

CITY OF DALLAS
STANDARD SPECIFICATIONS
FOR
CONSTRUCTION OF
WATER MAINS
AND
SANITARY SEWERS
DECEMBER 2005
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CITY OF DALLAS, GEORGIA
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CITY OF DALLAS WATER AND SEWER SYSTEM

In the interest of protecting the public health and standardization and ultimate economy in maintenance operations, the enclosed set of detailed specifications are to be followed in the planning and construction of water mains and sanitary sewers throughout the City of Dallas service area. **IT IS RECOMMENDED THAT YOU AND YOUR CONTRACTORS STUDY THEM CAREFULLY.**

Briefly, the steps to follow in planning and constructing water mains and sanitary sewers are:

1. Present to the City two (2) complete sets of all plans for all the water mains and sewers BEFORE you are ready to start construction. Profiles are also required for all sanitary sewers. All elevations shall be referenced to mean sea level and not based on an assumed datum.
2. The City will issue written acceptance or rejection of water main and sanitary sewer plans. Plans shall be submitted through the Community Development Department. Approved plans will be stamped by the City and must be on-site during construction.
3. Notify the Public Works Department two (2) days before beginning construction, before all necessary inspections, and before testing.
4. Keep the Public Works Department advised of all work progress, and before paving streets to insure against removal because of faulty construction, etc.
5. Initial inspection by the City will be made when all of the utilities are installed.
6. Following the initial inspection, the Contractor shall complete all documentation required by the City including providing four (4) complete final as-built "Record Drawings" which show as built conditions of all manholes, stub outs, valves, hydrants, blow-off valves, monuments, etc. Record drawings shall be construction plans that have been revised to show as-built conditions. All manholes, pump stations, and fire hydrants shall have state plane coordinates shown on the as-built plans. An approved digital copy of the as-builts shall also be provided to the City. The Contractor is to provide a 5% Cash Bond on the development for a two year duration that coincides with a mandatory two year warranty period. At the completion of the two year warranty period, the Contractor will send a letter to the City notifying them the warranty and bond period have expired. The letter shall state that the Contractor is requesting refund of the bond and a final inspection for acceptance of the development by the City. Following a successful final inspection, the Contractor's request will be submitted to the City Council for approval and acceptance of all water and sewer lines, and pump station(s).
7. Contractors may be required to furnish the City satisfactory proof of insurance and references.

The above procedure will assist us in planning and building a good, sound water distribution and sewerage collection system with future maintenance cost reduced to a minimum.

We appreciate your cooperation, and will cooperate with you in every way possible.

Sincerely,

CITY OF DALLAS

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**SECTION ONE
WATER DISTRIBUTION SYSTEM SPECIFICATIONS**

SECTION ONE: WATER DISTRIBUTION SYSTEM SPECIFICATIONS

PART 1: GENERAL

1.01 SCOPE

This specification covers the material requirements and installation procedures for all water pipe structures and appurtenances to be accepted by the City of Dallas, Georgia. However, this does not limit the City's ability to require and/or accept other materials, construction techniques, or engineering, when deemed appropriate by the City. Any water pipe structures or appurtenances, which the City has reason to believe is not in conformance with these specifications will not be accepted.

1.02 GENERAL

- A.** The construction drawings approved by the City indicate the extent and general arrangement of the water distribution system. If any departure from the approved contract drawings is deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted to the City as soon as possible for approval. No such departures shall be made without the City's written approval.
- B.** All approved water distribution system plans and these specifications shall be considered as supplementary, one to the other, so the material and labor indicated, called for, or implied by these specifications and not on the plans, shall be supplied and installed as though specifically called for on the plans.
- C. ALL CONTRACTORS AND DESIGNERS SHOULD BE AWARE OF THE CITY'S CONSTRUCTION SPECIFICATIONS REQUIREMENTS PRIOR TO CONSTRUCTION.** As such, all Contractors and designers are required to possess a copy of the City's Construction Standards for Water and Sanitary Sewer, latest edition. The Contractor's copy of these specifications shall be available for consultation at the construction site. The City of Dallas reserves the right to stop the Contractor's water and sewer line construction if the City's Construction Standards for Water and Sanitary Sewer, Latest Edition, are not available for inspection and consultation at the construction site. Copies of these specifications are available from the City for a nominal fee.
- D.** Plans shall be signed and sealed by the Design Professional registered in the State of Georgia. The Design Professional shall certify that no part of water system improvements will be built in a landfill.
- E.** Plans shall have satisfactory report of technical review from the authority having jurisdiction showing erosion and sedimentation control measures are adequate prior to approval by the city.

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- F. If wetlands exist in the development area, they shall be shown on the plans. If wetlands are to be disturbed, information related to the U.S. Army Corps of Engineers shall be provided showing the wetlands work is being done to meet their requirements.
- G. Water lines shall cross streams at near 90 degree angle.
- H. Sewer lines and water lines shall have 10 feet horizontal and/or 18 inches vertical separation, with the water line on top. In any instance where the minimum 10-ft separation cannot be maintained, the water main shall be encased in concrete.
- I. All work shall be done in accordance with OSHA standards.
- K. Refer to the 10 States Standard, most recent edition for odd conditions.

The City will not be held responsible for any water distribution system installation which cannot be accepted into the City's system because of the Contractor's lack of knowledge of the existence of the City's specifications. If it appears that the plans were prepared without regard to these specifications, they will be returned without comment.

1.03 APPLICABLE SPECIFICATIONS AND STANDARDS

The latest editions of the following specifications, standards and publications setting minimum requirements for quality, safety and performance of work and materials form a part of this specification as though full repeated herein.

ASTM	American Society of Testing Materials
ANSI	American National Standards Institute
AWWA	American Water Works Association

1.04 RECORD DRAWINGS

- A. The contractor shall be responsible for maintaining a set of approved design drawings, which have been marked to reflect as-built conditions. These "record drawings" shall be kept at the site during working hours and shall be made available to the City Inspector upon request.
- B. The record drawings shall show the constructed locations off all lines, tees, meters, vaults, manholes, valves, hydrants, blow-off valves, valve markers, etc. The size and type of all lines and valves shall be noted on the record drawings.
- C. Final as-built drawings and a digital copy shall be provided to the City prior to filing the final plat. These drawings shall be stamped and signed by the Developer's Engineer or Surveyor.

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PART 2: MATERIALS

2.01 GENERAL

- A. Materials to be incorporated into the work shall be new and unused, and shall conform to all applicable requirements of these specifications. Submittal and approval of all materials, shop drawings or samples shall be in conformance with these specifications. Any material installed prior to approval by the City will be subject to rejection, and will be removed at the Contractor's expense.
- B. All water mains unless approved otherwise shall be C900 DR 18 PVC piping, blue in color. Water service lines on the System's side of the meter shall be cross linked polyethylene PEX-A tubing.**
- C. Acceptance will be on the basis of inspection and the manufacture's written certification that the pipe, fitting and appurtenances were manufactures and tested in accordance with the applicable standards.
- D. Any pipefitting and appurtenances used in the installation or repair of water mains or services shall be lead-free.**

2.02 DUCTILE IRON PIPE (DIP)

- A. Ductile iron pipe shall conform to AWWA C 151 (ANSI A21.51) and shall be a minimum of pressure Class 350.** Sizes will be as shown. All pipes shall be furnished in minimum lengths of 18 feet. Pipe and fittings shall be cement lined in accordance with AWWA C104. Fittings shall be mechanical joint compact ductile iron and conform to AWWA 153 with rated working pressure of 250 psi. Pipe and fittings shall be furnished with a bituminous outside coating.
- B. Joints shall be push on type for pipe and standard mechanical joints for fittings with the exception of hydrant fittings. Fittings for bends and hydrants shall be mechanical joint with retainer glands. Hydrant tees used in lieu of retainer glands and harness rods on fire hydrants shall be equal to ACIPCO A10180 OR U.S. Pipe U-592. Anchor couplings used in lieu of retainer glands and harness rods on fire hydrant leads shall be American A-10895 or approval equal. Joints shall conform to AWWA C 111. Provide and install the appropriate gaskets, nuts and bolts for mechanical joints. Nuts shall be steel with American Standard Regular hexagonal dimensions, all as specified in ANSI B 17.2.**

All bolts and all nuts shall be threaded in accordance with ANSI B 1.1, Coarse Thread Series, Class 2A and 2B fit.

- C. When flanged joints are indicated provide gaskets for flange joints made of 1/8-inch thick cloth reinforced rubber. Gaskets may be ring type or full-face type. Provide bolts**

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for flange connections. Bolts shall be steel with American Regular unfinished square hexagon heads. Nuts shall be steel with American Standard Regular hexagonal dimensions, all specified in ANSI B 17.2. All bolts and all nuts shall be threaded in accordance with ANSI B1.1, Coarse Thread Series, Class 2A and 2B fit.

2.03 POLYVINYL CHLORIDE PRESSURE RATED PIPE (PVC)

- A. Pipe for water mains shall be polyvinyl chloride (PVC) C900 pipe. The pipe shall conform to AWWA C900, shall be DR-18 and a pressure rating of not less than 235 psi, color blue. The PVC material shall be designated as PVC 1120 and shall conform to ASTM 1784. The joints shall be gasketed bell joints conforming to ASTM D3139.
- B. All PVC pipe shall bear the NSF (National Sanitation Foundation) seal of approval for potable water use.

2.04 SERVICE LINES

- A. Saddles shall be Ford F202 or approved equal.
- B. Corporation stops shall be Ford FB1000-3Q OR 590 or approved equal.
- C. Service lines ½” – 3” in size shall be cross linked polyethylene pipe (PEX-A) conforming to AWWA C904. It shall meet the requirements of the National Sanitation Foundation Standard 14 and shall conform to ASTM F876.
- D. Fittings for service lines shall be brass and manufactured by Ford or approved equal.

2.05 GATE VALVES

- A. Gate valves size 2-inches and larger shall be resilient seat wedge type and shall conform to the specifications of the American Water Works Association, Designation C509, latest edition rated for 200 psi minimum working pressure. Gate valves shall be required with “O” ring stem seals above and below stem thrust collar.

Gate valves for use on mechanical joint ductile iron pipe and slip joint ductile iron pipe shall have a manufacturer’s standardized mechanical joint ends. Gate valve body and bonnet shall be ductile or cast iron and shall be fusion bonded, interior and exterior, with epoxy coating which conforms at AWWA C-550, latest edition.

- B. Water mains in which the valves are installed shall be tested as specified and the valve must remain water tight under this pressure in each direction.

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- C.** Valves shall open counter clockwise; shall be designed for vertical installation, and shall be the non-rising stem type
- D.** Valves shall be equipped with valve boxes. Provide extension stem where required to bring the operating nut to within 36-inches of ground surface and shall have a 24" x24" X 10" concrete collar poured in place or approved equal.
- E.** All gate valves shall be manufactured by Mueller, M & H Valve or approved equal.
- F.** Gate valves 1-½inches in diameter and smaller shall be bronze, heavy duty, rising stem, rated for 200 psi WSP. Valves shall conform to Federal Specifications WW-V-54, Class A, Type II.

2.06 VALVE MARKERS

- A.** Valve markers shall be 4 feet long concrete posts. Shall have a "V" stamped on one side.

2.07 FIRE HYDRANTS

- A.** All fire hydrants shall conform to the requirements of AWWA C 502 for 150 psi working pressure. Hydrants shall be the compression type, closing with line pressure. The valve opening shall not be less than 5 1/4 inches.
- B.** In the event of a traffic accident, the hydrant barrel shall break away from the stand pipe at a point above grade and in a manner which will prevent damage to the barrel and stem, preclude opening of the valve, and permit rapid and inexpensive restoration without digging or cutting off the water. Hydrants shall be installed to the proper bury height as indicated by the bury line on the hydrant.
- C.** The means for attaching the barrel to the standpipe shall permit 360- degree rotation.
- D.** Hydrant shall be fully bronze mounted with all working parts of bronze. Valve seat ring shall be bronze and shall screw into a bronze retainer.
- E.** All working parts, including the seat ring shall be removable through the top without disturbing the barrel of the hydrant.
- F.** The operating nut shall match those existing hydrants. The operating threads shall be totally enclosed in an operating chamber separated from the hydrant barrel by rubber O' ring stem seal and lubricated by grease or an oil reservoir. A stop nut shall be positioned in the top operating mechanism of the hydrant so that the valve stem cannot contact the bottom of the shoe when the hydrant is fully open.

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- G.** Minimum depth of bury shall be 4 feet. Extension sections shall be furnished where necessary to bring hydrant to the proper elevation. Extensions shall be installed in accordance with the manufacturer's recommendations. The centerline of the 2- ½ inches connections shall be a minimum of 18 inches above finish grade.
- H.** Hydrants shall be non-freezing design and provided with a simple, positive, and automatic drain, which shall be fully closed whenever the main valve is opened.
- I.** Hose and pumper connections shall be breech-locked, pinned, or threaded and pinned to seal them into the hydrant barrel. Each hydrant shall have a (2) 2 ½ inch hose connections and one (1) 4 ½ inch pumper connection, all with National Standard threads and each equipped with cap and non-kinking chain.
- J.** All outside surfaces of the barrel above grade shall be painted yellow with enamel equal to Koppers Glamortex 501.
- K.** Fire hydrants shall be Mueller A 421 M.J. or M&H Style 929 Reliant M.J.

2.08 VALVE BOXES

- A.** All valve boxes and valve box risers shall be cast or ductile iron. Valve boxes shall be two-piece heavy roadway type with inside diameter of barrel not less than 5 inches. Valve covers shall weigh a minimum of 13 pounds. They shall be the extension type with screw-type adjustment and with flared base. The minimum thickness of metal shall be 3/16-inch. The word "WATER" shall be cast on the cover. The boxes shall be of such length as will be adapted without full extension, to the depth of cover required over the pipe at the valve location. All valve boxes and valve box risers shall be manufactured in USA only.

2.09 RETAINER GLANDS

- A.** **Retainer glands shall be ductile iron and shall be manufactured in the USA.** All retainer glands on the Project shall be the product of a single manufacturer.
- B.** Retainer glands shall be provided at all mechanical joints, including fittings, valves, hydrants, and other locations as shown on the drawings or as directed by the City.
- C.** Retainer glands shall be one of the following types:
 - 1) Set Screw Type: Set screw type retainer glands shall be ACIPCO A-90857, EBAA Iron Series 100, Union Foundry Fig. 176, or Tyler. Compact/lightweight retainer glands shall not be allowed. The minimum

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working pressure and minimum weight, excluding set screws and gasket material, shall be as follows:

MANUFACTURED IN THE USA.

RETAINER GLAND SIZE (INCHES)	MINIMUM WORKING PRESSURE (PSI)	MINIMUM WEIGHT WEIGHT (POUNDS)
4	350	6.0
6	350	11.8
8	250	16.0
12	250	24.8
16	200	50.0
20	200	72.5
24	150	85.0

- 2) Wedge Type: Wedge type retainer glands shall be MEGALUG, Series 1100 as manufactured by EBAA Iron, Inc. or approved equal.

2.10 DUCTILE IRON FITTINGS

Fittings for ductile iron pipe and PVC pipe shall be ductile iron and shall conform to requirements of AWWA-C153 for diameters through 16 inches and AWWA-C110 for diameters larger than 16 inches. All fittings shall be pressure rating 350 psi. **ALL FITTINGS SHALL BE MANUFACTURED IN THE USA.**

- A. All fittings shall be cement mortar lined in accordance with AWWA-C104.
- B. All fittings shall be mechanical joint unless other- wise specified or indicated on the Drawings.
- C. Rubber gasket joints shall conform to AWWA-C111.
- D. Gaskets for PVC pipe shall be plain rubber transition type compatible with the type of pipe and fittings used.

2.11 LOCATOR WIRE AND DETECTABLE UNDERGROUND CAUTION TAPE

- A. Locator wire shall be Number 14 AWG solid THHN plastic coated copper wire.
- B. Detectable underground caution tape shall consist of a minimum 4.0 mil thickness, inert polyethylene plastic which is impervious to all known alkalis, acids, chemical

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reagents and solvents likely to be encountered in the soil, with a minimum 1/3-mil metallic foil. The tape shall be at least six inches (6") in width and shall be solid blue with identifying print in black letters. The tape shall have printed thereon the following: "CAUTION - BURIED WATERLINE BELOW". The identifying lettering shall be minimum 1 inch high and repeated continuously the full length of the tape. In no instance shall the spacing of the individual segment of the identifying message be greater than eight inches (8").

2.12 CASING PIPE

- A. The materials for casings shall be in accordance with the Georgia Department of Transportation Standard Specifications for the Construction of Roads and Bridges, latest edition. It shall be the Contractor's responsibility to determine the exact requirements of the Georgia Department of Transportation. If there is a conflict between these Specifications and the Georgia Department of Transportation Specifications the latter shall take precedent.

2.13 BEDDING MATERIALS

- A. Embedment materials shall be angular graded crushed stone, ¼ inch to ¾ inch in size with no more than 5% PASSING a No. 8 standard sieve in accordance with class 1 materials as defined in ASTM D2321 Section 5.1.1. Recycled concrete shall not be used without prior approval of the Engineer.

2.14 CONCRETE THRUST BLOCK

- A. Concrete shall have a comprehensive strength of not less than 3000 psi, with not less than 5.5 bags of cement per cubic yard and a slump between 3 and 5 inches. For job mixed concrete, submit the concrete mix design for approval. Ready mix concrete shall be mixed and transported in the accordance with ASTM C94. Reinforcing steel shall conform to the requirements of ASTM A 615, Grade 60.

2.15 METER BOX - SETTER ASSEMBLY

- A. ¾" meter box assembly shall be Ford LYLBBP224-233-LL-TP-Q consisting of double ball valve, long yoke box with dual check valve, angle inlet straight outlet and electronic meter reading lid (1-27/32" hole with removable plug). Fitting shall have Q Style connections.
- B. 1" meter box assembly shall be Ford LYLBB141-444-T-Q.
- C. 2" meter box assembly shall be Ford VBHH77-24BCH-44-77-Q-NL.

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2.16 METER

- A. All meters shall comply with AWWA Standard C700 – latest revision.
- B. Meters shall be Sensus iPERL for ¾” and 1”. Meters shall be Sensus Omni Turbo (T2) or Sensus Omni Compound (C2) for 2” and larger services. Meters shall be programmed to read one gallon increments. Meters shall have a Sensus M-series MXU transceivers included. Each application will need the City’s approval on a case-by-case basis.

PART 3: EXECUTION

3.01 PIPELINE INSTALLATION

- A. Proper and suitable tools and appliances for safe and convenient handling and laying of pipe and fittings shall be used. Great care shall be taken to prevent the pipe coating from being damaged particularly cement linings on the inside of the pipes and fittings. Any damage shall be remedied as directed.
- B. All pipe and fittings shall be carefully examined by the Contractor for defects just before laying. No pipe or fitting shall be laid which is defective. If any defective pipe or fitting is discovered after having been laid, it shall be removed and replaced in a satisfactory manner with a sound pipe or fitting by the Contractor at his own expense.
- C. No pipe shall be laid in water. The Contractor will be required to operate pumps, if necessary, to remove water (whether from ground or surface sources) from the trench while pipe is being laid and joints are being made. When work is not in progress the ends of the pipe shall be closed to prevent water or other foreign material from entering the pipe. Valves installed on existing mains shall be kept closed until after the line is tested, disinfected and accepted for service.
- D. Pipe laid in trenches shall be laid true to line and grade on a firm and even bearing for its full length at depths and grades as indicated. Adequate precautions shall be taken to prevent floatation of pipelines prior to backfilling. Installation of ductile iron pipe in underground pressure piping systems shall conform to the requirements of AWWA C600. Excavation of trenches and backfilling around pipes shall conform to the requirements of the section entitled “Excavation’ Trenching and Backfilling” of these Specifications.
- E. **All water mains shall have a minimum of 48-inches of cover above the top of the pipe or 48- inches below the edge of pavement, whichever is greater.**

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- F.** Water mains shall maintain a minimum of 10 feet edge to edge separation from sewer lines, whether gravity or pressure. If the main cannot be installed in the prescribed easement or right of way and provide the 10 feet separation, the separation may be reduced provided the bottom of the water main is a minimum of 18-inches above the top of the sewer. Should neither of these two separation criteria be possible, the water main shall be installed as approved by the City. In any instance where the minimum 10-ft separation cannot be maintained, the water main shall be encased in concrete.
- G.** All elbows, tees, branches, crosses, and reducers in pressure piping systems shall be adequately restrained against thrust. Underground pressure piping containing unharnessed push-on or mechanical joints or expansion joints shall be restrained by thrust blocks. The Contractor may use forms or earth walls to mold the thrust blocks. When earth walls are used, they shall be cut true to shape and all excess earth removed. The work shall be conducted so that no loose earth will become mixed with the concrete. At the end of 24 hours, damp earth may be placed over the concrete to retain moisture.
- H.** All lumps, blisters, excess, coating, dirt and other objectionable substances shall be removed from the bells and spigots. Bells and spigots shall be wiped clean and dry. Bells shall be centered in the trench and spigots driven home.
- I.** Bends, valves and other points where deemed necessary shall be blocked and harnessed to resist thrust. This shall be accomplished by methods and means approved by the Inspector. All forms used to form concrete for blocking shall be removed before backfilling. All fire hydrants shall be harnessed as directed by the City and concrete blocking will be required to resist the thrust on fire hydrants. All stress points and ends of mains shall be inspected before backfilling.
- J.** Whenever pipe requires cutting to fit the lines or install fittings, the work shall be done in such manner as to leave a smooth end at right angles to the axis of the pipe. Special care shall be exercised to guard against breaking or splitting the existing piping.
- K.** All cutting of ductile iron pipe shall be done with a cutting saw. All burrs shall be removed from the inside and outside edges of all cut pipe.
- L.** Mechanical joints and restrained joints shall be made in strict accordance with the pipe manufacturer's instructions. The gaskets and follower rings shall be kept clean and carefully centered in the bell with the bolts and bolt holes always parallel with the centerline of the pipe. The coating and lining of the pipe shall not be damaged.

