall be operated to insure the chlorinating agent is equally distributed throughout the pipeline.

The highly chlorinated water at fifty (50) parts-per-million shall be retained in the pipe long enough to destroy all non-spore-forming bacteria. This period shall be at least twelve (12) hours and no more than twenty-four (24) hours. After the chlorine treated water has been retained for the required time, the water shall be field-tested for residual chlorine at the extremities. Residual chlorine at any given test location shall not be less than ten (10) part-per-million.

Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipe at its extremities. This process shall continue until water sampled throughout the newly laid pipe tests chemically the same for residual chlorine as the water being served through the existing pipelines.

After flushing, the Project Inspector shall notify City of Loganville Utilities Department Laboratory, that the main is ready for a bacteriological sample to be processed. The City of Loganville Inspector must be on site when the bacteriological sample is pulled for testing. Once the sample is processed, it must remain in incubation a minimum of twelve (12) hours before a "sample passed" certification from the Environmental Laboratory can be obtained.

NOTE: WHEN THE LABORATORY REPRESENTATIVE ATTEMPTS TO OBTAIN AN ACCEPTABLE SAMPLE, IF THEY OBSERVE AIR, DISCOLORED WATER, TRASH, DEBRIS, TOO HIGH OR NO CHLORINE RESIDUAL IN THE WATER, NO SAMPLE WILL BE TAKEN UNTIL THE MAIN IS RE-FLUSHED.

Due to the proximity of creeks, streams, ponds, or other bodies of water, the contractor may be directed by City of Loganville Utilities Department to de-chlorinate any water flushed from the main to prevent damage to aquatic organisms, plants, fish, etc. Method and system of de-chlorination must be pre-approved by City of Loganville Department of Utilities. Should the bacteriological test fail due to bacterial growth, the Contractor shall be directed to re-chlorinate the entire pipeline.

Unless City of Loganville Utilities Department directs otherwise, cuts made into existing lines for the insertion of valves or fittings, for repairs, or for any other purpose, shall be disinfected by thoroughly wetting the interior of the pipes, valve, fittings, etc. with a sprayed-on solution having a residual chlorine of 200 parts-per-million.

4.17 RESTORING PAVEMENTS, SIDEWALKS, AND CURBS

4.17.1 Work Included

The Contractor shall furnish all materials for, and properly restore all pavements, drives, sidewalks, and curbs, which may have been damaged, removed, or disturbed as a result of accomplishing the Work. Restoration and replacement shall be made to the satisfaction of City of Loganville Department of Utilities. This shall include in general, but without limitation, all necessary concrete, reinforcing steel, stone, cinders, gravel, slag, asphalt, or other bituminous material necessary for the proper completion and restoration of the Work as may be required, directed, or specified.

4.17.2 Materials and Workmanship

Materials to be used in the repair and restoration of pavements, drives, sidewalks, and curbs, shall be first quality. All materials removed while accomplishing the work shall be disposed by the Contractor on sites approved by the City of Loganville. No existing material may be reused in the Work unless pre-approved by the City of Loganville. All workmanship shall be first class.

4.17.3 Restoring Pavements

After the pipe has been laid, appurtenant work constructed, and backfill completed, the Contractor shall furnish, place, restore, and maintain all pavements or roadway surfaces that have been removed or damaged by or in pursuit of the Work. The form and degree of restoration shall be as specified on the approved design, as specified herein, or as directed by.

For backfilling roadway cuts, only crusher-run gravel, run-of-the-bank gravel, or property rammed sand shall be used. Backfill material shall be placed and compacted to a density of not less than 95% as determined by a modified proctor ASTM Des. D1557-70. The City of Loganville may require that tests, conducted by an independent laboratory, be made at various locations to confirm the density of the compacted material. The location and number of tests shall be designated by as the work progresses. All costs associated with such testing shall be borne by the Contractor.

All roadway restoration shall be done in accordance with the lawful requirements of the authorities within whose jurisdiction such pavement is located. All highway utilities and traffic controls are to be maintained, and work shall conform to the rules and regulations of the authorities, including the use of standard signs. The Contractor shall furnish all such bonds or checks which may be required by the highway authorities to insure proper restoration of paved areas.