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The nuts on all bolts shall be started and tightened evenly around the entire circumference of the pipe. No one nut shall be tightened more than ½ turn tighter than the remainder of the nuts of the joint. When the joint is complete, the follower ring shall be equal distance from (parallel with) the face of the bell. Bolts shall not be over-stressed and shall be tightened just enough to compress the gasket sufficient to prevent leakage. Just prior to assembly, the gasket shall be cleaned of all foreign material and shall be brushed with soapy water just before slipping the gasket over the spigot and into the bell of the pipes. The joint shall be in straight alignment during assembly. Any deflection required shall be made after the assembly but before tightening bolts. Bolts shall be tightened with torque wrenches with the following torque loads applied.

BOLT SIZE	RANGE OF TORQUE FOOT-POUNDS
5/8"	45-60
¾"	75-90
1"	100-120
1 ¼"	120-150

- M.** Push on type joints shall be made in strict accordance with the pipe manufacturer's instructions. All joints shall be completely "belled-up" and all spigots shall be "home". The gasket seat in the socket, the gasket and the plain end of the pipe to be entered shall be wiped clean before assembly. After the gasket has been inserted into the gasket recess, a thin film of lubricant shall be applied to the inside surface of the gasket and to the outside surface of the spigot end of the pipe to be jointed. After lubricating, the end of the pipe shall not be allowed to touch the bottom or the side of the trench causing dirt to adhere to the joint surface. When pipe is cut in the field the cut end of the pipe shall be beveled with a file or grinder. The joint shall be in straight alignment while pushing the pipe to make assembly. Any deflection required shall be made after the joint is assembled.
- N.** Set screw type retainer glands shall be installed in strict accordance with the fitting manufacturer's instructions.
- O.** Wedge type retainer glands shall be installed in strict accordance with the manufacturer's instructions.
- P.** Retainer gland joints shall be made in straight alignment and any deflection required shall be made before tightening the joint bolts or set screws.

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- Q.** Deflection of any pipe at joints for long radius curves or for avoiding obstacles shall be permitted only upon approval of the Inspector.
- R.** Where deflection of joints is permitted, such deflection shall be made in accordance with manufacturer's recommendations.

3.02 CONNECTIONS TO WATER MAINS

- A.** Make connections to existing pipe lines in accordance with instructions from the Inspector.
- B.** Location: Before laying pipe, locate the points of connection to existing water mains and uncover as necessary for the Inspector to confirm the nature of the connection to be made.
- C.** Interruption of Services: Make connections to existing water mains only when allowed by the City. Operate existing valves only with the specific authorization and direct supervision of the inspector.
- D.** Connecting to Existing Side Street Mains:
 - 1) Before taking existing side street mains out of service, taps for air removal shall be made at each high point along the section of existing main to be temporarily taken out of service. With the City's approval at each location, existing service lines may be used to expel air.
 - 2) Close service line curb stops along the section that will be dewatered and close all connecting main valves.
 - 3) Take existing main out of service, cut and complete connections as detailed on the drawings.
 - 4) Open appropriate valve and after expelling all air, return existing main to service and re-open all service line curb stops.
 - 5) At all taps to remove air, install brass cap on corporation stop, backfill, and replace pavement where required.

3.03 HYDRANT INSTALLATION

- A.** Prior to installation, inspect all hydrants for direction of opening, nozzle threading, operating nut and cap nut dimensions, tightness of pressure-containing bolting, cleanliness of inlet elbow, handling damage and cracks. Defective hydrants shall be corrected or held for inspection by the City.

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- B.** All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the roadway, with pumper nozzle facing the roadway.
- C.** Hydrants shall be set to the established grade, with the centerline of the lowest nozzle at least 18-inches above the ground or as directed by the Inspector.
- D.** Each hydrant shall be connected to the main with a hydrant tee, 6" valve and anchor coupling.
- E.** Hydrants shall be located as shown on the drawings or as directed by the inspector.

3.04 VALVE AND FITTING INSTALLATION

- A.** Prior to installation, valves shall be inspected for direction of opening, number of turns to open, freedom of operation, tightness of pressure-containing bolting and test plugs, cleanliness of valve ports and especially seating surfaces, handling damage and cracks. Defective valves shall be corrected or held for inspection by the System. Valves shall be closed before being installed.
- B.** Valves, fittings, plugs and caps shall be set and jointed to the pipe in the manner specified in Section 3.01 except that 12-inch and larger valves shall be provided with special support, such as crushed stone, concrete pads or a sufficiently tamped trench bottom so that the pipe will not be required to support the weight of the valve. Valves shall be installed in the closed position.
- C.** A valve box shall be provided on each underground valve. They shall be carefully set, centered exactly over the operating nut and truly plumbed. The valve box shall not transmit shock or stress to the valve. The bottom flange of the lower belled portion of the box shall be placed below the valve operating nut. This flange shall be set on the brick, so arranged that the weight of the valve box and superimposed loads will bear on the base and not on the valve or pipe. Extension stems shall be installed where depth of bury places the operating nut in excess of 36-inches beneath finished grade so as to set the top of the operating nut 36 inches below finished grade. The valve box cover shall be flushed with the surface of the finished area or such other level as directed by the City.
- D.** If valve boxes are installed concurrently with valves, the Contractor shall be responsible for maintaining valve boxes until the Project is complete. All lost or damaged valve boxes shall be replaced by the Contractor, at the Contractor's own expense.
- E.** A concrete pad shall be required around each valve box, the top flush with the cover as detailed on the drawings. Precast valve pads will only be allowed where

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approved by the Inspector. Precast pads shall not be used on slopes or in ditches. If precast pads are used, the space between the valve box and opening shall be filled with grout.

- F.** In no case shall valves be used to bring misaligned pipe into alignment during installation. Pipe shall be supported in such a manner as to prevent stress on the valve.
- G.** **Where main valves are shown on the drawings adjacent to fire hydrant tees or intersection tees, install the valves no more than four feet from the tee unless shown or specified otherwise.**
- H.** Non-restraint and push-on joints shall not be installed within 15-feet of restrained joints at valves or fittings, unless shown otherwise on the drawings or approved by the City.

3.05 JACK AND BORE

- A.** The Contractor shall provide to the City for approval, a detailed plan for the methods proposed for the construction of the casing. These plans shall include the methods proposed for groundwater control, face protection and protection of overhead and underground utilities.
- B.** In general, jack and bore operation shall conform to the requirements of the Georgia Department of Transportation as presented in their Standard Specifications for the Construction of Roads and Bridges, latest edition. If a conflict between these specifications and the Georgia Department of Transportation Specification exists, the more stringent Specifications shall govern.
- C.** Install the steel casing pipe by the drop boring method. Bore the hole and install the casing through the soil simultaneously by a cutting head on a continuous auger mounted inside the casing pipe. Fully weld lengths of casing pipe to the preceding section in accordance with AWS recommended procedures. After the boring and installation of the casing is complete, install a cleaning plug on the rig and clean the casing.
- D.** After construction of the casing is complete, and has been accepted, install the pipeline in accordance with the drawings and/or the specifications.
- E.** Check the alignment and grade of the casing and prepare plan for approval to set the carrier pipe at proper alignment, grade and elevation. The carrier pipe shall be supported by stainless steel casing spacers to preclude movement within the casing. One spacer shall be placed not more than two feet from each end of the casing.

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Subsequent spacers shall be placed at intervals between 6 feet and 10 feet within the casing.

- F.** Seal the ends of the casing with flexible rubber end seals which are secured in place with tightened stainless steel bands.
- G.** Provide all necessary bracing, bulkheads, and shields to ensure complete safety to all traffic at all times during the work. Perform the work in such a manner as to not permanently damage the roadbed or interfere with normal traffic over it.

Begin the boring operation in a pit, sheeted and shored as necessary and begin at and proceed from one end. Observe all applicable requirements of Georgia Department of Transportation and the City of Dallas.

Conduct the operations in such a manner that all work will be performed below the level of the roadbed. Coordinate and schedule all of the work with the proper jurisdiction of the roadway and the City of Dallas.

- H.** Complete all boring work at one particular location before boring work is started at another location.
- I.** If the casing installation work is being conducted in an unsafe manner or in a manner detrimental to the over passing roadway or to the safety of the traveling public, all operations of boring shall cease until the necessary corrections have been made. In the event that distress occurs to the roadway due to the boring, the Contractor shall be required to submit a plan to repair the roadway. The plan must be acceptable to the proper jurisdiction of the roadway and the City.

3.06 FREE BORING

- A.** The Contractor may construct a driveway crossing by the free bore method, in lieu of making a pavement cut, where indicated on the drawings and approved by the City. The free bore method shall be accomplished by the dry auger boring method without jetting, sluicing, or wet boring.
- B.** The diameter of the free bore shall not exceed the pipe bell outside diameter or the pipe barrel outside diameter plus 1-inch, whichever is greater.
- C.** Free boring is allowable only under residential driveways. Free boring is not allowed under commercial driveways or any roadway except when the pipe diameter is 4-inches or less.

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- D.** The Contractor shall be responsible for any settlement of the roadway caused by the free bore construction activities.
- E.** If the Contractor elects to free bore and acceptable installation does not result for any reason, the Contractor shall install a casing pipe by the bore and jack method.
- F.** Any abandoned free bores shall be filled with flowable fill.

3.07 DOUBLE CHECK BACKFLOW PREVENTER

- A.** A double check backflow preventer shall be provided immediately downstream from the customer's water meter. The backflow preventer shall be housed in the same meter box or vault as per the detail for meters less than 2". The backflow preventer shall be housed in a separate box for meters 2" or greater.

3.08 DOUBLE DETECTOR CHECK VALVE ASSEMBLIES

- A.** A compact fireline meter assembly with bypass meter and a double detector check valve assembly by manufactured by Sensus or approved equal, shall be installed in all fire mains and fire sprinkler service lines as close to the System main as is possible. The compact fireline meter assembly and backflow prevention assembly shall be housed in an approximately sized vault.

3.09 WATER METERS AND SERVICE LINES

- A.** A water service connection shall consist of a corporation stop tapped into the main and a service line from the main to the meter box assembly.
- B.** All service lines crossing under existing pavement shall be installed by boring in a 2" PVC casing. All service line taps shall be made with System pressure on the main and any visible leaks shall be repaired. After each meter service has been completed, the entire assembly shall be flushed to remove any foreign matter. All service lines shall have a minimum bury depth of 36- inches under ditches and shoulders, and 48" under the roadway.
- C.** All water double service "Y" connections shall have an inline compression coupling with cut-off valve installed on the primary branch of the "Y" service line.
- D.** Meter boxes and yoke boxes shall be installed with 12 inches of #57 gravel stone beneath box.

3.10 LOCATOR WIRE AND DETECTABLE UNDERGROUND CAUTION TAPE

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- A. A continuous or properly spliced Number 14 AWG THHN solid plastic coated copper wire and warning tape shall be placed along all PVC pipe installations.
- B. Care shall be taken during backfilling to prevent damaging or cutting of the locator wire.
- C. All splices shall be made by using copper wire “U” bolt assemblies and then wrapping with electrical tape.
- D. Wire shall be wrapped around pipe such that at least four (4) “wraps” are produced per length of pipe.
- E. In lieu of “wrapping”, the tracer wire may be strung along the top of pipe provided it is taped to the pipe every 5 feet to ensure proper positioning during backfilling.
- F. Detectable underground caution tape shall be placed one (1) foot over the top of all PVC pipe.

3.11 VALVE MARKERS

- A. Markers shall be installed with the top of the marker protruding 12 to 18 inches above the ground surface. Valve markers shall be located in a suitable location approved by the City Inspector during construction.

3.12 FIELD PRESSURE AND LEAKAGE TESTING

- A. After the pipe has been installed, the complete pipe line shall be subjected to a hydrostatic pressure test. Notify the City 24 hours in advance to a test being performed.
- B. **Except as hereinafter allowed, the line shall be tested in sections not to exceed the distance from one line valve to the next adjacent line valve.** Testing two sections through an open intermediate valve will not be allowed unless adjacent line valves are less than 300 feet apart. In no case will leakage from two or more adjacent sections be “averaged” to determine that the total section meets the leakage test. Each section of line or valved section of the line shall be tested as follows:
 - 1) At all high points, where air release valves or fire hydrants have not been installed, the Contractor shall install corporation stops to expel the air as the pipe is being slowly filled with water. After the pressure and disinfecting tests have been completed, the corporation stops shall be capped with brass caps and left in place. The location of said corporation stops shall be marked

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on record drawings with dimensions measured from three (3) permanent structures.

- 2) A test pump shall be installed at the low point of the section being tested and the pipe shall be slowly filled with water.
- 3) **After expelling all air at the high point, the corporation stops shall be closed and the pressure increased to 200-PSI gauge at the lowest point on the section being tested. The test pressure shall be maintained for the duration of two hours.**
- 4) The volume of water required by the test pump to maintain this excess pressure which will represent the leakage, shall not exceed .014 gallons per hour per inch diameter per 1000 feet of pipe.5) Pressure and leakage test shall be successfully conducted for not less than two (2) consecutive hours. Provide an accurate pressure gage with graduation not greater than one (1) psi.
- 6) The Contractor shall, at his own expense, locate and make repairs as necessary until the leakage is within the specified allowance.
- 7) All visible leaks shall be repaired regardless of the amount of leakage.

The Contractor shall furnish all labor, equipment and material necessary to conduct the test, and shall furnish and install all temporary plugs and valves necessary to isolate the test sections. Water for test purposes will be furnished by the City.

3.13 DISINFECTING PIPELINES

- A. After successfully pressure testing each pipeline section, disinfect in accordance with AWWA C651 for the continuous feed method and these specifications.
- B. Chlorination
 - 1) Apply chlorine solution into the new water main. Retain chlorinated water for 24 hours minimum.
 - 2) After 24 hours, the Contractor shall obtain samples at every outlet. Samples of water shall contain at least 25 milligrams per liter free chlorine. Re-chlorinated if required results are not obtained on all samples.
- C. Flushing and Disposal of Chlorinated Water: Flush all lines until chlorine residual is equal to existing system. Provide proper treatment and disposal of chlorinated

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water in accordance with federal, state, and local law. Neutralize chlorine residual of disinfection water as necessary prior to disposal.

- D.** Bacteriological Testing: After final flushing and before the main is placed into service, the Contractor shall collect samples from the line to have tested for bacteriological quality. Testing shall be performed by the Contractor at a laboratory certified by the State of Georgia. Re-chlorinate lines until the required results are obtained. Contractor shall open all valves being a part of said system being tested upon approval of bacteriological testing.

3.14 GUARANTEE AGAINST TASTE, ODOR OR COLOR.

- A.** The Contractor shall guarantee for a period of one year against taste, odor or color caused by pipe lining materials. The Contractor shall at his own expense provide all necessary treatment to counteract any such taste, odor, or color. Bona fide complaints of taste, odor, or color in the area served by the new mains shall be deemed caused by the pipe lining materials.

**SECTION TWO
SEWER SYSTEM SPECIFICATIONS**

SECTION TWO: SEWER SYSTEM SPECIFICATIONS

PART 1: GENERAL

1.01 SCOPE

This specification covers the material requirements and installation procedures for all sanitary sewer pipe, structures and appurtenances to be accepted by the City of Dallas, Georgia. However, this does not limit the City's ability to require and/or accept other materials, construction techniques, or engineering when deemed appropriate by the City. Any sewer pipe, structures or appurtenances which the City has reason to believe are not in conformance with these specifications will not be accepted.

1.02 GENERAL

- A. The construction drawings approved by the City indicate the extent and general arrangement of the sanitary sewer system. If any departure from the approved contract drawings is deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted to the City as soon as possible for approval. No such departures shall be made without the City's written approval.
- B. All approved sewer system plans and these specifications shall be considered as supplementary, one to the other, so that materials and labor indicated, called for, or implied by these specifications and not on the plans shall be made without the City's written approval.
- C. **ALL CONTRACTORS AND DESIGNERS SHOULD BE AWARE OF THE CITY'S CONSTRUCTION SPECIFICATIONS REQUIREMENTS PRIOR TO CONSTRUCTION.** As such, all Contractors and designers are required to possess a copy of the City's Construction Standards for Water and Sanitary Sewer, latest edition. The Contractor's copy of these specifications shall be available for consultation at the construction site. The City of Dallas reserves the right to stop the Contractor's water and sewer line construction if the City's Construction Standards for Water and Sanitary Sewer, Latest Edition, are not available for inspection and consultation at the construction site. Copies of these specifications are available from the City for a nominal fee.
- D. Plans shall be signed and sealed by the Design Professional registered in the State of Georgia. The Design Professional shall certify that no part of sewer improvements will be built in a landfill.
- E. Plans shall have satisfactory report of technical review from authority having jurisdiction showing erosion and sedimentation control measures are adequate prior to approval by the city.

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SEWER SYSTEM SPECIFICATIONS

- F. If wetlands exist in the development area, they shall be shown on the plans. If wetlands are to be disturbed, information related to the U.S. Army Corps of Engineers shall be provided showing the wetlands work is being done to meet their requirements.
- G. Sewer lines or force mains shall cross streams at near 90 degree angle.
- H. Sewer lines and water lines shall have 10 feet horizontal and/or 18 inches vertical separation, with the water line on top. In any instance where the minimum 10-ft separation cannot be maintained, the water main shall be encased in concrete.
- I. Manholes within the 100-year flood plain shall have bolt down and gasketed covers, or shall have top elevations a minimum of 2 foot above the flood plain. The 100-year flood plain shall be shown on the plans and shall be indicated on the sewer profiles.
- J. All work shall be done in accordance with OSHA standards.
- K. Refer to the 10 States Standard, most recent edition for odd conditions.

1.03 BYPASSING OF RAW WASTEWATER

- A. The bypassing of raw wastewater onto the ground or into a receiving stream is prohibited.

1.04 APPLICABLE SPECIFICATIONS AND STANDARDS

- A. The latest editions of the following specifications, standards and publications setting minimum requirements for quality, safety and performance of work and materials form a part of this specification as though fully repeated herein.

ASTM	American Society of Testing Materials
ANSI	American National Standards Institute
AWWA	American Water Works Association

1.05 RECORD DRAWINGS

- A. The Contractor shall be responsible for maintaining a set of approved and stamped design drawings, which have been marked to reflect as-built conditions. These “record drawings” shall be kept at the site during working hours and shall be made available to the City Inspector upon request.
- B. The record drawings shall show the as-built constructed locations and elevations of all manholes, stub outs, service materials, cleanout, air release valves etc.

**SECTION TWO
SEWER SYSTEM SPECIFICATIONS**

PART 2: MATERIALS

2.01 GENERAL

- A. Materials to be incorporated into the work shall be new and unused, and shall conform to all applicable requirements of these specifications. Submittal and approval of all materials, shop drawings or samples shall be in conformance with these specifications. Any materials installed prior to approval by the City, will be subject to rejection, and will be removed at the Contractor's expense.

2.02 SEWER PIPE

- A. **Polyvinyl Chloride (PVC) pipe for gravity sewers shall meet extra strength minimum of SDR-26 of the requirements of the largest revisions of ASTM D3034.** At each join, provisions must be made for contraction and expansion by insertion of a rubber ring. The bell shall consist of an integral wall section with a solid cross-section rubber ring, factory- assembled, and securely locked in place to prevent displacement. PVC pipe shall have a minimum cover of 36 inches. If the soil cover is less than 36 inches ductile iron shall be required. Use ductile iron pipe if the sewer depth is more than 16 feet.

Polyvinyl Chloride (PVC) pipe for force main sewers shall be C900 class 200 pipe. The pipe shall conform to AWWA C900, shall be DR-18 and a pressure rating of not less than 200 PSI. The PVC material shall be designated as PVC 1120 and shall conform to ASTM 1784. The joints shall be Gasketed Bell Joints conforming to ASTM D3139 and shall bear the NSF (National Sanitation Foundation) seal of approval. The color shall be green.

- B. Service line connections shall be made of the same material as the major sewer line to which they are connected. All service lines shall be 6" in diameter unless noted otherwise on the plans. Polyvinyl Chloride (PVC) service pipe shall be SDR-26. Service line shall terminate with a push plug. A 2" PVC pipe shall be installed vertically above the service line termination as a marker.
- C. Ductile iron pipe shall be push on or mechanical joint conforming to the latest editions of ASTM 746 and AWWA C106 Class 51. The pipe shall be lined with Protecto 401 Ceramic Epoxy coating. Rubber gasket joints shall conform to AWWA C111.

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- D.** Fittings shall be mechanical joint ductile iron fittings conforming to AWWA C110 and shall be lined with Protecto 401 Ceramic Epoxy coating. All fittings shall be pressure rating 350 psi. All fittings shall be manufactured in the USA.
- E.** Locator wire shall be Number 14 AWG solid THHN plastic coated copper wire.
- F.** Detectable underground caution tape shall consist of a minimum 4.0 mil thickness, inert polyethylene plastic which is impervious to all known alkalis, acids, chemical reagents and solvents likely to be encountered in the soil, with a minimum 1/3-mil metallic foil. The tape shall be at least six inches (6”) in width and shall be solid green with identifying print in black letters. The tape shall have printed thereon the following: “CAUTION - BURIED SEWER LINE BELOW” and installed above both PVC and DIP sewer pipe. The identifying lettering shall be minimum 1 inch high and repeated continuously the full length of the tape. In no instance shall the spacing of the individual segment of the identifying message be greater than eight inches (8”).
- G.** Locator wire and caution tape shall be installed on all sewer pipe including laterals. Locator wire shall run up marker pipes at end of service line terminations. Coordinate with City of Dallas.

2.03 PRE-CAST MANHOLES

- A.** Prefabricated concrete manholes shall be constructed as shown on the contract drawings which must contain the City’s standard details and City specifications. The concrete shall have a minimum of 28 days comprehensive strength of 4,000 pounds per square inch with 2” x 8” 6/8 welded wire mesh reinforcement. The wall thickness shall be a minimum of 5 inches and the inside diameter of the manhole shall be 4 feet.
- B.** Manhole steps shall be factory cast into walls of manholes with 12” vertical spacing between steps.
- C.** The necks of pre-cast manholes may be built up with precast concrete rings a maximum of 8 inches in order to bring finished manhole height up to a finished grade. Brick may only be used under special circumstances as approved by the City.

2.04 MANHOLE CASTINGS

- A.** All castings shall be made accurately to the required dimensions and shall be sound, smooth, clean and free from blisters and other defects. Defective castings, which have been plugged or otherwise treated, shall be rejected. The contact surfaces between the cover and its corresponding supporting ring in the frame shall be

SECTION TWO SEWER SYSTEM SPECIFICATIONS

machined so that the cover will rest on the ring for the full perimeter of the contact surfaces.

Castings shall be thoroughly cleaned and before rusting begins shall be painted with bituminous coating so as to present a smooth finish-touch and tenacious when cold, but not tacky nor with any tendency to scale. There shall be no holes or perforations in the covers.

- B.** Manhole casting shall consist of cast iron frames and 22 ¾ inch diameter covers. Castings shall be Class II, weighing approximately 425 pounds. Rings shall be at least 7" high overall. Manhole lids must be set neatly in the rings with contact edges machined for even bearing and tops flush with ring edge. They shall have sufficient corrugations to prevent slipperiness and be marked in large letters "SANITARY SEWER". Lids shall have 2 pick holes each about 1 ½" wide and 1" deep with 5/8" undercut all around. All manhole frames and covers shall conform to ASTM A48, latest edition.
- C.** Manhole steps shall be polypropylene plastic steps with ½" diameter grade 60 reinforcement bars. Steps shall conform to ASTM D4101, latest edition and ASTM A615M, latest edition. Steps shall have corrugated treads. Steps shall be in vertical alignment the full, length of the manhole barrel.
- D.** Manhole exteriors shall be sealed to prevent ground water infiltration as listed on the City's Standard Precast Manhole detail.

2.05 INVERTS

- A.** Manhole inverts shall be constructed of cement mortar and shall have the same cross section as the invert of the sewers, which they connect. The manhole invert shall be carefully formed to the required size and grade by gradual and even changes in sections. Invert shall be rowlock. Changes in direction of flow through the manhole shall be made to a true curve with as large a radius as the size of the manhole will permit.

2.06 CASING PIPE AND SPACERS

- A.** The steel casing pipe shall be manufactured from steel conforming to ASTM A139, Grade B, size and thickness shall be in accordance with approved plans and permits.
- B.** Spacers shall be bolt on style with a two-piece shell made from T-304 stainless steel of a minimum 14-gauge thickness. The shell shall be lined with a ribbed P.V.C. sheet of a .090" thickness that overlaps the edges. Runners made from UGMW polymer, shall be attached to riser at appropriate positions to properly locate the

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carrier within the casings and to ease installation. Risers shall be made from T-304 stainless steel of a minimum 14 gauge thickness and shall be attached to the shell by MIG welding. All welds shall be fully passivated. All fasteners shall be made from T-304 stainless steel. Casing spacers shall be Model CCS as manufactured by Cascade Waterworks Manufacturing Company of Yorkville, Illinois or approved equal.

2.07 ADAPTOR COUPLINGS

- A.** Adaptor couplings shall be polyvinyl chloride (PVC) with push-on gaskets designed for sealing joints between sewer pipes of dissimilar materials. Adaptors shall provide a positive seal against infiltration and exfiltration and remain leak proof and root proof. Couplings shall be manufactured by HARCO and shall be installed in accordance with the manufacturer's recommendations.

2.08 PIPE BEDDING MATERIAL

- A.** Embedment for PVC pipe shall be Class II in accordance with ASTM D2321, latest edition, and ASTM D2487, latest edition. Bedding materials shall be placed and compacted in accordance with Table 2 of ASTM D2487 to a minimum of 6 inch above the pipe crown. Recycled concrete is unacceptable.
- B.** Embedment for ductile iron pipe shall be Class A, B or C as defined in ASTM C12, latest edition. The pipe shall be bedded in clean coarse graded gravel and sand as defined in ASTM D2487, latest edition, Table (Type SW, SP, GW, & GP).
- C.** There are specific areas where crushed stone encasement (such as running ground water) may be desirable. The crushed stone shall be #57 stone or #67 stone conforming to ASTM D448, latest edition.
- D.** Bedding under structures shall be placed in the areas and to the depth shown on the plans or as required by the Inspector.
- E.** Bedding material shall be compacted by tamping with suitable tools and shaped to receive the pipe and to support the full length of the barrel of the pipe at exact line and grade.

2.09 AIR RELEASE AND AIR VACUUM VALVES

- A.** Air release valves (Type I): Valves shall be automatic air release valves designed to allow escape of air under pressure and close water tight when liquid enters the valve. The valve shall have a maximum orifice diameter of 5/16 inch. The valve body shall be cast iron, designed to facilitate disassembly for cleaning and maintenance. The float shall be stainless steel; the valve seat and all working parts

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shall be of corrosion resistant material. Valves shall be equipped with the necessary attachments, including valve, quick disconnect couplings and hose, to permit back flushing after installation without dismantling the valve. A letter from the Air Release Valve manufacturer stating their recommendation for the particular application, is required as part of the submittal approval process. Air release valves shall be APCO Valve Corp., Val-Matic, G.A. Industries, or approved equal.

B. Combination Air Valves (Type II): Combination air valves shall consist of an air release valve tapped into the body of an air and vacuum valve. Valves shall conform to the following.

- 1) Automatic Air and Vacuum Valves: Valves shall be automatic air and vacuum valves designed to allow escape of air, close water tight when liquid enters the valve, and allow air to enter on the event of a vacuum. The valve body shall be cast iron, designed to facilitate disassembly for cleaning and maintenance. The float shall be stainless steel; the valve seat and all working parts shall be corrosion resistant materials. Valves shall be equipped with the necessary attachments, including valves, quick disconnect couplings and hose, to permit back flushing after installation without dismantling the valve. A letter from the Combination Air Valve manufacturer stating their recommendation for the particular application, is required as part of the submittal approval process. Air and vacuum valves shall be equal to APCO Valve Corporation, Val-Matic, G.A. Industries, or approved equal.
- 2) Air Release Valves: Valves shall be automatic air release valves designed to allow escape of air under pressure and close water tight when liquid enters the valve. Valve shall have a 2-inch NPT inlet and a maximum orifice diameter of 5/16 inch. The valve body shall be cast iron, designated to facilitate disassembly for cleaning and maintenance. The float shall be stainless steel; the valve seat and all working parts shall be of corrosion resistant materials. Valves shall be equipped with the necessary attachments, including valves, quick disconnect couplings and hose, to permit back flushing after installation without dismantling the valve. A letter from the Air Release Valve manufacturer stating their recommendation for the particular application, is required as part of the submittal approval process. Air release valves shall be equal to APCO Valve Corp., Val-Matic, G.A. Industries, or approved equal.

2.10 CONCRETE MATERIALS

A. Cement to be Type 1 Portland conforming to ASTM C150, latest revision.

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- B.** Fine and coarse aggregates to conform to ASTM C33 latest revision, maximize size one inch.
- C.** Water to be clean and free of deleterious amounts of acids, alkalis or organic materials.
- D.** Ready mixed concrete to be used, (except where job mixing is approved) shall conform to ASTM C94, latest revision.

2.11 REINFORCEMENT

- A.** Reinforcement bars shall conform to the requirements of ASTM Specifications A615 (Class AA Intermediate Grade) or ASTM Specification A616. Bars shall be deformed in accordance with the requirements of ASTM Specification A305.
- B.** Place reinforcement accurately, in accordance with Chapter 8 in Part III of ACI 318, support adequately and tie securely so as to withstand displacement by subsequent operations; reinforcement sizes, spacing and bending to be as shown by drawings.
- C.** Provide sufficient supports of masonry material on 2'-0" grid to position reinforcement at the exact elevation shown by drawings.
- D.** Reinforcement mesh shall be steel fabric reinforcement and shall be welded steel fabric in accordance with ASTM Specification A-185. All "Runs" of reinforcing mesh shall be lapped six inches minimum.
- E.** No concrete shall be placed until the reinforcement has been inspected and approved.

PART 3: INSTALLING SEWER PIPE

3.01 GENERAL

- A.** Work included under this section consists of installing all sewer lines in trenched excavations as show on the drawings and as specified herein.
- B.** Installing wye and tee branches and making connection to service lines is also included under this section of work.

3.02 PIPE GRADE & ALIGNMENT

- A.** The Contractor shall use laser beam equipment to grade and align all sewer lines between manholes.

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3.03 INSPECTION OF PIPE & JOINTS

- A. No backfilling, (except for securing pipe in place) over pipe will be allowed until the City has had an opportunity to make an inspection of the joints, alignment and grade in the section laid.
- B. Inspection of piping and joints shall not relieve the Contractor of further liability in case of defective piping and/or joints, which prove defective.

3.04 PIPE BEDDING

- A. All pipe shall be laid with bottom quadrant of body of barrel of pipe on original earth, or on bedding as specified in Part 2: Materials, Paragraph 2.10 of these specifications in case of solid rock subgrade, with cuts in trench subgrade and cushion made for bells and pipe. Subgrade shall be accurately shaped to contour of the pipe so as to give uniform bearing on at least the bottom quadrant of pipe in earth.
- B. Irregularities in subgrade shall be corrected by the use of bedding material herein before specified.

3.05 TRENCH WIDTH

- A. Maximum permissible trench widths from bottom of trench to a point 12” above top of pipe shall be outside diameter of pipe barrel plus 12”, except as noted otherwise.
- B. Trench excavation from 12” above top of pipe to the surface shall conform to OSHA requirements.

3.06 JOINT CONSTRUCTION

- A. Each joint shall be laid so that it will form a closed concentric joint with adjoining pipe and so as to avoid sudden offsets or inequalities in the flow line. The inside of all bells and the outside of all spigots shall be wiped to remove all dirt, water, or other foreign matter so that their surfaces are clean and dry when the pipes are joined.
- B. Rubber ring Gasket joints for PVC or D.I. pipe shall be installed according to the pipe manufacturer’s specifications and recommendations. Extreme care shall be used in joining large diameter pipe to avoid damaging the rubber ring or displacing it from the proper operating position.
- C. Mechanical joints on ductile iron sewers shall be installed according to the pipe manufacturer’s specifications and recommendations.

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SEWER SYSTEM SPECIFICATIONS**

- D.** After the joints have been completed, they shall be inspected by the City before they are covered up. Any leaks or defects discovered at any time after completion of the work shall be repaired immediately. All pipe in place shall be carefully protected from damage until the backfilling operations have been completed. Any pipe which has been disturbed shall be taken up, the joint cleaned and remade and the pipe relayed at Contractor's expense.
- E.** Water shall not be allowed to run or stand in the trench while pipe laying is in progress or before the joints are completed or before the trench has been backfilled. The Contractor shall not open up at any time more trench than his available pumping facilities are able to dewater.

3.07 PIPE LAYING-GENERAL

- A.** Before sewer pipe is placed in position in the trench the bottom and sides of trench shall be carefully prepared, bedding shall be placed and compacted, and necessary bracing and sheeting shall be installed.
- B.** Each piece of pipe and special fitting shall be carefully inspected before it is placed and no defective pipe shall be laid in the trench. Pipe laying shall proceed up-grade, starting at the lower end of the grade and with the bells up-grade.
- C.** All sewer lines shall be laid at constant grade between invert elevations shown on the plans. Grades shown on the drawings are invert of the pipe and not trench subgrade. The pipe lengths shall be fitted together and matched, so that when they are laid in the trench, they will form a sewer with a smooth uniform invert visible as a full circle from manhole to manhole.
- D.** Air release valves as specified in part 2, paragraph 2.10, page 24 of this section are required at system high points of force mains that have at least 2 feet of depression downstream of the high point.
- E.** No filling of trench with earth to bring pipe to grade will be permitted. If trenches are dug too deep, they must be brought to grade and supported by pipe bedding. No pipe shall be laid in the trench until subgrade is checked and found to be correct.
- F.** Pipe shall not be laid on solid rock. A cushion of sand or gravel for pipe bedding, as herein before specified, at least 6" deep shall provide support for at least the bottom quadrant of the pipe.
- G.** The interior of the pipe shall, as the work progress, be cleaned of all dirt, jointing materials, and superfluous materials of every description. When laying of pipe is stopped for any reason, the exposed end of such pipe shall be closed with plug fitted

SECTION TWO SEWER SYSTEM SPECIFICATIONS

into the pipe bell, so as to exclude earth and other material, precautions being taken to prevent flotation of pipe by runoff into trench.

- H.** Sewer line trenches shall not be excavated more than 400 feet in advance. Trenches shall not be left open overnight unless approved by the inspector.
- I.** Laying of pipe may be held up by the City until trenching has progressed far enough ahead to remove the possibility of having to change grade or alignment on account of other structures, pipe lines, or conduits.
- J.** Not less than 100' of pipe shall be laid at one operation, unless permitted or directed for the following reason(s):
 - 1) Street and railroad crossings.
 - 2) Wet caving trenches
 - 3) Businesses, houses or institutions damaged by prolonged disconnection from street.
- K.** Unsuitable soils must be removed and replaced at the Contractor's expense. Unsuitable soils include: wet, yielding and mucky soils where pipe is in danger of sinking below grade or floating out of grade or line, or where native soil backfill materials are of such a fluid nature that such movements of pipe might take place during the placing of the backfill. The use of anti-buoyancy collars in flood plains will be considered on a case-by-case basis.
- L.** When approved by the Inspector: areas of the trench less than the length of the pipe that contain unsuitable soils, the unsuitable soils are to be removed and filled with stone to the sub grade level and then the appropriate bedding employed to support the pipe. If a void is encountered, the void can be filled with stone and the grade finished as listed for the unsuitable soils.
- M.** Pipes shall be laid free from all structures other than manholes. Any pipes entering structures underground unsupported by original earth, shall be supported by Class "B" concrete or brick and mortar masonry.
- N.** Pipe stubbed out of manholes for future connections shall be plugged and tightly sealed with the same jointing material used to plug laterals and the location will be shown on the as-built drawings.
- O.** Branch pipes or service lines shall be installed as shown on detail sheet of plans.
- P.** Six inch sewer pipe service laterals shall be laid to the easement right-of-way adjacent to property to be served. The end openings shall be closed by a plastic

SECTION TWO SEWER SYSTEM SPECIFICATIONS

plug jointed in the bell of the sewer pipe by a jointing compound approved by the Inspector. Dead ends of sewers shall be plugged similarly. The end of the service laterals shall be marked with a 20' section of 2" PVC pipe. A continuous length of locator wire shall be installed on the service lateral and up the marker pipe, where it shall be firmly affixed.

- Q.** Under normal conditions, where elevations are not critical, branch service sewers to customers shall be laid on not less than .01' per foot of length grade. Where depth of cover over wye or tee branches is greater than 6', these wyes or tees shall be encased in concrete.
- R.** Branch pipes may be brought up to a minimum 5-feet below surrounding finish grade with suitable bends. These pipes shall be laid on a slant outside sewer trench, so they will be supported on undisturbed earth and not dragged down and cracked by backfill settlement. Where depth of cover over wye or tee branches is greater than 6', these wyes or tees shall be encased in concrete.
- S.** All pipes and fittings must undergo pressure testing described later in the standards. No sections will be accepted that do not pass the leak test. Any sections that fail the leak test must be dug up and corrected. The Inspector may request an inflow test if he feels the groundwater level is such that the pressure test may not indicate a leak. If the inflow test shows any leak deemed excessive, the section must be excavated and repaired until it can pass the test.

3.08 DUCTILE IRON SEWER PIPE LAYING

- A.** Ductile iron sewers shall be laid to line and grade and according to provisions regarding bedding, laying, and jointing of PVC pipe, Except that joints shall be made with mechanical or push-in joints, according to the manufacturer's specifications and with tools recommended by them.

A copy of the manufacturer's instructions shall be made available at the site of work at all times when pipe is being laid.

- B.** Cutting of pipe may be done by wheeled pipe cutters. The Contractor will be held responsible for breakage or damage caused by careless cutting or handling.
- C.** No pipe shall be laid resting on rock, blocking, or other underlying objects except where laid above ground on piers or in permanent tunnels.

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SEWER SYSTEM SPECIFICATIONS**

3.09 PIPING CROSSING HIGHWAYS

- A. Highway and road crossing shall be made by jacking or boring unless specifically designated otherwise on the drawings for a particular location. In no case shall jetting or wet-boring of pipe lines be permitted.
- B. At crossing designed on the drawings, “steel casing pipe”, shall be installed for insertion of the sewer pipe. Casing shall be of size shown on drawings.
- C. Sewer pipe at jacked or bored crossings shall be Cast Iron pipe blocked or anchored in the casing to provide constant alignment and uniform grade through the casing. Field Lock gaskets shall be used to restrain the pipe joints installed in casing.
- D. In case of replacement of state highway pavement, the width, depth, other details, and method of applying, including base, shall be provided as required by the Georgia Department of Transportation Standards and Specifications.
- E. All pipe laid or bored on or beneath streets or roads shall be in accordance with the Georgia Department of Transportation Standards and Specifications.

3.10 SEPARATION OF WATER AND SEWER LINES

- A. **Maintain a 10-foot horizontal separation and/or an 18-inch vertical separation between all water and sewer lines. (Water main shall be above sewer main).**
- B. Where a 10-foot horizontal separation between water and sewer line is not maintained. Either the water main or sewer line shall be encased in a watertight carrier pipe which extends 10-feet on both sides of the crossing, measured perpendicular to the water main. The carrier pipe shall be of material approved by the regulatory agency for use in water main construction.

3.11 CONCRETE CONSTRUCTION

- A. Class A concrete shall have a minimum compressive strength at 28 days of 3,500 lbs. per square inch; and class B concrete shall have a 28 day compressive strength of 2,000 lbs. per square inch; take necessary precautions to prevent damage in freezing and near freezing weather.
- B. Do not: retemper or add water to the mix at job site; use no partially set concrete; deposit as near its final resting place as possible without segregation, rehandling or flowing, protect from damage after placing.
- C. Concrete placement shall proceed continuously each foundation.

SECTION TWO SEWER SYSTEM SPECIFICATIONS

- D. Concrete shall be well worked around reinforcement, into the corners of forms, and against all surfaces; thoroughly compacted by vibrating, spading and ramming with suitable tools and equipment.
- E. Curing shall conform to ACI-308 except where the Inspector approves an alternate method.

All slabs on grade: concrete will be maintained in a moist condition for a period of seven (7) successive days after depositing. During temperatures below 50 degrees F, the cure time shall be extended to (14) fourteen successive days. Concrete shall be kept moist by any one or a combination of these methods: Ponding or Immersion, Fog Spraying or Sprinkling, Pervious or Impervious Sheeting.

All other concrete: after placement, concrete shall be maintained in a moist condition for the same periods as slabs on grade.

Concrete in Formed Surfaces: Maintain a moist condition for the same periods as slabs on grade. If the forms are removed before the end of the curing period, apply a curing compound within one hour of form removal.

Concrete in Formed Containment Vessel Walls: Maintain a moist condition for the same periods as slabs on grade. If the forms are removed before the end of the curing period, maintain the same moist condition schedule as listed for slabs on grade.

- F. Concrete not formed as shown by drawings, is porous, or has defective surface or lacks required strength, shall be removed from the job site or repaired as directed.
- G. Concrete shall not be placed at temperature below 40 degrees when temperature is falling.

3.12 CONCRETE FINISHING

- A. All exterior surfaces of the foundations shall be finished with steel troweling.
- B. The finish shall be free from depression and defects and shall present a smooth texture.
- C. Curing as specified shall follow immediately upon the surfaces hardening sufficiently to prevent damage.
- D. Patch slight honeycomb and minor defects with cement mortar containing TrusconIso-Vol as recommended by the manufacturer.

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SEWER SYSTEM SPECIFICATIONS**

3.13 LOCATOR WIRE AND DETECTABLE UNDERGROUND CAUTION TAPE

- A. A continuous or properly spliced Number 14 AWG THHN solid plastic coated copper wire and caution tape shall be placed along all PVC pipe installations.
- B. Care shall be taken during backfilling to prevent damaging or cutting of the locator wire.
- C. All splices shall be made by using copper wire “U” bolt assemblies and then wrapping with electrical tape.
- D. Wire shall be wrapped around pipe such that at least four (4) “wraps” are produced per length of pipe.
- E. In lieu of “wrapping”, the locator wire may be strung along the top of pipe provided it is taped to the pipe every 5 feet to ensure proper positioning during backfilling.
- F. Detectable underground caution tape shall be placed one (1) foot over the top of all PVC pipe.
- G. The contractor shall provide access points to the locator wire as directed by the City.

3.14 CREEK CROSSINGS

- A. Sewer lines crossing above creeks or low areas shall be either ductile iron pipe within a steel casing or flanged ductile iron pipe set on piers. The casing or pipe shall be placed on piers as shown in the details. Spacing of piers shall be determined by an engineer to provide proper structural support without deflection. The drawings showing the pier layout shall be stamped and signed by the engineer.
- B. The bottom of aerial pipe shall not be set below the 50-year flood elevation.
- C. Buried stream crossings shall be ductile iron pipe within a steel casing. If there is less than 2 feet of cover from the top of the casing to the bottom of the streambed, the casing shall be encased in concrete. The crossing alignment shall not exceed more than a few degrees of perpendicular to the stream banks.