Whenever the removal of pavements is required (other than gravel types), the Contractor shall outline the area to be removed by making saw-cuts, providing vertical kerfs to allow the removal of the paving material in straight lines. Should pavement breakage occur beyond the saw-cut, the Contractor shall make a new straight saw-cut beyond the furthest point of breakage?

The Contractor shall be responsible for maintaining all pavement cuts prior to project acceptance, and during the one-year maintenance period. Should any failures be noted associated with any portion of the work, the Contractor shall remove all such damaged surfaces and make full repairs, including adding and re-compacting approved backfill materials, placing and maintaining bituminous concrete pavement or stone road surfaces. All required pavement repairs necessitated due to pavement failure, either prior to final project acceptance or during the one-year maintenance period, shall be effected by the Contractor within five (5) working days of notification by the City of Loganville.

Bituminous concrete pavements or stone road surfaces, which the Contractor is required to replace, shall be in at least as good condition at the end of the one-year maintenance period as it was before construction.

4.17.4 Roadway Permits

The Contractor is responsible for obtaining all road opening permits from the City, including providing any required restoration bonds.

The City of Loganville shall obtain all road opening permits required by the Ga. Department of Transportation. The Contractor is not permitted to make any type cuts on roadways requiring a permit from the Ga. D.O.T. until such time as the permit is provided and prominently displayed on-site.

4.17.5 Restoring Driveway Pavements

The Contractor shall repair or replace all driveway sections disturbed by the process of the work. Driveways shall be constructed of the same materials, and to the thickness of the adjoining wearing surface, or to the minimums indicated on detail drawing A-44 in the Appendix, whichever is greater. In restoring driveways, the subsoil and foundation material shall be well-compacted so as to prevent any future settlement or cracking of the driveway pavement. Where necessary to cut a concrete driveway, the cuts shall be made with a masonry saw, providing a smooth, straight line completely across the driveway. Partial cut-outs, crooked cuts, or cuts made by any other method other than masonry saw are not permitted. In general, or where directed, concrete slab removal shall be made in entire pavement sections to the nearest existing expansion-joint.

4.17.6 Restoring Curbs

The Contractor shall restore all curbs and combination curbs and gutters that have been removed or disturbed in the progress of the work. Curbing shall be made to conform accurately in size, line, grade, and materials to mat adjoining. In restoring curbs, the subsoil and foundation material shall be well compacted so as to prevent any future settlement of the concrete curbing.

All concrete shall conform to the specifications for Class A Concrete, sec. 4.13.1

4.17.7 Restoring Sidewalks

The Contractor shall restore all sidewalks which have been removed or disturbed in the progress of the work. Sidewalks shall be constructed to the same dimensions and materials as the adjoining sections. Where necessary to cut a walk, entire sections shall be removed and replaced unless otherwise directed by the City of Loganville. The sub-base shall be thoroughly rolled or tamped and shall be wetted just before the concrete is placed, but shall show no pools of water.

4.17.8 Contractor's Warranty of Restored Paved Surfaces

The Contractor shall make every provision to insure compaction by properly tamping any backfill under areas to be paved. Any settlement which may occur during the one-year warranty period shall be corrected by the Contractor at his expense, including removing, re-compacting, and replacing any paved surfaces which show signs of settlement, whether or not actual damage to the paved surface has occurred. This shall apply to all paved surfaces including streets, drives, sidewalks, and curbs and gutters.

Should settlement, cracks, or other indications of failure, or impending failure, appear in the paved surface, the adjoining paving shall be removed to the extent necessary to secure a firm, undisturbed bearing. All removal, re-compaction, and replacement shall be in accordance with the specifications concerning these operations as stated elsewhere.

4.18 **SEEDING / SOD REPLACEMENT**

4.18.1 Work Included

The Contractor shall furnish all materials for, and properly restore to the satisfaction of the City of Loganville, all ground surfaces irrespective of type, which may be disturbed in the progress of the work.