PART 4: INSPECTION AND TESTING OF SEWERS

4.01 GENERAL

- A. Work under this section shall consist of furnishing all labor and material for performing tests for alignment, defective, and leakage of the sewerage system installed.

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SEWER SYSTEM SPECIFICATIONS

- B. Defective work as indicated by tests specified herein shall be corrected immediately and the defective sections shall be retested.
- C. The City Inspector shall have a minimal of 48 hours notification prior to any testing.

4.02 HYDRAULIC TESTING OF SEWERS

- A. Measurements shall be performed on any lines with a visible flow of water. In no case will an infiltration rate be greater than 25 gallons per inch of pipe diameter per mile of sewer per day (24 hours) be allowed. All visible or audible leaks must be dug up and repaired, unless the leak is found to be in a joint and can be repaired by chemical grouting. The chemical grouted joint location must be shown on the as-built drawing and fully inspected by the video test. The testing procedure shall be in accordance with ASTM C1091, latest edition.

4.03 MANHOLE TEST

- A. **Manholes shall be tested in accordance to ASTM C 1244 “Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill”.**
- B. All lift holes and any pipes entering the manholes shall be plugged.
- C. Vacuum test in accordance to ASTM C 1244 must be conducted on completed manhole but prior to backfilling. Zero the vacuum gauge prior to starting the test. Place a vacuum of 10" Hg on the manhole. Maximum allowable vacuum loss shall be 1 inch of Hg in 60 seconds for 4 ft. diameter manhole, 75 seconds for 5 ft. diameter manhole, or 90 seconds for 6 ft. diameter manhole.
- D. Repair all manholes that fail the leakage test by an approved method and retest until satisfactory results are obtained.
- E. The City Inspector must be notified 48 hours in advance of the scheduled testing procedure.
- F. A Hydraulic Exfiltration test will be considered on a case-by case basis for approval by the City Inspector. To receive consideration, it must be demonstrated to the Inspector’s satisfaction that a Vacuum Test cannot be performed on a certain manhole. Following approval, the Hydraulic Test will be conducted by plugging all inlet and outlet pipes in the manhole. Fill the manhole with water to the top of the rim of the ring and cover. After sufficient time has passed to thoroughly wet the concrete, monitor the water loss over a 2 hour period. Maximum loss of water shall not exceed 2 – inches of water measured to the rim. Any plug(s) allowed to travel down an existing or new sewer line(s) will be recovered at the Contractor’s expense.

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SEWER SYSTEM SPECIFICATIONS**

4.04 AIR TEST

- A. A low pressure test of each sewer should be conducted in accordance with Unibell UNI-B-6 OR ASTM F1417, latest edition.**
- B. The sewer line shall be plugged and an initial air pressure of 5.0 psi shall be applied to the pipe. The air pressure must not drop below 4.5 psi for the duration of the test. For an 8-inch diameter sewer line with no service laterals, the minimum test duration is 1 minute, 12 seconds per 100 feet of length. Each 100 feet of 6-inch lateral length on the test section adds 42 seconds to the minimum test duration. Duration time for pipes with larger than 8-inch diameter will be adjusted at the direction of the City Inspector.**
- C. Any section of sewer line that fails to meet requirements of the method used shall be repaired, as necessary, to eliminate all detectable leaks and shall be retested until satisfactory test results can be obtained.**
- D. The City Inspector must be notified 48 hours in advance of the scheduled testing procedure.**

4.05 ALIGNMENT TEST

- A. The sewers shall be checked for alignment by visual, lamping or laser alignment methods. A complete “full moon” must be seen during lamping by the Inspector. Any detection of being out of alignment shall be repaired as directed by the Inspector.**

4.06 MANDREL TEST

- A. A mandrel test shall be performed prior to acceptance of all installed PVC pipe. The initial mandrel test shall be performed thirty (30) days after the trench has been backfilled. The mandrel must move freely inside the pipe and will be pulled by hand from the upstream end of the pipe to the downstream end. Deflections in PVC pipe shall not exceed the limit required in ASTM 3034, latest edition, and ASRM D2122. The mandrel used shall be capable of measuring 5% deflection.**

4.07 SEWER VIDEO

- A. The contractor shall provide an internal video on DVD of all gravity sewers to the City at his expense.**

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SEWER SYSTEM SPECIFICATIONS

4.08 FORCE MAIN TESTING

- A. After the force main has been installed, the complete pipeline shall be tested in accordance with Section One, Water Distribution System Specification.

**SECTION THREE
EXCAVATION, TRENCHING AND BACKFILLING**

SECTION THREE: EXCAVATION, TRENCHING AND BACKFILLING

PART 1: GENERAL

1.01 SCOPE

- A.** This section covers the excavation, trenching, and backfilling for all water mains, sanitary sewers, and service laterals up to the point of connection to the building sewer, property line, right of way, or back of curb as applicable.

1.02 DENSITY TESTS

- A.** All trenches 12-inches or wider, as measured at the top, that are within roadways, or roadway right of ways, parking areas, and areas to be paved shall be tested for conformance to specified compaction requirements.

- 1) These trenches shall be backfilled and compacted to their full depth.
- 2) Tests shall be made within each 400 square feet of trench areas for each one foot of lift above top of conduit. Tests taken in one foot lifts shall be staggered.
- 3) Backfill compaction shall have a minimum density of 95% standard proctor in accordance with ASTM D698, latest edition for the full depth.
- 4) Backfill within the Georgia Department of Transportation right-of-way shall meet all requirements as stipulated in the "Utility Accommodation Policy and Standards", as published by the Georgia Department of Transportation.

- B.** All trenches 12-inches or wider, as measured at the top, that are not within roadways, or other areas to be paved shall be compacted to not less than that of surrounding areas of 90% of the maximum dry density.

PART 2: MATERIALS

2.01 SHEETING & SHORING MATERIALS

- A.** Construction wood sheeting may be new or used lumber of a species or grade suitable for the proposed use.
- B.** If steel sheet piling is used, it shall conform to ASTM A328 and consist of rolled sections of the continuous interlocking type. Minimum thickness of the web and flange metal shall be 3/8 inch, unless otherwise approved or specified. Rivet steel and structural material as fabricated connections and accessories shall conform to requirements of ASTM A502 and ASTM A36. All steel sheet piles shall be

**SECTION THREE
EXCAVATION, TRENCHING AND BACKFILLING**

furnished with standard pulling holes located approximately 4-inches below the top of the pile.

- C. The Contractor shall retain full responsibility for the structural integrity and adequacy of the sheeting.

PART 3: EXECUTION

3.01 EXCAVATION

- A. The Contractor shall perform all excavation in accordance with the most recent OSHA standards and to the depths required or as shown on drawings. During excavation, material suitable for backfilling shall be piled a minimum distance of 2 feet from the banks of the excavation to avoid overloading and to prevent slides and cave ins. Excavated materials not required for fill or back fill shall be removed from the site. Unless otherwise indicated or specified, all excavation shall be made by open cut. No tunneling shall be done.

- B. Excavation shall not be carried below the designated level except where special bedding required due to unforeseen conditions, or is specified or shown on the drawings. Excess excavation below the designated level shall be backfilled with crushed stone and tamped.

Excess excavation for manholes and other structures shall be filled with crushed stone or concrete to the required elevation.

- C. Trenches shall be only of sufficient width to provide a free working space on each side of the pipe. To prevent excess pressure on the pipe, the maximum width of pipe trench at the top of the pipe shall not be greater than two feet more than the pipe diameter. If this maximum width is exceeded for water or sewer pipelines, the Contractor shall provide Class A bedding as presented in Section Two. The top portion of the trench above 4 feet shall be excavated with sloping sides in accordance with OSHA standard to any width, which will not damage adjoining structures, roadways, pavements, utilities, or private property. If it is deemed necessary to excavate trench with vertical sides, then OSHA approved shoring and sheeting methods shall be used.
- D. All water mains shall have a minimum of 48-inches of cover above the top of the pipe or 48-inches below the edge of pavement, whichever is greater, unless shown otherwise on the approved plans.
- E. The trench bottom shall be made to conform as near as possible to the shape of the lower third of the pipe. Excavation shall be made for joints of all pipes, and shall be of sufficient depth to permit access to the joint for construction and inspection.

SECTION THREE
EXCAVATION, TRENCHING AND BACKFILLING

In no case shall the joints be used to support the body of the pipe. Bell holes shall be excavated in the trenches so as to relieve pipe bells of all load, but small enough to insure that support is provided throughout the length of the pipe barrel.

- F.** Unsuitable soil shall be removed and replaced with crushed stone, which shall be tamped at the Contractor's expense.
- G.** Ground adjacent to all excavations shall be graded to prevent inflow of water.
- H.** The excavation of the trench shall not advance more than 100 feet ahead of the completed pipe work.
- I.** The Contractor shall remove any water accumulated during excavation, whether from ground or surface sources.
- J.** The Inspector shall be notified immediately upon encountering site conditions at variance to those indicated and any active or inactive utility encountered not indicated on the drawings. No work shall be done to correct or incorporate unforeseen conditions until written instructions are issued.
- K.** **No trenches will be permitted to be left open overnight, on weekends, or on holidays.**
- L.** All unsuitable excavated material shall be properly disposed of in a manner acceptable to the City Public Works Department and in a manner that will not adversely impact the environment.

**SECTION THREE
EXCAVATION, TRENCHING AND BACKFILLING**

3.02 ROCK EXCAVATION

- A. All rock encountered shall be removed 6-inches below the bottom of grade of the trench where pipe is being laid, and the trench built back to the correct grade with suitable select material thoroughly tamped into place, unless the Contractor is specifically directed to place stabilization.
- B. Blasting permits for each development within the City shall be required. Coordinate with Community Development office for a permit. Blasting shall be done with the precautions specified by the State Fire Marshall. Notify the City Marshal 24 hours in advance of proposed blasting within the City.
- C. The Contractor shall notify the Paulding County Fire Department prior to blasting operations.
- D. All blasting operation and all handling, storage and use of blasting materials shall be in strict accordance with Federal, State and local ordinances and regulations and shall be approved by the State Fire Marshall. Blasts shall be restricted to the extent that no appreciable shock will be transmitted to existing structures, pipelines, sewers, cables or other private facilities. The Contractor shall be wholly responsible for any and all personal injury or property damage resulting from blasting. **The Contractor shall monitor blasting in accordance with State rules and regulations.**

3.03 SHEETING AND SHORING

- A. All excavations shall be properly shored, sheeted and braced or cut back at the proper slope to furnish safe working conditions, to prevent damage to structures or other work, and to avoid delay to the work, in all compliance with the most recent U.S. Department of Labor Occupational Safety and Health Administration 29CFR part 1926 Occupational Safety and Health Standards-Excavations; Final Rule. Bracing shall be so arranged as not to place any strain on portions of completed work until the general construction has proceeded far enough to provide ample strength.
- B. Timber sheet piles shall be sharpened in a manner which will assist in holding them in true alignment during driving and the tops shall be protected with caps or other means to prevent damage by the driving equipment. Any pieces damaged or split below the point of cutoff shall be removed and replaced with undamaged pieces.
- C. Sheet piles shall be carefully located and driven straight and true to the desired elevation with secure interlocking for the entire length. Damaged piling or one with

**SECTION THREE
EXCAVATION, TRENCHING AND BACKFILLING**

faulty alignment shall be withdrawn and new piling driven properly in its place. Jetting will not be permitted. Excavation shall not be carried in advance of the sheet piling.

- D.** Sheeting and bracing shall be removed as the excavation is refilled in such a manner as to avoid caving in of the areas or structures. Voids left by withdrawal of the sheeting shall be carefully filled by ramming.

3.04 BACKFILLING

- A.** No backfilling shall be done over pipelines until all pipes have been inspected and approval received from the Inspector, unless otherwise directed.
- B.** Trenches shall be backfilled with earth backfill materials placed evenly around and on both sides of the pipe in 6-inches maximum layers, the tamped until pipe has cover of not less than 12-inches above top of pipe. The remaining backfill shall be placed evenly in 12-inch layers compacting each layer thoroughly to the specified compaction. Water settling shall not be permitted. Any trenches where settlement occurs shall be reopened, refilled and compacted with the surface restored to the specified grade and compaction, and smoothed off.
- C.** Prior to backfilling at manholes, structures, and other accessories, all forms, trash and debris shall be removed. Backfill material shall be symmetrical on all sides in 8-inch maximum layers. Each layer shall be moistened and compacted with tamps.
- D.** Where pipes are in a fill section or are projecting into fill sections, ductile iron pipe shall be used. Where pipe is not structurally supported, unsuitable material shall be removed and trench stabilization provided. A pipe bed shall be constructed of No57 crushed stone and be compacted to at least 90 percent of the maximum dry density, unless otherwise specified. The material shall be placed evenly in 6-inch maximum layers to the proper subgrade unless otherwise directed by the City. After the trench has been stabilized, normal backfill and compaction operations shall resume as specified herein.
- E.** Prior to final acceptance of the pipeline installations, the Contractors shall refill all sunken trenches and excavations to final grade.
- F.** Earth backfill shall be free of stone and boulders. Acceptable backfill material may be from excavation or borrowed.
- G.** No rock will be allowed in the backfill within a distance of 6-inches from the pipe or the ground surface, and rock larger than 6-inches in the greatest dimensions will not be permitted in any parts of the trench.

**SECTION THREE
EXCAVATION, TRENCHING AND BACKFILLING**

3.05 SUBSURFACE OBSTRUCTIONS

- A.** The drawings indicate underground utilities or obstructions that are known to exist according to the best information available to the City. **The Contractor shall call the Utilities Protection INC., “CALL BEFORE YOU DIG” at 811 prior to starting any excavation or construction.**
- B.** While excavating, backfilling, and laying pipe, care must be taken not to remove, disturb, or injure any existing water, sewer, or gas pipes, or other conduits or structures. If necessary and with the permission of the utility Owner, the Contractor shall sling, shore up and maintain such structures in operation, and within a reasonable time shall repair any damage done to them. Written proof of the Utility’s inspection and acceptance of any and all repairs shall be submitted to the City’s Inspector. Before final acceptance of the work, he shall return all such structures to original condition.
- C.** The Contractor shall give sufficient notice to the interested utility of his intention of removing or disturbing any pipes, conduits, etc, and shall abide by their regulations governing such work. In the event that any subsurface structure becomes broken or damaged in the course of the work, the Contractor shall immediately notify the proper authorities and shall be responsible for all damage to persons or property caused by such damage.
- D.** When pipes or conduits providing services to adjoining buildings are broken during the progress of the work, the Contractor shall repair them at once, or if repaired by the utility involved, shall pay the utility any charges for having such repairs made by the utility.
- E.** The City will not be liable for any claim made by the Contractor based on underground obstructions being different to that indicated in these specifications or on the plans.

3.06 CLOSING OF STREETS AND DRIVES

- A.** **Driveways which are cut for installation of piping must be backfilled and cleared for traffic within four hours of being cut. Property owners must be given 24 hours advance notice that work will be done.**
- B.** **The City shall be notified of any scheduled street closing, and approval must be obtained for such closing, notification must include a scheduled time for closing the street and a scheduled time for completion of work.**

**SECTION THREE
EXCAVATION, TRENCHING AND BACKFILLING**

- C. Notify the City of Dallas Public Works, the City of Dallas Police Department, Paulding County School System and Paulding County E-911 Communications Center in advance of any street closings.**

- D. A number of steel plates, enough to span an open trench in a roadway, shall be on the jobsite in the event that emergency road or driveway access is demanded by the City or County Officials.**

**SECTION FOUR
SITE PREPARATION, RESTORATION AND RELATED WORK**

SECTION FOUR: SITE PREPARATION, RESTORATION AND RELATED WORK

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. This section covers all work required to prepare the site for pipeline construction as well as site restoration. Also, included in this section is miscellaneous work required to complete the overall project.
- B. This work includes but is not limited to pavement and sidewalk removal and replacement, erosion and sedimentation control, curb and gutter removal and replacement, grassing and refuse removal.

PART 2: MATERIALS

- A. Materials to be incorporated into the work shall be new and unused, and shall conform to all applicable requirements of these specifications. Any materials installed prior to approval by the City will be subject to rejection, and will be removed at the Contractor's expense.
- B. Asphaltic coverage and related bituminous materials for roadway construction shall conform to the requirements of Georgia Department of Transportation Standard Specifications for the Construction of Roads and Bridges, latest edition.
 - 1) Asphaltic concrete shall be Type F. Type E will not be accepted.
 - 2) Concrete and reinforcement for concrete pavement shall conform to the requirements for the Georgia Department of Transportation Standard Specifications.
- C. Grassing and erosion control materials shall conform to the requirements outlined by the Georgia Department of Transportation Standard Specification, latest edition and Georgia Soil and Water Conservation and Commission Erosion & Sediment Control Manual.
- D. Stone rip rap shall be sound, tough, durable stones resistant to the action of air and water. Slabby or shaley pieces will not be acceptable. Specific gravity shall be 2.0 or higher. Unless shown or specified otherwise, stone rip rap shall be Type 3 rip rap.

**SECTION FOUR
SITE PREPARATION, RESTORATION AND RELATED WORK**

PART 3: EXECUTION

3.01 CLEARING AND GRUBBING

- A.** The location of the work shall be cleared of all trees, growth, debris, stumps and other objectionable matter before trenching. Special care shall be taken not to damage any adjacent or nearby shrubbery, trees, grass, fences, walks, utility, lines, drainage structure, paving or other property. The Contractor shall be responsible for such damage and shall replace all such property damage with equally new property, all to the satisfaction of the property owner.

Removal of trees and permanent structures along or in the trench space shall be done by the Contractor, but only as directed. All construction activity shall be confined to the limits of the easement, right-of-way unless the Contractor obtains legal rights to use adjacent property from the private owners concerned.

- B.** The Contractor shall clear all permanent City of Dallas right-of-way and remove obstructions along the pipeline for a sufficient area to provide adequate and safe work place. All debris shall be removed and disposed of by the Contractor.
- C.** Where the tree limbs interfere with utility wires, or where the trees to be felled are in close proximity to utility wires, the tree shall be taken down in sections to eliminate the possibility of damage to the utility.
- D.** All fences adjoining any excavation or embankment that may be damaged or buried shall be carefully removed, stored, and replaced.
- E.** All stumps, roots, foundations and planking embedded in the ground shall be removed. Piling and butts of utility poles shall be removed to a minimum depth of 2 feet below the limits of excavation.
- F.** Do not cut trees for the performance of the work except as allowed above and as absolutely necessary. Protect trees that remain in the vicinity of the work from damage from equipment. Do not store spoil from excavation against the trunks.

3.02 TEMPORARY EROSION AND SEDIMENTATION

- A.** Temporary erosion and sedimentation controls shall meet the requirements of the Georgia Erosion and Sedimentation Act of 1975 (as amended) the approved erosion and sedimentation control plan or as directed by the City or EPD Inspector. All erosion and sedimentation (E&S) control measures must be installed prior to the initiation of construction activity.

SECTION FOUR
SITE PREPARATION, RESTORATION AND RELATED WORK

- B.** The Contractor shall acquire land disturbance permits from the appropriate governing authority, and shall pay any fees for said permits.
- C.** All silt fence shall be removed and the abandoned fence trench stabilized subsequent to the NOT is submitted by the Contractor.

3.03 CONSTRUCTION WITHIN STATE HIGHWAY, COUNTY ROADS AND CITY STREETS

- A.** All storage of materials, excavation, backfilling, pavement removal and replacement, clean up and grassing shall be in strict accordance with the applicable State, County or City regulations. It shall be the Contractor's responsibility to determine the exact requirements of the authority having jurisdiction over the right-of-way and obtain all required permits. No highway, road, or street shall be closed to traffic without written authorization from the proper authority.
- B.** **The Contractor shall coordinate the closing of any street at least 72 hours in advance with the City, the Paulding County Department of Transportation, or the Georgia Department of Transportation.**
- C.** The Contractor shall provide, erect and maintain all necessary barricades, suitable and sufficient lights and other traffic control devices; shall provide qualified flagmen where necessary to direct traffic; shall take all necessary precautions for the protection of the work and the safety of the public as required by the authority with jurisdiction of the roadway.
- D.** Construction traffic control devices and their installation shall be in accordance with the current Georgia "Manual of Uniform Traffic Control Devices for Streets and Highways".
- E.** Placement and removal of construction traffic control devices shall be coordinated with the City, Georgia Department of Transportation and/or Paulding County a minimum of 48 hours in advance.
- F.** Placement of construction traffic control devices shall be scheduled ahead of associated construction activities. Construction time in street right-of-way shall be conducted to minimize the length of time traffic is disrupted.

When working within all right-of-ways, provide trained and certified flag people who have completed a training program approved by the Georgia Department of Transportation. Construction traffic control devices shall be removed immediately

SECTION FOUR
SITE PREPARATION, RESTORATION AND RELATED WORK

following their useful purpose. Traffic control devices used intermittently, such as “Flagmen Ahead”, shall be removed and replaced when needed.

- G.** Existing permanent traffic control devices within the construction work zone shall be protected from damage due to construction operations. All damaged traffic control devices requiring temporary relocation due to construction shall be located as near as possible to their original position with approval from the owner. Their original position shall be measured from permanent reference points and recorded in a permanent log prior to relocation. Temporary locations shall provide the same visibility to affected traffic as the original position. Relocated permanent traffic control devices shall be reinstalled in their original positions as soon as practical following construction in the affected location.
- H.** Construction traffic control devices shall be maintained in good repair, clean and visible to affected traffic for daytime and night time operation. Traffic control devices affected by the construction work zone shall be inspected daily.
- I.** Construction warning signs shall be black legend on an orange background. Regulatory signs shall be black legend on a white background. Construction sign panels shall meet the minimum reflective requirements of the Department of Transportation. Signs panels shall be of durable materials capable of maintaining their color, reflective character and legibility during the period of construction.

3.04 RAILROAD CROSSINGS

- A.** Railroad crossing shall be made in accordance with all requirements of the affected railroad. It will be the Contractor’s responsibility to obtain all requirements from the railroads and furnish all labor materials required to fulfill such requirements. The Contractor shall furnish and install the casing under the tracks with whatever material and with whatever methods and under whatever regulations are required by the railroads.

3.05 STREAM AND DITCH CROSSING

- A.** At all points where banks of streams or drainage ditches are disturbed by the excavation or where natural vegetation is removed, carefully compact backfill and place rip rap to prevent subsequent settlement and erosion.
- B.** Place rip rap a distance of not less than 10 feet upstream and downstream or 10 feet each side of the stream in any disturbed area. Place to conform with natural slope of the stream bank. Do not place any riprap within the stream bed or bank unless a permit has been obtained from the U.S. Corps of Engineers.

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SITE PREPARATION, RESTORATION AND RELATED WORK

- C.** The requirements of this section apply equally to construction along side a stream or drainage ditch as well as crossing a stream or drainage ditch.

- D.** Embed stone rip rap by hand so as to form a compact layer at least 12- inches thick. Place rip rap in such a way that the smaller stones are not segregated but evenly distributed. Place chinking stones in the crevices between the larger stones so that a dense, well graded mass is produced.

SECTION FIVE GRASSING

SECTION FIVE: GRASSING

PART 1: GENERAL

1.01 SCOPE

All disturbed areas left idle for 14 days shall have mulch applied to a depth of 2 to 4 – inches and/or seed to establish temporary vegetation in accordance with the erosion control details of the plans and the Manual for Erosion and Sedimentation Control in Georgia, latest edition.

All disturbed areas left idle for longer than 4 weeks shall be established to permanent vegetation in accordance with this section and the Manual for Erosion and Sedimentation Control in Georgia, latest edition.

PART 2: EXECUTION

2.01 VEGETATION SCHEDULE

- A.** During the period from March 1 to July 31, plant Weeping Love Grass at the rate of 2 pounds per acre and Interstate Lespedeza (scarified) at the rate of 60 pounds per acre.
- B.** During the period from August 1 to February 28, plant tall Fescue at the rate of 20 pounds per acre and Interstate Lespedeza (unscarified) at the rate of 75 pounds per acre.
- C.** In locations where piping is installed across established lawns or pastures, Contractor shall be responsible for re-seeding or re-sodding all disturbed areas. Such areas shall be restored as nearly as possible to original conditions.
- D.** Seed shall conform to Georgia DOT Standards Specifications Sections 700 and 890, latest edition.
- E.** Any disturbed area left exposed for a period greater than 14 days, and less than 4 weeks shall be stabilized with mulch or temporary seeding as specified in the Manual for Erosion and Sedimentation Control in Georgia, latest edition.

2.02 LIME AND FERTILIZER APPLICATION

- A.** Lime shall be applied to all areas to be seeded at the rate of one ton per acre. Lime shall conform to Georgia DOT Standard Specifications Sections 700 and 882, latest edition.

**SECTION FIVE
GRASSING**

- B.** 10-10-10 fertilizer shall be applied to all areas to be seeded at the rate of 1500 pounds per acre. Fertilizer shall conform to Georgia DOT Standard Specifications Sections 700 and 891, latest edition.

2.03 GROUND PREPARATION FOR PLANTING

- A.** The ground shall be prepared for planting in accordance with Georgia DOT Standard Specifications Section 700, latest edition.

2.04 IRRIGATION

- A.** Water used for irrigation may be obtained from any approved source. The water shall be free of excess and harmful chemicals, acids, alkalines, and all substances which may be harmful to plant growth. Salt or brackish water shall not be moved.

2.05 ACCEPTABLE GRASSED AREA

- A.** Grass areas will be considered acceptable when a visible stand of grass covers at least 98% of the total area with no bare spots exceeding one square foot and the ground surface is fully stabilized against erosion

**SECTION SIX
FURNISHING AND INSTALLING SEWAGE LIFT STATION**

SECTION SIX: FURNISHING AND INSTALLING SEWAGE LIFT STATION

PART 1: GENERAL

1.01 PLAN REQUIREMENTS

- A.** The City of Dallas will consider allowing a lift station only in areas where the City determines gravity sewer is not feasible.

- B.** All plans, Engineer's calculations for TDH, GPM, and documents submitted to the City of Dallas must be signed and sealed by a professional engineer who is qualified to design sewage lift stations in the State of Georgia. The City may require further review of any or all documents by a qualified P.E. chosen by the City at the Developer's expense. Plans of the pump station shall also be submitted to Georgia EPD for approval.

1.02 SCOPE

- A.** Work under this section shall include furnishing material, equipment and labor to install a sewage lift station with a stand-by generator system. The station shall be complete with all needed equipment including all appurtenances in a precast concrete wet well and an electrical control panel configured as shown on the Drawings.

- B.** The City will decide on the type system to be installed either a Wet Well Mounted or a Submersible Pump station. Should the project profile make it unreasonable to select the Wet Well Mounted unit, the City will consider the use of a Submersible Pumps station. The City will make the choice.

- C.** The principle items of wetwell mounted sewage pump station equipment shall include wetwell, pump chamber, pumps, piping, valves vacuum priming system, electrical and level controls, standby generator with automatic transfer switch, high liquid level alarm bell and warning light, heater, recommended spare parts, and all appurtenances for a complete operating raw sewage pump station

- D.** The principle items for a submersible pump system shall include a minimum of two submersible pumps, pump chamber and valve pit, pump removal guide system, mounting plates with discharge elbows, access frames and covers, pump lifting chains with hooks, permanently mounted pump hoist system, standby generator with automatic transfer switch, power and control cables with support brackets, electrical panel, level controls, discharge valves and piping, recommended spare parts, and all appurtenances for a complete operating raw sewage pump station.

SECTION SIX
FURNISHING AND INSTALLING SEWAGE LIFT STATION

- E.** Work under the section shall also include installing a wet well for the lift station, complete with piping to lift station and fencing as detailed on plans.
- F.** All openings and passages shall be large enough to permit the passage of a sphere 3” in diameter and any trash or stringy material, which can pass through a 4” house pipe system. Internal piping and valves shall be 6” size, with 6” common discharges, except as noted on drawings.
- G.** A wetwell mounted station shall be manufactured by Smith and Loveless, Inc., Lenexa, Kansas as shown on the plans. A submersible pump station shall be manufactured by Xylem, Inc., Flygt Corporation of Norwalk, Connecticut as shown on the plans.
- H.** The Manufacturer shall furnish to the City six (6) copies of drawings of equipment to be furnished; foundations plans, number and position of all anchor bolts, literature and operating instructions. Six (6) copies of performance curves shall also be furnished for all pumping equipment, showing the condition point, shut-off head, the impeller diameter, the pump speed, and the horsepower. Six (6) copies of the manufacturer’s installation, operation and maintenance instructions shall be furnished when the equipment is installed.
- I.** Review of the shop drawings shall not relieve the Contractor for the correctness of all dimensions and for the correct fitting of all parts, or for the satisfactory installation and operation, in service, of all materials and equipment as specified.
- J.** The pump station capacity shall be as directed by the City of Dallas.
- K.** All pump stations shall be designed to be 2 feet above the 100 year flood plain.
- L.** A security fence and night lite must be provided around the pump station (see standard details).
- M.** Vehicular traffic shall have access to the pump station by a paved driveway or road as shown on the drawing.
- N.** The pump station shall have an audible horn and visual alarm light provided by the pump manufacturer, or approved equal.
- O.** All electrical diagrams, load calculations, and schematics used to provide power to the equipment will be approved and signed by a registered Electrical Engineer.

**SECTION SIX
FURNISHING AND INSTALLING SEWAGE LIFT STATION**

PART 2: MATERIAL SPECIFICATIONS

2.01 LIFT STATION ELECTRIC SERVICE

- A. The Contractor shall confirm the available power source from the local utility services and provide pole, service entrance switch and all other labor and material necessary to supply electrical power to the lift stations, and shall be responsible for making connections to the main control cabinet in the station.
- B. Service entrance switch shall be sized as shown on the plans, and shall be an ampere-fusible automatic transfer switch with solid neutral. The switch shall be enclosed in a NEMA-3R enclosure and shall be fused and sized as shown on the plans.
- C. Back-up generator, generator controls and connections shall be as specified in Part 4 of this section.
- D. All electrical equipment must be in accordance with NFPA 70. The electrical installation must comply with all local codes.

2.02 PUMP OPERATING CONDITIONS

- A. Pumps shall be capable of delivering the capacity of raw, unscreened sewage against the total dynamic heads as required on the pump station chart in the plans. The maximum allowable speed shall be 1,760 RPM for a wet well mounted pump, and 3,600 RPM for a submersible pump. The minimum rated horsepower of each pump motor shall be as shown on the plans. The pump selected shall allow for impeller replacement with a larger diameter unit for future expansion.

2.03 WETWELL MOUNTED SEWAGE PUMP STATION

- A. The sewage pump station shall include wetwell, pump changer, pumps, piping, valves, vacuum priming system, electrical and level controls, and all related appurtenances. The entire system except for inlet and discharge pipes shall be factory assembled, tested, and ready for installation and operation. The system shall be a factory built wetwell mounted, duplex sewage pump station, manufactured by Smith & Loveless, Inc., Lenexa, Kansas.
- B. The wetwell shall be a standard precast manhole section(s) in accordance with ASTM-C478, latest revision and monolithic base section. The wetwell shall be coated as specified and installed in accordance with the drawings. The wetwell shall be tested as specified for manholes for infiltration. The wetwell shall have the interior coated with an approved epoxy protective coating designed for severe wastewater immersion and fume environment.

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FURNISHING AND INSTALLING SEWAGE LIFT STATION

- C.** The pump chamber shall be one complete factory built assembly to sit on top of a standard diameter wet well with the diameter dimension selected by the City. The base plate shall be a minimum of ½-inch thick stainless steel and reinforced where needed. The station enclosure shall be fiberglass, with stainless steel hinges, held open by gas struts, with a locking hasp and padlock. A separate locking access hatch shall be provided in the base plate with padlock for access to the wet well. The minimum open area of the hatch shall be 4.2-square feet. The hatch will be signed with a 7-inch by 10-inch sign permanently attached reading “Confined Space Entry Permit Required”. A stanchion with lifting arm shall be provided to facilitate removal of the pumps and motors. Enclosures for housing valves and/or controls shall not be placed in a Confined Space.
- D.** The pumps shall be vertical, “Non-Clog” sewage pumps. Each pump shall be of heavy, cast iron construction and shall include a vertical motor with the pump impeller mounted directly on the one-piece motor- pump shaft.
- E.** The pump impeller shall be of the enclosed type made of close-grained cast iron and shall be balanced. To prevent the build-up of stringy materials, grit and other foreign particles around the pump shaft, all impellers less than full diameter shall be trimmed inside the impeller shroud. The shroud shall remain full diameter so that close, minimum clearance from shroud to volute is maintained.
- F.** The pump volute shall be of heavy, cast iron construction, free from projections that might cause clogging or interfere with flow through the pump.
- G.** The motor shall be attached to the pump volute by a one-piece cast iron adapter and backhead. The pump shall be vacuum primed from above the impeller and behind a full shroud. The pump adapter shall be made so the water level can rise in the adapter, and submerge the seal assembly. The water level shall rise in the adapter far enough to eliminate all air in the volute. The pumps shall come equipped with mechanical seal designed to function with a vacuum priming system.
- H.** The pumps shall be supported by a heavy, cast iron base with four legs to provide maximum rigidity and balance. The height shall be sufficient to permit the use of an increasing suction elbow which shall be provided. The suction and discharge opening shall be flanged, faced and drilled 125-pound American Standard.
- I.** The pump motors shall be specially built NEMA P base, Squirrel-cage induction type, suitable for 3 phase, 60 cycle (voltage as shown on plans) electric current. They shall have a normal starting torque and low starting current, as specified for NEMA Design B characteristics. The motors shall not be overloaded at the design condition, and not at any head in the operating range as specified under “Operating

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Conditions". Prior to pump selection and approval by the City, Smith & Loveless shall submit to the City the model number of the pump and motor HP selected and describe the compatibility with the design parameters provided. The information provided for the proposed pumps shall meet the minimum performance requirements or the selection will be rejected. Motors rated 40 HP and greater shall be equipped with soft start motor starters.

- J.** The motor shall be fitted with heavy lifting eyes, each capable of supporting the entire weight of the pump and motor.
- K.** In the event that the City determines that the pump station has the potential for becoming submerged, the pump motors shall be of special construction and fitted with special seals to enable the motor to be immersed in up to 30-feet of water for a period of up to three weeks, without water entering the motor cavity. As part of the immersible motor package, a float switch shall be provided in the station to provide indication of water approaching the level of the motors and another float switch shall shut down the motors when the water level reaches them. Each of these floats shall have signal alarms and activate alarm lights on the control panel. The alarms shall remain activated until manually reset by switches on the panel. Moisture detectors and high temperature thermostats shall be provided in each motor, as a backup, to shut down the associated pump and to signal alarm conditions and activate alarm lights on the control panel. All of the alarm contacts shall be wired to a terminal strip in the control panel for connection to the City's alarm system.
- L.** The wetwell mounted sewage pump station pump control equipment shall be mounted within a NEMA Type 4 steel enclosure with two hinged, lockable doors and a steel barrier partition down the middle. One side of the divider shall house the three-phase circuits, (motor starters and circuit protectors, etc.), and the other shall house the single-phase control circuits and low voltage components. The microprocessor and low voltage control shall be accessible without exposing the three-phase high voltage supply, and the pump station controller shall be operable without opening the enclosure door. The control panel shall be supported on adjustable, extruded aluminum mounting legs, secured to the station baseplate. The slotted legs shall also serve as mounting points for auxiliary items, such as the vacuum priming subassembly. All circuit breakers, motor-starter reset buttons and pump control switches shall be mounted so that they are operable without opening the high-voltage cabinet. Control of the system will be provided by the microprocessor panel. A grounding type convenience duplex outlet shall be provided for operation of 115-volt A.C. devices. All wiring shall be completely factory installed, except for the power lines that run to the high voltage panel from

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the disconnect switch and the low voltage control wires to the floats and the level sensor. Controls shall include:

1. H-O-A of the pumps in lead lag automatic level control with separate on/off set points for each pump and pump alternation. The switches shall be 3 position rotary type with spring return on the Hand position.
2. Three phase overload protection, elapsed time meters, alarm light (100 watt, red globe with guard) and 4-inch weatherproof horn with external silencer and run lights. Three phase power systems shall have phase monitoring relays on each power leg which prevent operation during low power as well as power surges. Surge protections shall be provided to protect the MSS as well as the pumping equipment.
3. Delay start to prevent pumps starting simultaneously after a power failure.
4. 460/230V primary, 120V secondary and a 120/24 VAC control power transformer.
5. Three phase voltage monitor to stop pumps on voltage disturbances.
6. Main disconnect NEMA 4X rated service entrance, connected ahead of the transfer switch.
7. Indicating pilot light connected across the utility service line to monitor utility service availability.
8. A High Water Alarm and light mounted on the pump control panel. The unit shall be a manually adjustable loud horn, a flashing red light including a 100 watt bulb, red vapor proof globe and guard, and a control center containing switches for horn silence, alarm reset, and alarm test.
9. A running time meter for each pump.
10. A flow measuring device.
11. Lightning arrestor surge capacitor connected on the side of the main disconnect and to panel ground.
12. Wiring controls, and instrumentation shall conform to the requirements of the electrical section of this standard.
13. All conduits in the pump station shall be sealed air tight at each panel.
14. All electrical ratings shall conform to NFPA 820.

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- 15.** All control panel components shall be UL listed or recognized, and the control panel shall be labeled as a UL 508A General Use Industrial Control Panel. The control panel electrical equipment shall be protected by a surge protection device.
- M.** Thermal magnetic air circuit breakers shall be provided for branch disconnect service and over-current protection of all motor, control and auxiliary circuits. Magnetic across-the-line starters with under-voltage release and overload coils for each phase shall be provided for each pump motor to give positive protection against single phasing. Each single phase auxiliary motor shall be equipped with an over-current protection device, in addition to its branch circuit breaker, or shall be impedance protected. All switches shall be labeled and a color-coded wiring diagram shall be provided.
- N.** A NEMA 4 rated display unit shall be mounted through the front of the panel to provide operator input to and visual output from the microprocessor controller. Smith & Loveless' standard menu and field programmable screens shall be provided for display and management of pump and station control functions.
- O.** To maintain pump prime, a vacuum priming system shall be provided for each pump. The priming system shall be complete with vacuum pumps, vacuum control solenoid valve, prime level sensing probe, and a float operated check valve installed in the system ahead of the vacuum pump to prevent liquid from entering the vacuum pump. The priming system shall provide positive lubrication of the pump seal each time the pump is primed.
- P.** An automatic alternator with manual "on-off" switch shall be provided to recycle the pumps' sequence of operation on the completion of each pumping cycle.
- Q.** A ventilating blower shall be provided to adequately cool the machinery chamber in hot weather. The ventilating blower shall be turned on and off automatically by a pre-set thermostat. Heavy extruded aluminum, adjustable ventilating louvers shall be provided on each end of the fiberglass cover, which are capable of being closed during cold weather operation.
- R.** A 500-watt heater and thermostat shall be provided to protect the pumps from freezing in cold weather. Thermostat to be set to turn heater on at 37 degrees F.
- S.** The check valves shall be of the spring-loaded lever type so that the clapper can be lifted to back-flush the pump and suction line. Check valves shall have stainless steel shaft with non-lubricated packing glands. The common discharge pipe and the discharge outlet shall be as shown on the plans with a mechanical joint bell just outside the wet well.

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- T.** Smith & Loveless will review the plans during the design phase to determine if a Priming Locking Loop is recommended.
- U.** Level control shall be monitored by a level transducer enclosed in a “birdcage”. Probe and cable length shall be determined by the Contractor. All mounting brackets and hardware shall be 316 stainless steel. Level signals shall include low water level, high water level which is an alarm status, lead/lag pump on and pumps off. Back up float switches shall be provided for pumps off, low level pump on, and high level pump on.
- V.** Two sets of O&M manuals shall be provided for each pump station. The services of a factory trained service representative shall be provided for one 8 hour day for startup, testing, and operator training including any video presentations of seal location and replacement and care and maintenance of the pump station.
- W.** All steel structural members shall be joined by electric arc welding with welds of adequate section for the joint involved.
- X.** After welding, all inside and outside metal surfaces of the structure shall be blasted with steel grit to remove rust, mill scale, weld slag, etc. All weld splatter and surface roughness shall be removed by grinding. All surfaces other than stainless steel or aluminum shall be coated with Smith & Loveless’ Versapox epoxy coating to a 6 mil thickness.
- Y.** Exterior surfaces below grade elevations shall receive a minimum of 16 mils thickness of epoxy based coal tar coating applied in accordance with the manufacturer’s recommendation. Interior surfaces above grade elevation shall receive a 1.5 mil coat of epoxy primer followed by a minimum of two coats of epoxy enamel in accordance with the manufacturer’s recommendations.
- Z.** A touch-up kit shall be provided for repair of any marks or scratches occurring during installation. This kit shall contain detailed instructions for use and shall be a material which is compatible with the original coating. All kit materials will be removed from the site after the City accepts the station
- AA.** The wetwell mounted sewage pump station shall have been given a thorough operational test of all equipment at the factory to check for excessive vibration, for leaks in all piping or seals and for correct operation of the automatic control system and all auxiliary equipment prior to shipping to the site.

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2.04 SUBMERSIBLE PUMP SEWAGE STATION

- A.** The submersible pump station shall be manufactured by Xylem, Inc., Flygt Corporation of Norwalk, Connecticut as shown on the plans. The submersible pump system shall include a minimum of two (2) submersible pumps, pump chamber and valve pit, pump removal guide system, mounting plates with discharge elbows, access frames and covers, pump lifting chains with hooks, permanently mounted pump hoist system, standby generator with automatic transfer switch, power and control cables with support brackets, electrical panel, level controls, discharge valves and piping, recommended spare parts, and all appurtenances for a complete operating raw sewage pump station.
- B.** Pumps shall be totally submersible, electrically operated sewage pumps equipped with 3 Phase, 60 HZ, 230/460 volt motors. The motors shall not be overloaded at the design condition, nor at any head in the operating range “Operating Conditions”.
- C.** Pumps shall be designed for placement and removal via a stainless steel guide rail system without mechanical connections to the discharge piping.
- D.** All major parts of the pump shall be gray iron.
- E.** Motors shall operate at 3600 rpm maximum, have moisture resistant Class H insulation, and be designed for continuous duty.
- F.** Cable entry water seal shall not require specific torqueing in the field, and no supplemental sealing with caulks or epoxies shall be allowed. The pump shall include a cable entry junction box which is isolated from the motor.
- G.** Units shall have an adequately designed cooling system such that pumps are capable of operating continuously without submergence of the motors.
- H.** Stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. The switches shall open at 125° C (260° F), stop the motor and activate an alarm either local and/or remote.
- I.** A leakage sensor shall be provided to detect the presence of water in the stator chamber. When activated, the sensor shall stop the motor and activate an alarm either local and/or remote.
- J.** A leakage sensor shall be provided to detect the presence of water in the oil casing. When activated the sensor shall stop the motor and activate an alarm either local and/or remote.