This shall include in general but without limitation, the spreading of topsoil, seeding, sod replacement, fertilizing, and mulching required to restore disturbed areas as may be necessary, directed, or specified herein. On all "sod" type lawns and other improved, well established grass areas, the sod/grass shall be carefully removed, kept alive, and replaced after the backfilling and grading is finished. The Contractor shall also remove all spoil from such areas as quickly as possible after the excavation is backfilled, and he shall leave the premises in as good condition as before undertaking the work. It is the intent of these Specifications to restore all disturbed areas, to place seed and mulch in areas not specifically identified as improved lawns, to place topsoil and seed where improved lawns existed prior to construction, and to provide for "sod" removal and replacement in areas identified as such prior to construction.

4.18.2 Standard Specification for Seeding / Sod Replacement

The requirements of the Department of Transportation of the State of Georgia "Standard Specifications- Construction of Roads and Bridges," 1983 Edition, and as revised to date, shall apply insofar as they are applicable for all seeding/sod replacement. If requirements set forth in these Specifications differ from those of the Ga. D.O.T., then these requirements shall take precedence.

4.18.3 Topsoil

Where directed by the City of Loganville, area to be seeded shall be covered with a layer of topsoil. The topsoil shall be of sufficient thickness that when spread and compacted, a minimum of four (4) inches will be available. The Contractor shall famish natural topsoil of a good condition and tillable structure. Obtain topsoil as borrow from an outside source of uniform texture, drainage, and other characteristics so as to constitute a homogeneous soil meeting the requirements of the Ga. D.O.T., and as approved by City of Loganville Department of Utilities. The Contractor shall famish topsoil that is free from objectionable materials such as hard clods, stiff clay, sods, hardpan, partially disintegrated rock, large roots, or other materials that are not integrally a natural

component of good agricultural soils, and which are harmful or not beneficial for successful plant growth. Do not use topsoil containing frost or in a muddling condition. If utilizing existing material obtained from the initial excavation of the work site for re-use as topsoil, the Contractor must first obtain approval from City of Loganville Utilities Department as to suitability of its content, including approval of location and method of storage of topsoil for re-use.

4.18.4 Seeding

Seeding shall be accomplished by the Contractor using a properly proportioned mixture of inoculated seed approved for use in "Zone One" as detailed in the Ga. D.O.T.'s Standard Specifications. Seeding shall only be permitted in the specified planting season for “Zone One" for the specified mixture. All seeded areas shall be uniformly mulched immediately after seeding.

The Contractor shall maintain all seeded areas to include mowing, watering, and re-seeding any bare areas until a satisfactory stand of grass has been obtained and final acceptance of the work has been received from the City of Loganville. Areas showing evidence of settlement or loss of topsoil shall be rebuilt and re-seeded as required.

In general, the Contractor shall replace existing maintained lawn areas with the same type of grass as was established prior to construction. Any deviations or alternatives proposed due to unavailability of seasonal grasses, or inappropriateness of seeding due to time of year must be presented to City of Loganville Utilities Department Inspector in writing with **signed** authorization of homeowner.

4.18.5 Preparation of Seeded/Sod Areas

The sub-grade for any areas to be seeded shall be brought to a uniform grade by the Contractor, and shall be free of stones larger than 1", roots, gravel, or other debris. Where topsoil is required by the City of Loganville, the topsoil shall uniformly graded, trimmed, and raked free of unsuitable materials, ridges, bumps, or depressions. Over this area, the Contractor shall spread agricultural lime at the rate of 40 pounds per 1,000 square feet, and shall spread a general uniformly on the surface of the ground at a rate of 1,500 pounds per acre. The lime and fertilizer shall be mixed uniformly into the top four (4) inches of the soil using suitable harrows, tillers, or other mechanical equipment.

4.18.6 Sod Removal/Replacement

On all well established and "sod" type lawns, the Contractor may at his discretion, zing suitable sod cutting equipment, cut the sod into rolls, carefully remove and store the sod, and water and maintain in a viable condition for replacement after backfill. Any such sod removed and replaced in this manner must be demonstrated to be living to City of Loganville Utilities Department Inspector prior to final acceptance of project.

If sod is to be replaced with "new" sod, the Contractor shall only replace using sod of the same type as that removed. Any deviations or alternatives proposed due to unavailability of seasonal grasses must be presented to City of Loganville Utilities Department Inspector in writing with signed authorization of homeowner.