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- K.** The thermal switches and leakage sensors shall be connected to a monitoring unit mounted in the control panel.
- L.** One pump shall be equipped with a mix-flush valve.
- M.** Control panel shall be a standard accessory of the pump manufacturer and shall include:
1. NEMA 4X stainless steel cabinet with dead front, lock hasp, and removable inside panel.
 2. H-O-A operation of the pumps in lead-lag automatic level control with separate on/off set points for each pump, and pump alternation.
 3. Three phase overload protection, three phase monitoring, running time meters, alarm light (100 watt, red globe with guard) and 4 inch weatherproof horn with external silencer, surge suppression protection, and run lights.
 4. Delay start to prevent pumps starting simultaneously after power failure.
 5. 460/230V primary, 120V secondary and a 120/24 VAC control power transformer.
 6. Motors rated 40 HP and greater shall be equipped with soft start motor starters.
 7. Main disconnect NEMA 4X rated service entrance, connected ahead of transfer switch.
 8. Indicating pilot light connected across utility service line to monitor utility service availability.
 9. Lightning arrester surge protection connected on side of main disconnect and to panel ground.
 10. A module to monitor pump motor thermal sensors and pump leakage sensors installed in each pump. Upon activation of any sensor the module will shut down the pump and activate a local and/or remote alarm.
- N.** Level control shall be monitored by a level transducer enclosed in a “birdcage”. Probe and cable length shall be determined by the Contractor. All mounting brackets and hardware shall be 316 stainless steel. Level signals shall include low water level, high water level which is an alarm status, lead/lag pump on and pumps off. Back up float switches shall be provided for pumps off, low level pump on, and high level pump on.

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- O.** The wetwell shall be standard precast manhole sections in accordance with ASTM-C478, latest revision and monolithic base section. The wetwell shall be coated as specified and installed in accordance with the drawings. The wetwell shall be tested as specified for manholes for infiltration. The wetwell shall have the interior coated with an approved epoxy protective coating designed for severe wastewater immersion and fume environment. The wetwell cover shall be manufactured by Xylem Flygt as shown on the drawings, complete with counterbalanced hinged and hasped cover, safety latch, upper guide holder, and level sensor holder. The cover will be signed with a 7-inch by 10-inch sign permanently attached reading “Confined Space Entry Permit Required”.
- P.** Discharge Piping and Valves: Discharge piping shall be flanged, standard thickness, ductile iron with coal tar epoxy coating.
- Q.** Check valves shall be ball check with Class 35 gray cast iron body and cover, Class 125 flanges, Flygt Type HDL.
- R.** Plug valves shall be DeZurik Series 100 non-lubricated, eccentric type, flanged with lever actuators.
- S.** Lifting chains shall be stainless steel with a minimum load limit and length sufficient for lifting and reaching pump lifting rings. Guide rails shall be stainless steel and supplied by the pump manufacturer.
- T.** A removable hoist with a permanently mounted base capable of lifting installed submersible pumps from wet well into standard pick-up truck bed shall be provided. The hoist shall be equipped with heavy duty ratchet style crank winch with brake. The hoist assembly shall be fabricated from hot dipped galvanized steel. Hoist assembly shall be installed in concrete embedded well and reach shall be sufficient to reach all pumps from the installed position. Hoist shall rotate 360°.
- U.** A ½” NPT pressure port location will be shown on the drawings. Provide the plugged port and a 0 – 150 psi liquid filled gauge equipped with a diaphragm seal to be installed during testing.

2.05 SCADA SYSTEM

- A.** **The SCADA communication system shall be from a City specified supplier and installer, and provided at the Contractor’s expense.** The control panel shall be furnished with a communication module with an Ethernet RJ-485 (Modbus/Ethernet) connector for remote monitoring by the SCADA system by a City specified supplier. The equipment shall be contained in a NEMA 4X Control Panel similar to the City of Dallas Water Control Panels. At a minimum the following data shall be made available over the RS-485:

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1. Connect to the submersible level transducer.
2. Convert the transducer signal to level and Display.
3. PRIME contact allows CALL-TO-RUN logic when needed.
4. If AUTO but no PRIME after a PRIME DELAY SET-POINT then to remote alarm out if possible. Logic to skip and use the other pump if available.
5. PUMP OFF SET-POINT unlatches CALL-TO-RUN, dependent on AUTO & PRIME.
6. LEAD PUMP ON SET-POINT latches lead CALL-TO-RUN, dependent on AUTO & PRIME.
7. LAG PUMP ON SET-POINT latches lag CALL-TO-RUN, dependent on AUTO & PRIME.
8. Alternate pumps if both are in AUTO, and called for by SCADA setting.
9. All pumps off on LOW-LOW Float (safeguard/override against PUMP OFF SET-POINT).
10. Turn both pumps on HIGH FLOAT (safeguard/override against PUMP ON SET-POINTS or assumes transducer has failed, and low-low float will assume pump off duty) program to have a time delay so there is a gap between when each pump starts although both are to run, to remote alarm out if possible.
11. HIGH-HIGH FLOAT, same functions as HIGH FLOAT, assumes SP & HI-FLOAT fail, to remote High Priority Alarm out if possible.
12. Local or remote control by SCADA when in AUTO.
13. Keeps track of RUNTIME.
14. Keeps track of START COUNT.
15. Report the run and/or alarm status.

2.06 SEWAGE PUMP STATION PIPING

- A. Wetwell mounted sewage pump station pump suction lines shall be as detailed on plans, including the use of schedule 80 PVC pipe and auxiliary brackets when required by the manufacturer. The discharge line from each wetwell mounted

**SECTION SIX
FURNISHING AND INSTALLING SEWAGE LIFT STATION**

sewage pump station shall be fitted with a clapper-type check valve installed at the factory.

- B. The first 100 feet of force main shall be ductile iron pipe for the wetwell mounted pump station or the submersible pump station. The remaining force main may be C900 DR-14 (Class200) PVC piping; except as shown otherwise on the plans.**

2.07 SPARE PARTS

- A. Deliver recommended spare parts and maintenance instructions to the City's personnel at time of startup.**

PART 3: EXECUTION

3.01 INSTALLATION AND OPERATING INSTRUCTIONS

- A. Installation of the pump station shall be done in accordance with written instructions provided by the Manufacturer.**
- B. In addition to the maintenance and Operating Chart, the Manufacturer shall further provide six (6) copies of a complete and detailed Operating and Maintenance Manual. This Manual shall cover, in addition to general operating procedures, the operation, maintenance and servicing procedures of the major individual components provided with the pump station. This Manual shall be shipped with the pump station.**
- C. The Manufacturer shall provide the service of a factory trained representative to perform initial start-up of the pump station and to instruct the City's operating personnel in the operation and maintenance of the equipment provided by the manufacturer. Training to be provided shall be for at least one 8-hour day. A 48 - hour advance notice of the startup schedule shall be communicated to:**
- The City of Dallas Public Works Department
 - The City of Dallas Sewer Department
 - The Land Developer
 - The Installation Contractor
 - The Design Engineer.

3.02 GUARANTEE

SECTION SIX
FURNISHING AND INSTALLING SEWAGE LIFT STATION

- A. The Manufacturer shall guarantee for one year from date of shipment that the structure and all equipment will be free from defects in design, material and workmanship. This does not remove the Contractor/Developer's bonding obligations and the two year warranty period established in the City Standards planning and construction steps.

PART 4: STATION STANDBY GENERATOR

4.01 GENERAL

- A. The standby generator shall have sufficient capacity to run all the pumps simultaneously. The motor controllers shall be interlocked so that the pumps will start in sequential order one at a time should a power failure occur while the high level switch is closed.
- B. The generator shall be manufactured by Caterpillar, Inc., Peoria, Illinois.
- C. Electric set rating shall be based on operation at 1800 RPM when equipped with all necessary operating accessories. Electric set shall be capable of producing the required KW at 0.8 PF for continuous standby electric set applications. All ratings shall be readily accessible in public literature; no factory special ratings are acceptable. Ratings shall be based on SAE standard ambient conditions of 29.38 inches of mercury and 122 degrees F. Engine shall be rated with jacket cooling water pump radiator fan and other required appurtenances; no two core radiators or separate after-cooler water circuits shall be allowed.
- D. Generator shall be 3 phase, 4 wire, 60 cycle, 1800 RPM. It shall be single bearing of heavy-duty ball bearing construction connected to engine flywheel through a suitable flexible coupling. Regulator shall have adjustments for gain, level, and droop.
- E. Exciter shall have sufficient capacity to produce ample excitation under all normal load conditions. Exciter shall be brushless type.
- F. The generator mounted control panel shall be NEMA 4X type, vibration isolated 14 gauge with the following equipment:
1. Voltmeter, 3 1/2", 2% accuracy
 2. Ammeter, 3 1/2", 2% accuracy
 3. Frequency meter, 3 1/2", Dial type
 4. Voltage adjustment level rheostat
 5. 4 fault indicator lights (low oil pressure, high coolant temperature, over speed, over crank)
 6. Panel illumination lights

SECTION SIX
FURNISHING AND INSTALLING SEWAGE LIFT STATION

- G.** Main line molded case circuit breaker, 100A, 3p for the 480 v, 3 phase circuits rated at 600 Volts and shall be provided as load circuit interrupting and protection devices and be mounted on the generator. It shall operate both manually for normal switching functions and automatically during overload and short circuit conditions; Generator/Exciter field circuit breakers are unacceptable for line protection. The circuit breakers shall meet standards established by Underwriters Laboratories, NEMA, and the National Electrical Code.
- H.** 20A, 120V, 1 phase circuit with plug & 50' cord shall be provided and wired to a receptacle on the engine generator for the crankcase heater.
- I.** All wiring shall conform to manufacturers wiring diagrams and shall be installed in a neat manner and in accordance with all other sections of the specification. Wiring shall be stranded and terminated in the box type terminals.
- J.** Generator will be controlled by Automatic Transfer Switch furnished and installed as shown on the Drawings. The rating shall be as shown on the Drawings for use on 480 V., 3 phase, 4 wire system. The automatic transfer switch shall be UL 1008 listed and by ASCO Bulletin 940 or approved equal. Accessories shall include: time delay on start (3 sec.) to ignore momentary outages; adjustable time delay transfer to normal (2 to 30 min.); cool down timer; test switch to simulate outages and to load the system; pilot contacts to initiate starting of the engine; insulated neutral plate; three (3) sets of auxiliary contacts for indication of switch position on normal and emergency; weekly exercise timer; and charger that may be housed in the switch enclosure. The transfer switch shall be housed in a NEMA 4X enclosure where shown on the Drawings. For allowing motor and transformer voltage decay prior to transfer, the transfer switch shall have either a timed programmed neutral or timed contacts that may be wired into motor starter circuit that will drop out motor starter then re-energize it after the transfer is made. The time shall be adjustable up to 10 seconds.
- K.** The engine shall be a full compression four-cycle, single-acting, injection unit with solid state ignition. Engine output capacity shall not be less than the required horsepower to run the specified generator at 1800 RPM under the rating conditions specified. Engine speed shall not exceed 1800 RPM at normal full load operation.
1. Governor shall be of the hydro-mechanical type and shall maintain frequency regulation within 3% from no load rated load.
 2. The system shall operate on diesel fuel.
 3. Injection pumps and injection valves shall not require adjustment in service. The engine shall have an individual mechanical injection valve for each cylinder, any one of which may be removed and replaced from parts stock.

SECTION SIX
FURNISHING AND INSTALLING SEWAGE LIFT STATION

4. A gear-type lubricating oil pump with lube oil cooler will supply oil under pressure to main bearings, crank pin bearings, camshaft bearings, and valve mechanism. Pistons shall be spray cooled. Effective full flow lubricating oil filters of the replaceable resin impregnated cellulose type shall be provided and so located that lubrication oil is continuously filtered. Filter system shall be equipped with a spring-loaded bypass valve as an insurance against stoppage of lubricating oil circulation in event the filters become clogged. All lubrication oil piping and lube oil temperature controls shall be factory fabricated. Generator manufacturer shall pipe a valved oil drainpipe to the edge of the skid with flexible hose to facilitate oil removal. Engine shall be filled with SAE 10w oil.
 5. One or more engine mounted dry-type air cleaner of sufficient capacity to protect engine working parts from dust and grit shall be provided
 6. Provide suitable engine-mounted instrument panel including the following instruments:
 - a. Lubricating Oil Pressure Gauge
 - b. Water Temperature Gauge
 - c. Engine Hour Meter
 7. Automatically shut down the engine in the event of low oil pressure, high coolant temperature, overcrank or overspeed.
 8. The engine shall be equipped with a steel sheathed immersion type electric jacket water heater for maintaining the engine jacket water at approximately 100 degrees F. The heater shall be equipped with an adjustable thermostat and mounted on the engine, circulating the water by means of natural convection. Heater shall operate from the 120 volt, 1 phase electric system.
 9. A 12 or 24 volt battery charging alternator with D. C. Ammeter shall be provided to provide a quick charge of battery during operation of Engine-Generator set.
 10. A battery charger with at least 10A fast charge rate and trickle charge rate with ammeter and voltmeter and low/high rate indicator lamps, shall be furnished for remote mounting for maintaining the battery charge while the engine is idle.
- L.** The engine shall be equipped with an engine mounted radiator, fan, fan drive, and water pump for circulation of coolant through the water jackets of the cylinder block, cylinder head, exhaust manifold and lube oil cooler. The radiator shall be equipped with a capped filler opening, overflow line and drain cock. All engine cooling water piping shall be factory fabricated requiring only main supply and return connection to radiator. Cooling system shall be designed to operate in 125

SECTION SIX
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degrees F ambient rated output and shall be filled with a 50% ethylene glycol solution.

- M.** The Starting System shall include 12 or 24 volt automatic starting motor, sufficient Amp/H capacity battery set with rack and cables, and other wiring, controls, and equipment as required for heavy duty, long life operation. The Batteries shall be mounted in suitable battery rack 2 inches off floor. Rack shall be made of non-corrosive materials (but not wood). However, a wood base plate shall be provided to isolate battery from floor. Coat terminals with grease. Batteries shall be of size recommended in manufacturers published literature. Batteries shall be Delco, Willard, Exide, or approved equal.
- N.** The Exhaust System shall include a Maxim exhaust silencer model M41, to provide critical silencing. A seamless flexible exhaust adapter shall be furnished for the exhaust outlet. The exhaust pipe shall be steel with welded joints and fittings. Companion flanges shall be provided for the silencer by the generator supplier. Use sweeping long radius elbows, and a flexible connection between the engine manifold and the rigid piping. Exhaust piping shall be sized according to the engine manufacturer's recommendations. Exhaust piping shall have adequate support to stand severe service and allow for expansion as required by operating temperatures. No weight shall be supported by the engine manifold. A rain cap shall be provided at the end of the exhaust line.
- O.** The engine and generator shall be mounted on corfund vibration isolators.
- P.** The engine and generator shall be housed in a weatherproof enclosure with removable sides and a hinged door over the instrument panel.
- Q.** The entire generator set shall be warranted for a period of five years from the date of the commissioning. Generator manufacturer shall furnish service and maintenance of packaged engine generator system for one year from date of Substantial Completion.

4.02 EXTRA MATERIALS

- A.** Furnish one set of tools required for preventative maintenance of the engine generator system. Package tools in adequately sized metal toolbox.
- B.** Provide two additional sets of each fuel, oil, and air filter element required for the engine generator system.

4.03 DAY TANK

- A.** A 24-hour double-walled sub-base day tank unit with dual integral pumps and level control shall be provided. No underground storage will be allowed. Include flexible

SECTION SIX
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fuel line connections, fuel gauge, check valve, and leak detection alarm. A replaceable element fuel filter shall be conveniently located for servicing.

4.04 CIRCUIT BREAKER

- A. Provide a generator mounted circuit breaker, molded case insulated case construction, Sized to the Amp rating as indicated on the drawings, 3 pole. Breaker shall be Square D or approved equal and utilize a thermal magnetic trip. Steel NEMA 1 enclosure mounted on a separate support stand vibration isolated from the engine/generator arrangement. Bus Bars, sized for the cable type shown on drawing, shall be supplied on the load side of the breaker.

4.05 REMOTE ANNUNCIATOR PANEL

- A. The Annunciator shall provide remote annunciation of all points stated above and shall incorporate ring-back capability so that after silencing the initial alarm, any subsequent alarms will sound the horn. Provide alarm indication for “generator ground fault” on solidly grounded systems of more than 150 volts to ground and circuit breakers rated 1000 amp or more, to meet NEC.

4.06 FIELD QUALITY CONTROL

- A. Provide full load test utilizing portable test bank for two hours minimum. Simulate power failure including operation of transfer switch, automatic starting cycle, and automatic shutdown, and return to normal.
- B. During test, record the following at 20 minute intervals;
 - a) Kilowatts
 - b) Amperes
 - c) Voltage
 - d) Coolant temperature
 - e) Room temperature
 - f) Frequency
 - g) Oil pressure

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FURNISHING AND INSTALLING SEWAGE LIFT STATION

- C. Test alarm and shutdown circuits by simulating conditions.
- D. Provide copy of test results to City Inspector.
- E. Simulate power outage by interrupting normal source, and demonstrate that system operates to provide emergency power.

4.07 START-UP AND TESTING

- A. After installation is complete and normal power is available, the manufacturer's factory trained representative shall:
 - a) Verify that the equipment is installed properly, check all auxiliary devices for proper operation, including battery charger, jacket water heater(s), generator, space heater, remote annunciator, etc., and test all alarms and safety shutdown devices for proper operation and annunciation.
 - b) Check all fluid levels, start the engine and check for exhaust, oil, vibrations, etc., verify proper voltage and phase rotation at the transfer switch before connecting the load, connect the generator to building load and verify that the generator will start and run all designated loads in the plant.
 - c) Perform a 4 hour load bank test at full nameplate load using a load bank and cables supplied by the factory trained representative.
 - d) Observe and record the following data at 15 minutes intervals: Service meter hours, Volts AC-All phases, Amps AC-All phases, Frequency, Power factor or Vars, Jacket water temperature, Oil Pressure, Ambient temperature.
- B. Provide three (3) sets of operation and maintenance manuals covering the generator, switchgear, and auxiliary components. Include parts manuals, final as-built wiring interconnect diagrams and recommended preventative maintenance schedules.
- C. Following all testing and startup procedures the generator shall be delivered to the City with the crankcase oil level and the fuel tanks full.

4.8 TRAINING

- A. Provide one day of on-site training to instruct the City's personnel in the proper operation and maintenance of the equipment. Review operation and maintenance manuals, parts manuals, and emergency service procedures. Training shall be conducted by a certified manufacturer's representative. A 48 -hour advance notice of the startup schedule shall be communicated to:

**SECTION SIX
FURNISHING AND INSTALLING SEWAGE LIFT STATION**

- The City of Dallas Public Works Department
- The City of Dallas Sewer Department
- The Land Developer
- The Installation Contractor
- The Design Engineer.

PART 5: REMOTE ALARM SYSTEM

5.01 GENERAL

- A. SCADA antenna equipment shall be provided and installed by a City specified supplier and installer at the Contractor's expense. The equipment supplied shall be compatible with the existing SCADA system. All work and equipment provided by the City's specified supplier and installer shall be covered by the Contractor's two year warranty established in the City Standards planning and construction steps.

5.02 WIRELESS REMOTE COMMUNICATION

- A. All pump station alarms and SCADA shall be connected to the City's existing SCADA system to report the system status to a central location. The Contractor will co-ordinate with the City's specified supplier and the City so that the pump station alarms and SCADA system work smoothly with the City's existing system to report running, alarm, and failure status and any additional points selected by the City. The communication system shall report the pump station effluent level that corresponds to the 4-20ma output of the immersed level probe.

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CITY OF DALLAS SANITARY SEWER NOTES:

1. LINES TO BE 8" PVC. (SDR-26, ASTM D3034) UNLESS OTHERWISE NOTED.
2. SERVICES TO BE 6" PVC SDR-26.
3. MANHOLES TO BE 4' DIAMETER PRECAST.
4. ALL WORK AND MATERIALS MUST CONFORM TO THE CITY OF DALLAS SPECIFICATIONS.
5. LINE TO HAVE A MINIMUM OF 6' OF COVER IN STREETS.
6. LINES TO HAVE A MINIMUM OF 2' OF COVER IN OUTFALL OR BE DUCTILE IRON.
7. SEWER PIPE SHALL HAVE A GRAVEL BEDDING (PVC-MIN. CLASS "C" BEDDING).
8. ALL MANHOLES REQUIRE KOR-N-SEAL (OR EQUAL) RUBBER BOOT. EQUAL RUBBER BOOTS MUST BE APPROVED BY THE CITY OF DALLAS.
9. SEWER MANHOLES REMOTE FROM STREET RIGHT-OF-WAYS SHALL HAVE "BOLT-DOWN" COVERS.
10. ENGINEER/SURVEYOR REQUIRED TO FURNISH AS-BUILT DRAWINGS AT THE COMPLETION OF WORK.
11. DEVELOPER SHALL CONTRACT THE CITY OF DALLAS, PUBLIC WORKS, TO INSPECT FINISHED CONDITIONS OF ALL SANITARY MANHOLES IN THE STREET PRIOR TO ANY ROADWAY PAVING.
12. ONE SECTION OF DUCTILE IRON PIPE IS REQUIRED AT ANY POINT WHERE SANITARY LINES RUN PERPENDICULAR WITH STORM SEWER LINES WITHIN 2' VERTICALLY.
13. ALL SEWER SERVICE LINES TO HAVE PLUG AND 2" PVC MARKING PIPE AT THE EDGE OF THE RIGHT-OF-WAY OR PROPERTY LINE.
14. BURY SEWER TAPE 1.5' ABOVE SEWER LINE WITH TRACER ALONG PIPE.
15. CURBS SHALL BE STENCILED WITH AN "S" WHERE SEWER SERVICES INTERSECT CURB.
16. PUMP STATION DETAIL MUST BE APPROVED BY CITY OF DALLAS PRIOR TO INSTALLATION.
17. BURY FORCE MAIN TAPE 1.5' ABOVE FORCE MAIN WITH TRACER ALONG PIPE.
18. EIGHT (8) INCH SEWERS SHALL HAVE A MINIMUM SLOPE GREATER THAN 0.50 FEET PER 100 FEET (0.5% GRADE).
19. THE MAXIMUM SLOPE OF SEWERS SHALL BE 20% (20 FEET DROP IN ELEVATION PER 100 FEET OF LINEAL FOOTAGE OR PRO RATA).
20. ALL SEWERS INSTALLED WITH SLOPES GREATER THAN 15% (15 FEET DROP IN ELEVATION PER 100 FEET OF LINEAL FOOTAGE) SHALL HAVE ANCHORAGE SYSTEMS APPROVED BY THE DALLAS PUBLIC WORKS DIRECTOR.
21. PRIOR TO ACCEPTANCE OF THE SEWER SYSTEM BY THE CITY OF DALLAS ALL SEWER MAINS AND PIPES SHALL PASS AIR TESTING, MANDREL TESTING AND PROVIDE VIDEO OF ALL MAINS (DVD MEDIA). ALL MANHOLES SHALL PASS VACUUM TESTING. MINIMUM SPECIFICATIONS FOR ALL TEST CAN BE FOUND IN THE CITY OF DALLAS STANDARDS AND SPECIFICATIONS, COPIES OF WHICH CAN BE PURCHASED AT CITY HALL.
22. ALL SEWER SERVICES SHALL BE LOW ENOUGH TO SERVE FIRST FLOOR ELEVATIONS OF ALL HOUSES.
23. DEVELOPER SHALL ATTEND A PRE-CONSTRUCTION CONFERENCE AT THE PROJECT SITE WITH REPRESENTATIVES OF THE CITY OF DALLAS. PLEASE CONTACT PUBLIC WORKS FOR APPOINTMENT (770-443-8117)
24. ALL FORCE MAIN PIPE TO BE C-900 DR-18, GREEN IN COLOR.
25. PRIOR TO BEGINNING ANY CONSTRUCTION CONTACT THE UTILITIES LOCATION SERVICE (811) THREE DAYS IN ADVANCE FOR ON-SITE LOCATIONS.

NOTE: THESE NOTES SHALL APPEAR ON ALL SHEETS OF CONSTRUCTION PLANS PERTAINING TO SANITARY SEWER INSTALLATION.



CITY OF DALLAS, GEORGIA
PUBLIC WORKS DEPARTMENT
TELEPHONE (770) 443-8117

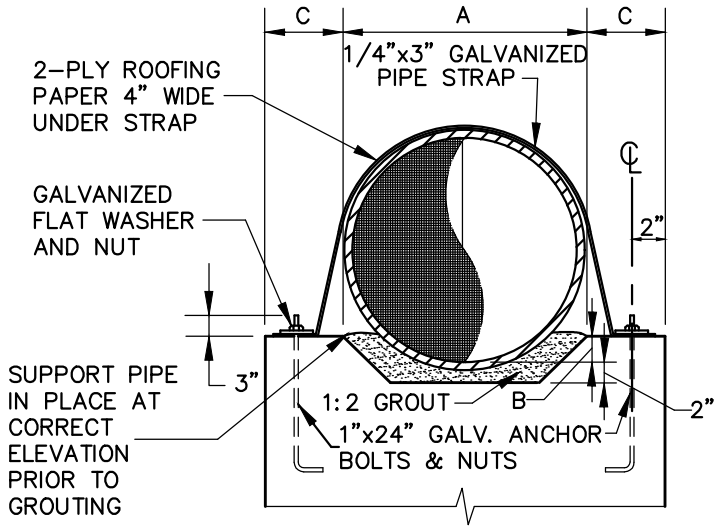
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NOTES**

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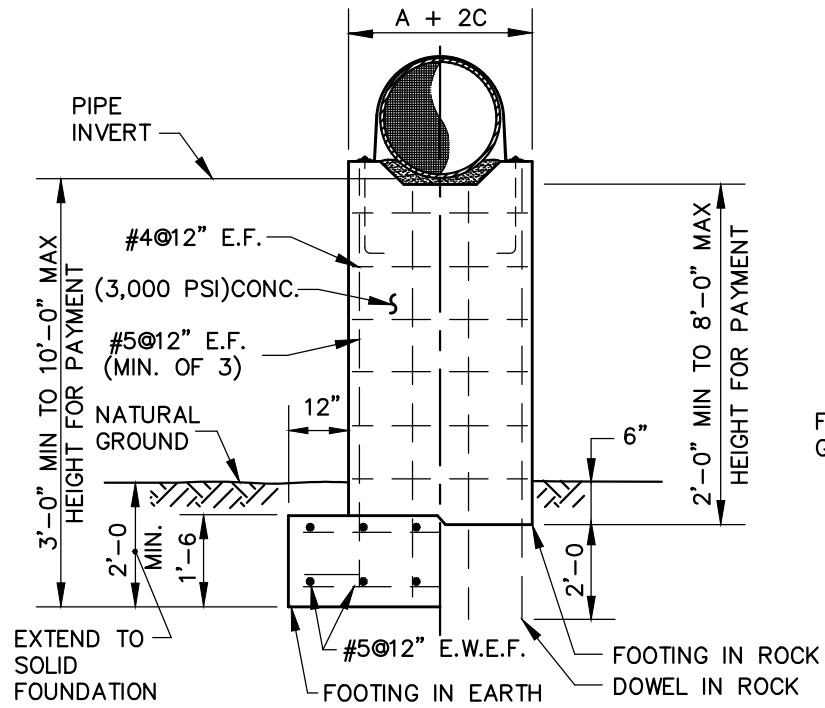
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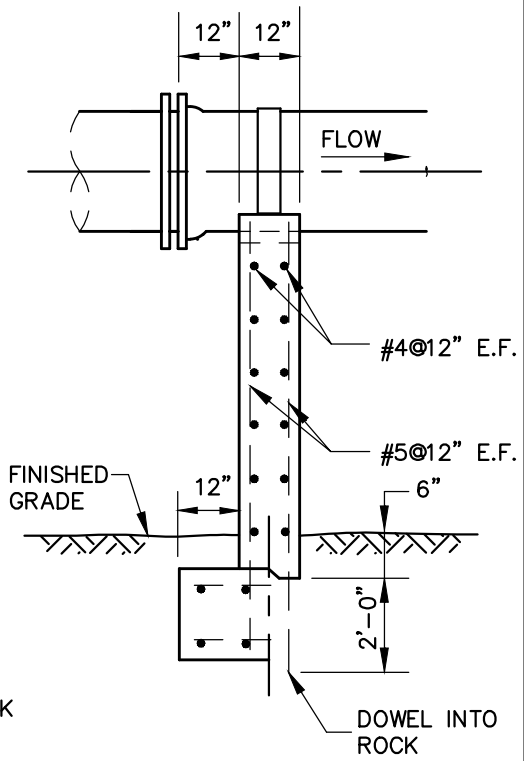


DIMENSIONS			
PIPE SIZE	A	B	C
8"	12"	2"	6"
10"	14"	2-1/2"	6"
12"	16"	3"	6"
16"	19"	4"	8"
18"	21"	5"	9"
20"	23"	5"	10"
24"	26"	6"	10"
30"	32"	7-1/2"	12"
36"	38"	9"	12"

SADDLE DETAIL



FRONT ELEVATION



SIDE ELEVATION



CITY OF DALLAS, GEORGIA
 PUBLIC WORKS DEPARTMENT
 TELEPHONE (770) 443-8117

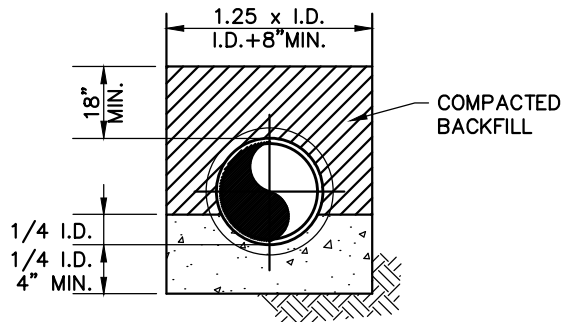
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CONCRETE PIER

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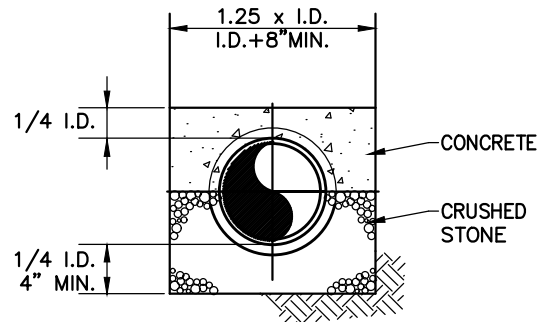
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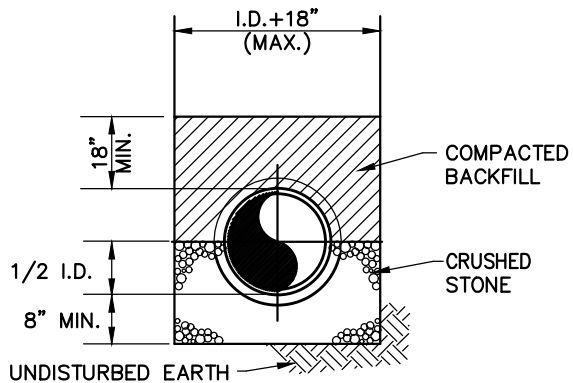


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(CONCRETE CRADLE)

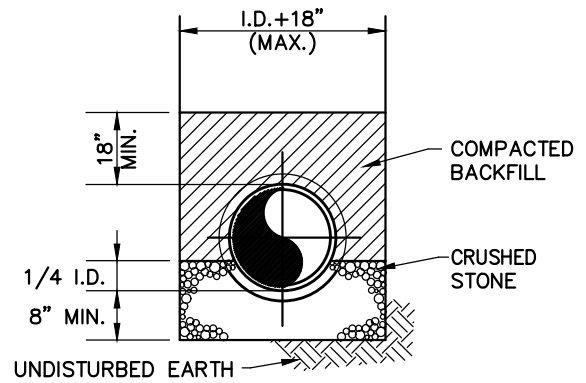


TYPE 2
(CONCRETE ARCH)

CLASS "A"



CLASS "B"



CLASS "C"



CITY OF DALLAS, GEORGIA
PUBLIC WORKS DEPARTMENT
TELEPHONE (770) 443-8117

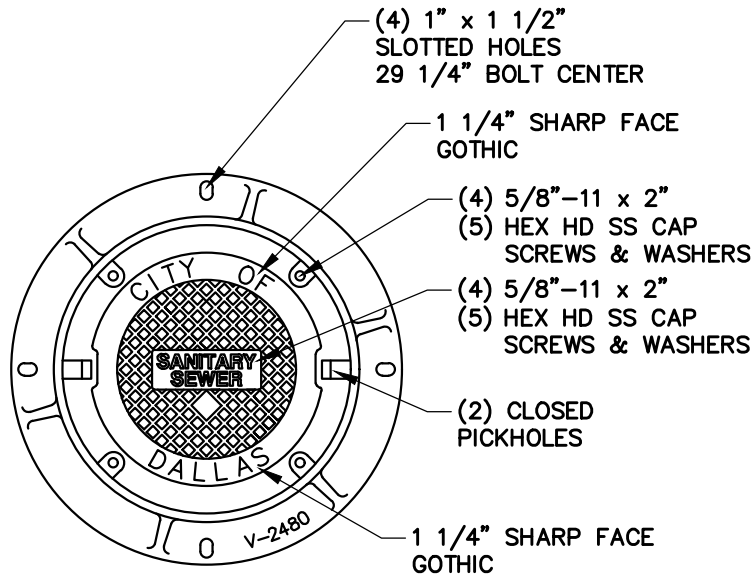
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PIPE BEDDING

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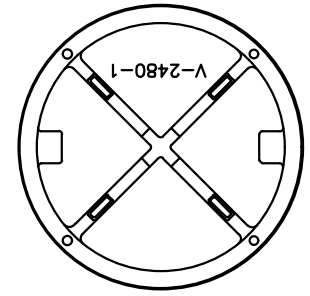
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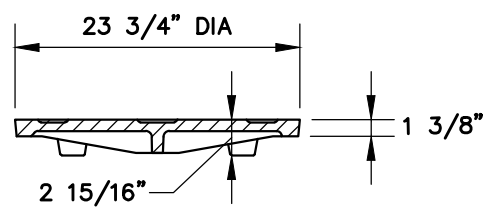
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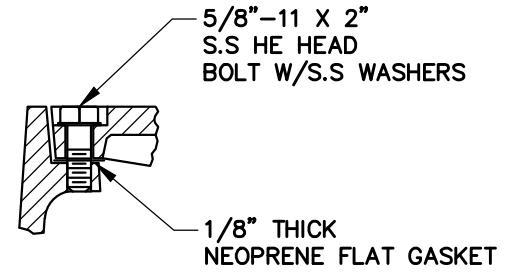
PLAN VIEW



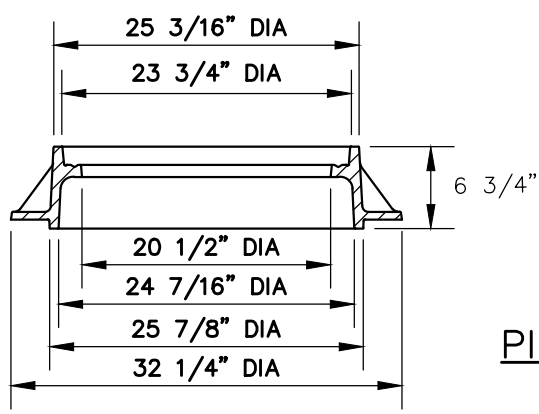
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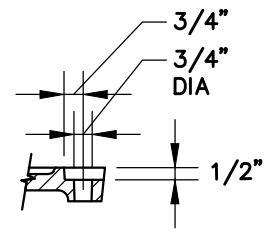
COVER SECTION



BOLT DETAIL



FRAME SECTION



BOLTHOLE DETAIL



PICKHOLE DETAIL

EJ V2480-I ASSEMBLY

**SEWER DETAILS
BOLT DOWN – WATERTIGHT
MANHOLE FRAME AND COVER
(OUTSIDE OF ASPHALT ONLY)**



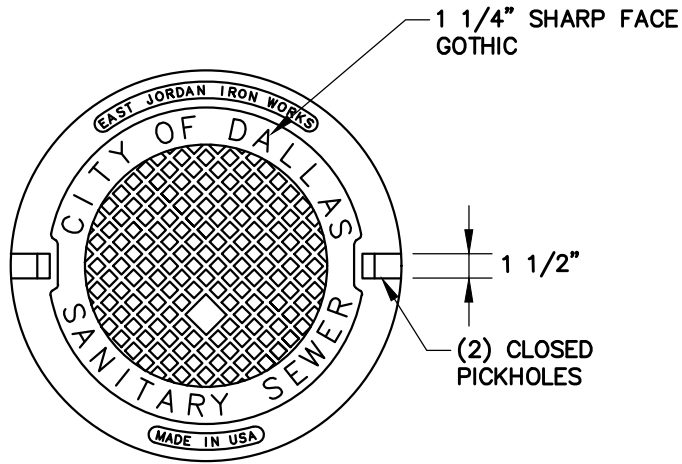
CITY OF DALLAS, GEORGIA
PUBLIC WORKS DEPARTMENT
TELEPHONE (770) 443-8117

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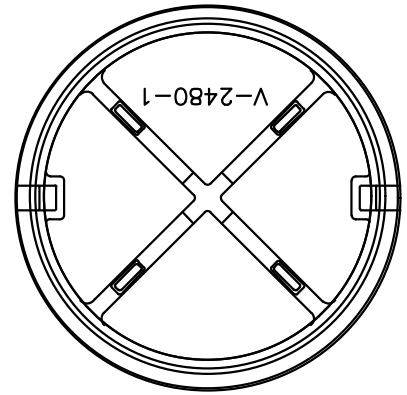
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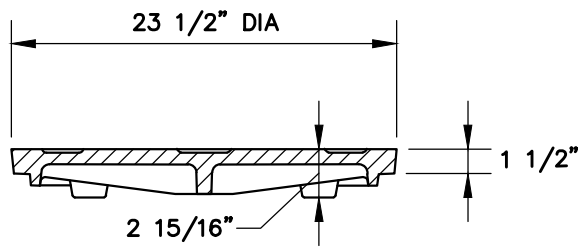
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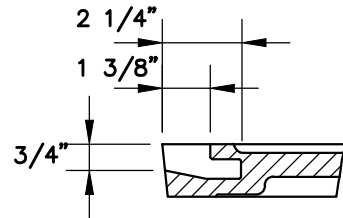
PLAN VIEW



BOTTOM VIEW



SECTION



PICKHOLE DETAIL

EJ V2480-I ASSEMBLY



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SEWER DETAILS
STANDARD MANHOLE
FRAME AND COVER

DRAWN BY: PBH

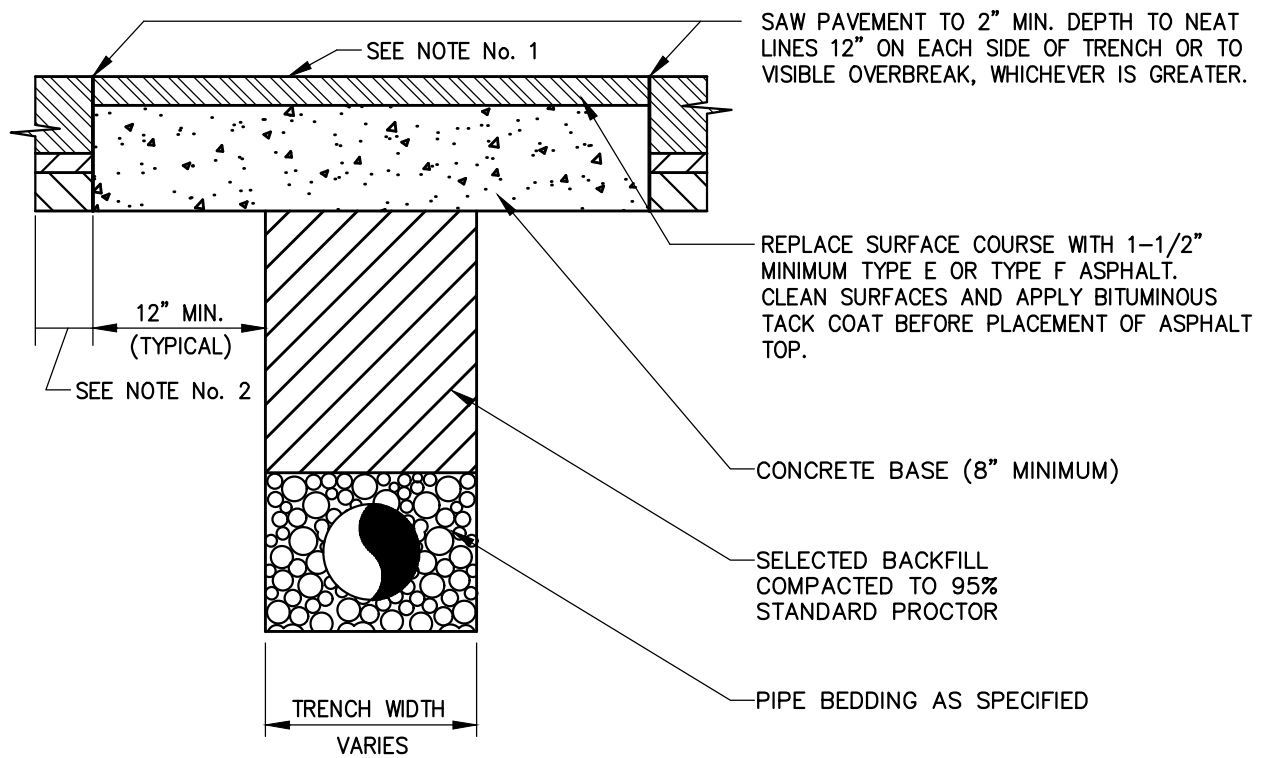
SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: S-4B

NOTES

1. IN AREAS WHERE TRAFFIC MUST BE MAINTAINED, COVER PAVEMENT CUTS WITH STEEL PLATES OF SUFFICIENT THICKNESS TO SPAN CUT AND SAFELY CARRY TRAFFIC.
2. REMOVE AND REPLACE BASE AND PAVEMENT TO OUTER EDGE OF EXISTING PAVEMENT IF REMAINING PAVEMENT WIDTH IS 24" OR LESS.
3. REPLACE CONCRETE DRIVEWAY PAVEMENT WITH 6" OF READY-MIX CONCRETE WITH 3000 PSI STRENGTH @ 28 DAYS.



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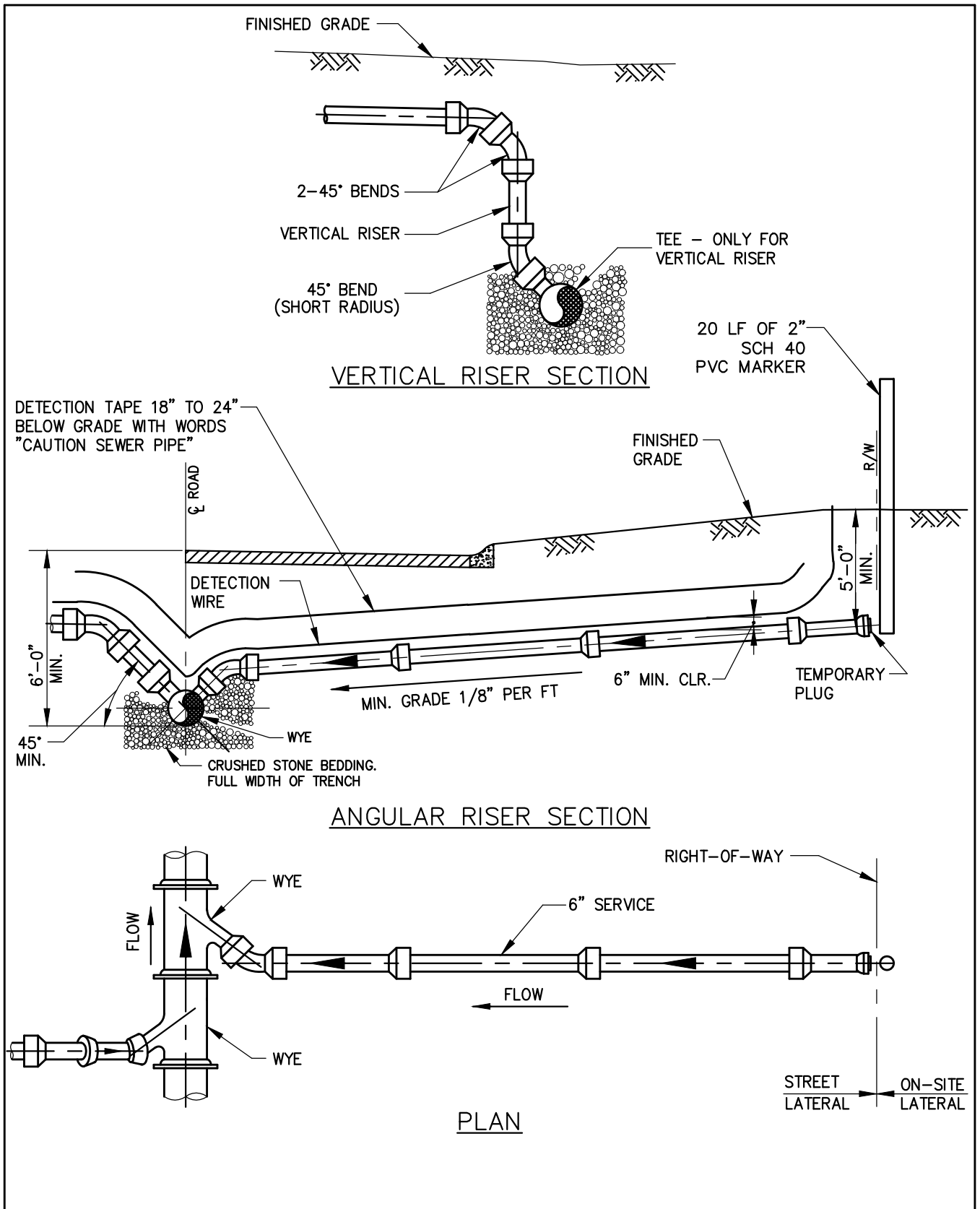
**SEWER DETAILS
 PAVEMENT REPLACEMENT**


DRAWN BY: TGA

SCALE: NTS

DATE: JUNE 5, 2017

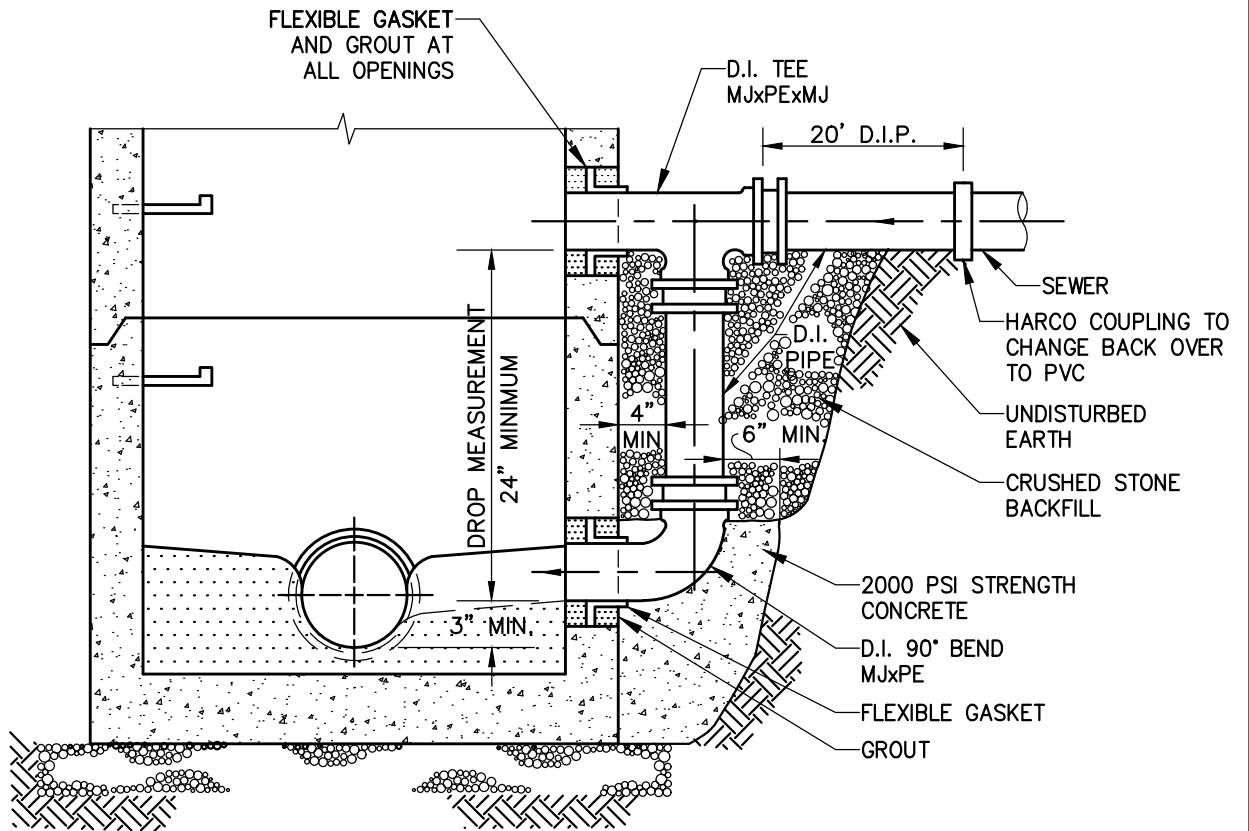
DWG. NO.: S-5



	<p>CITY OF DALLAS, GEORGIA PUBLIC WORKS DEPARTMENT TELEPHONE (770) 443-8117</p>	<p>SEWER DETAILS SERVICE LATERAL</p>	
<p>DRAWN BY: TGA</p>	<p>SCALE: NTS</p>	<p>DATE: JUNE 5, 2017</p>	<p>DWG. NO.: S-6</p>

NOTES

1. USE READY-MIX CONCRETE WITH 3,000 PSI STRENGTH @ 28 DAYS.
2. SEE STANDARD PRECAST MANHOLE DETAIL FOR TOP SECTION OF MANHOLE.
3. ALL FITTINGS TO HAVE MEGALUGS.



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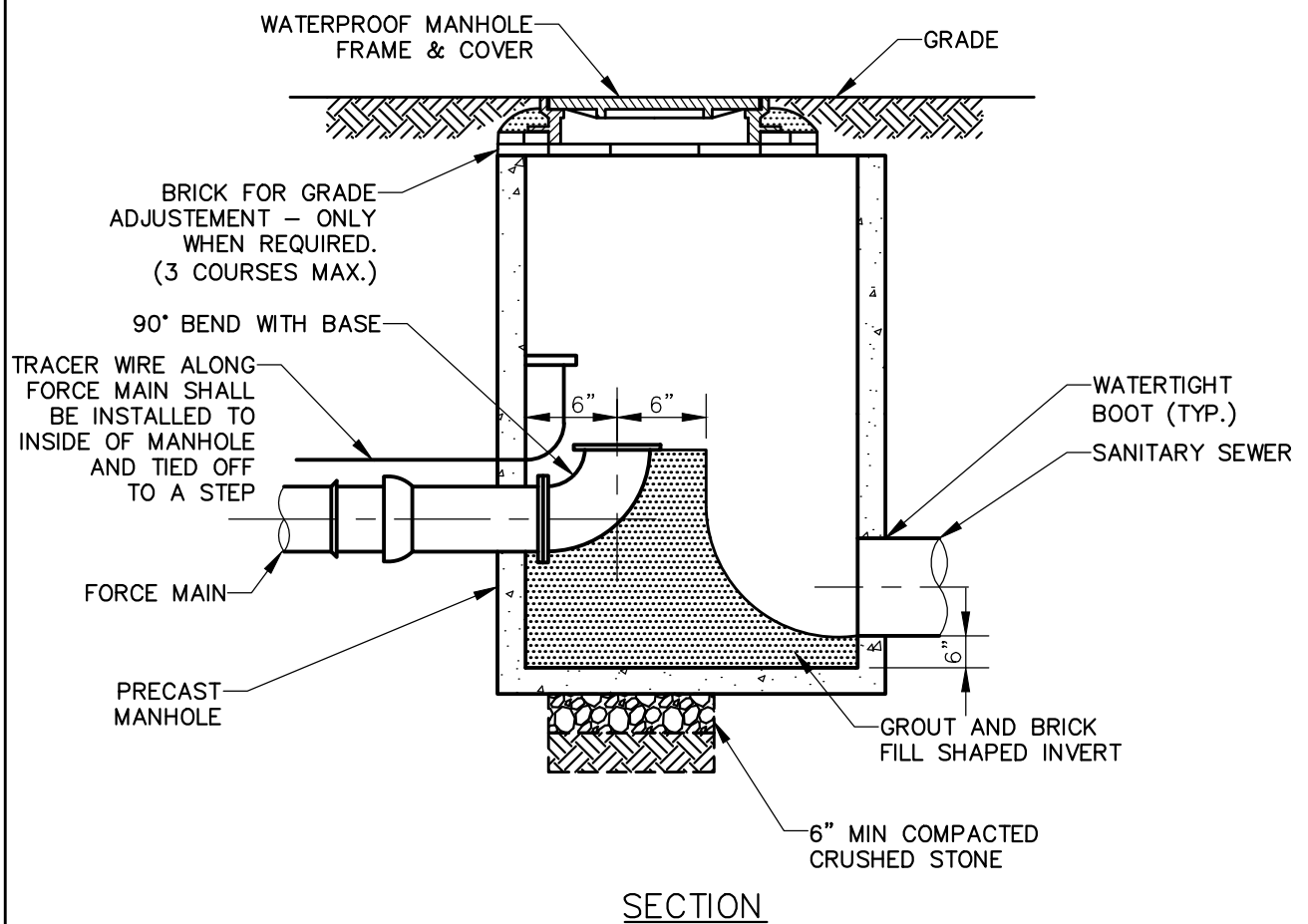
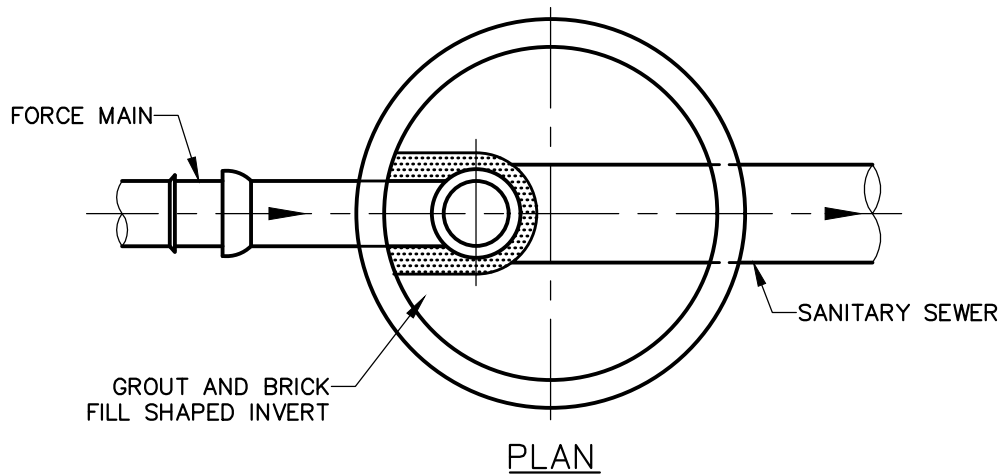
**SEWER DETAILS
 DROP CONNECTION**

DRAWN BY: TGA

SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: S-7



NOTE: INSIDE OF MANHOLE SHALL BE COATED WITH AN APPROVED CORROSION PROTECTION MATERIAL



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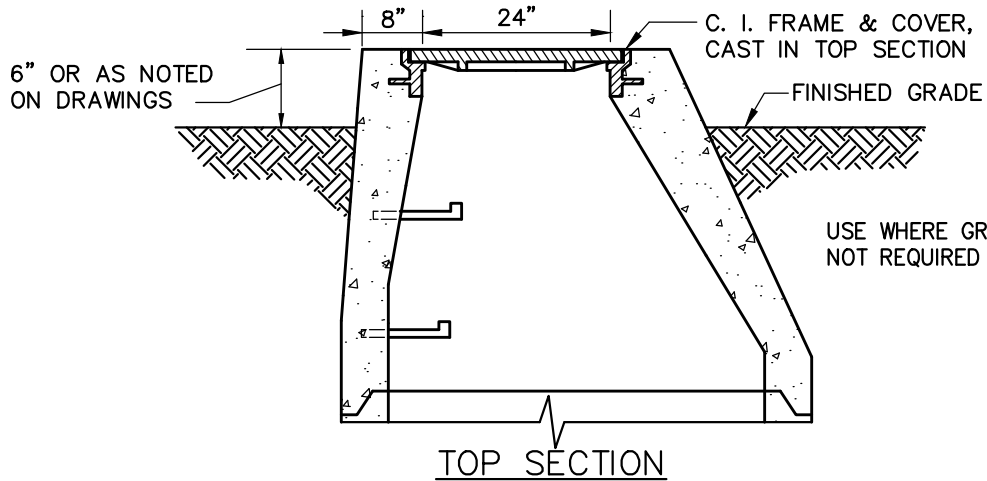
SEWER DETAILS
FORCE MAIN CONN. TO MANHOLE

DRAWN BY: TGA

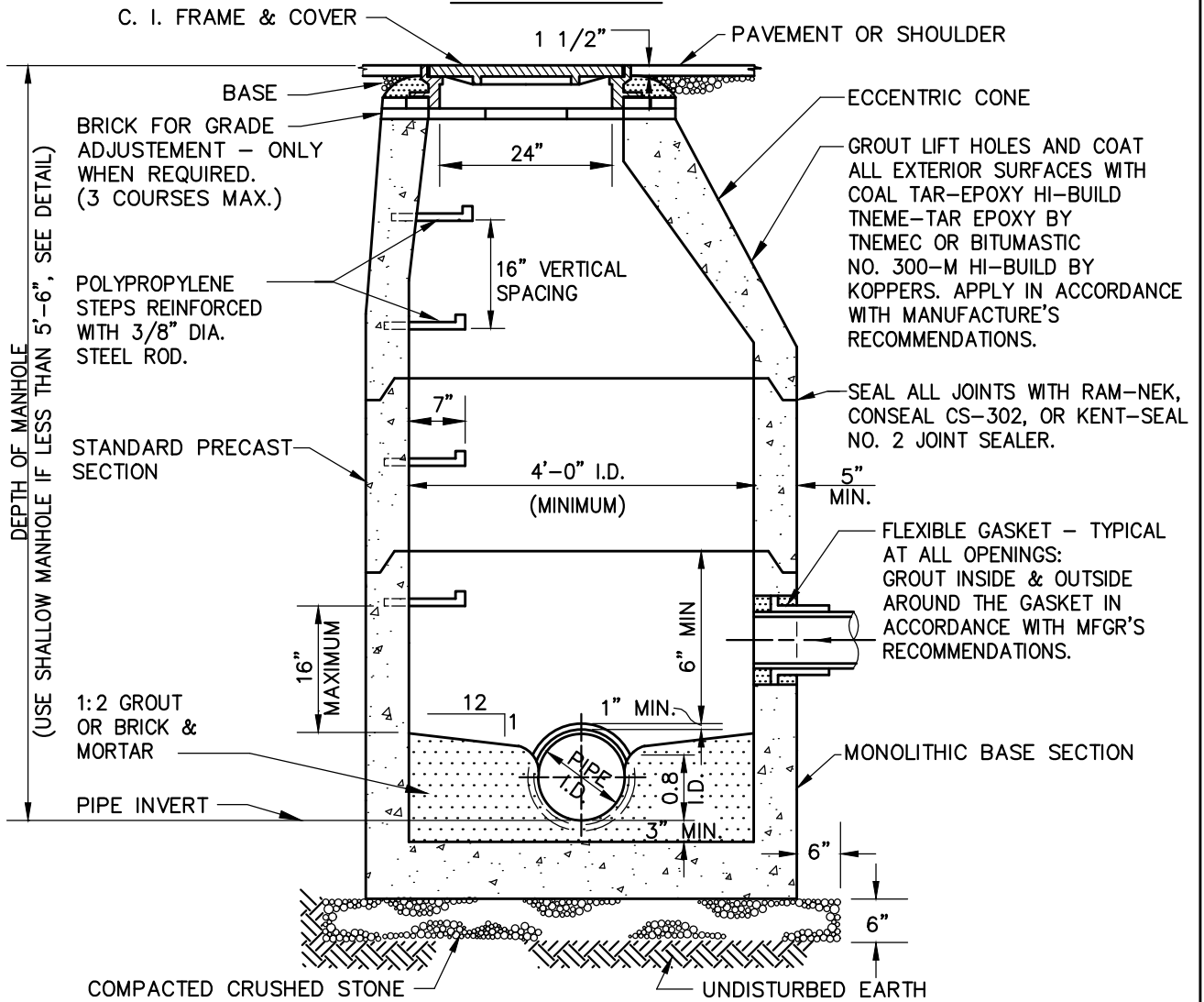
SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: S-8



USE WHERE GRADE ADJUSTMENT NOT REQUIRED (UNPAVED AREAS).



DEPTH OF MANHOLE
(USE SHALLOW MANHOLE IF LESS THAN 5'-6\", SEE DETAIL)

1:2 GROUT OR BRICK & MORTAR
PIPE INVERT



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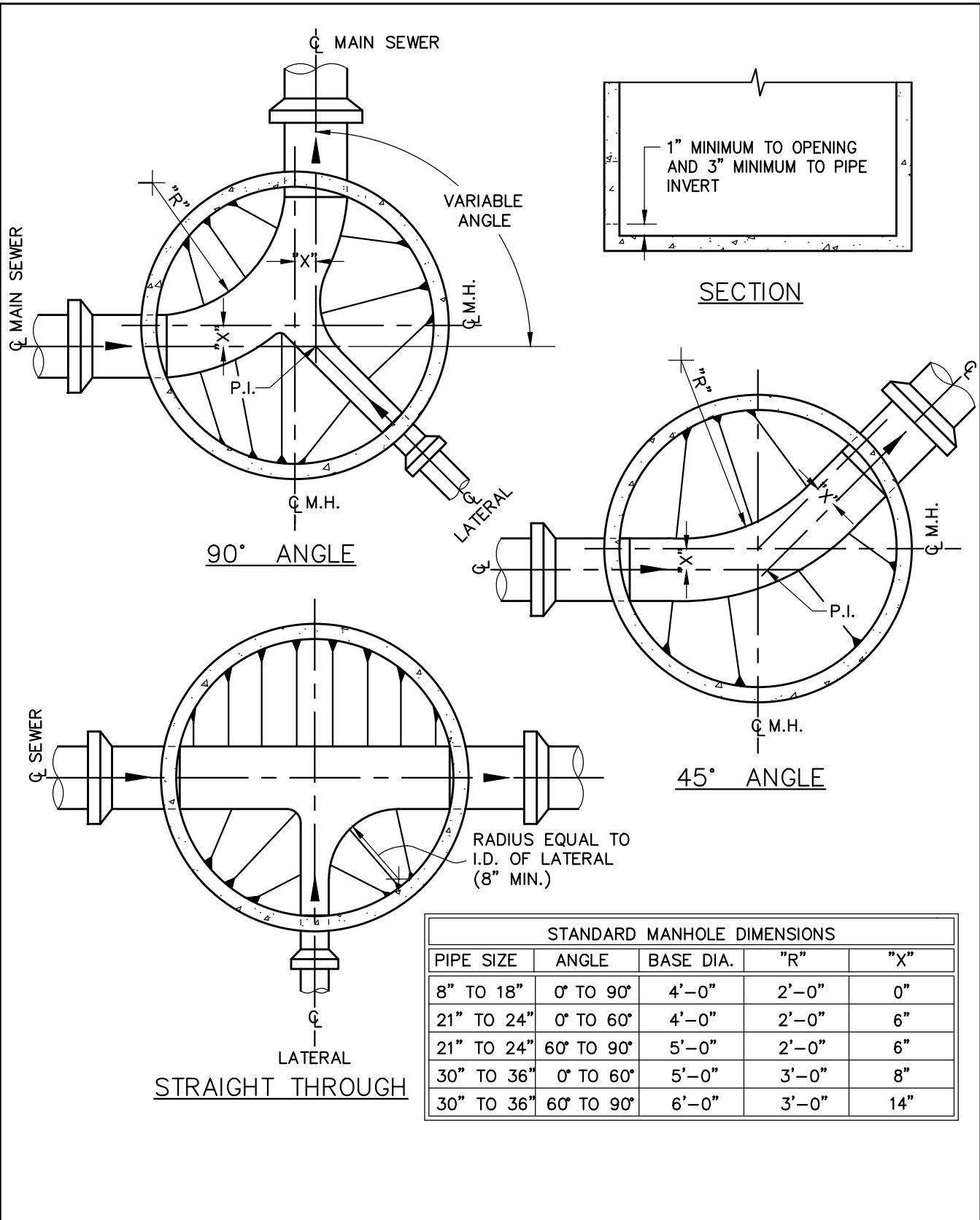
**SEWER DETAILS
STANDARD PRECAST MANHOLE**

DRAWN BY: TGA

SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: S-9A



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SEWER DETAILS
TYPICAL MANHOLE INVERT PLANS

DRAWN BY: DJH

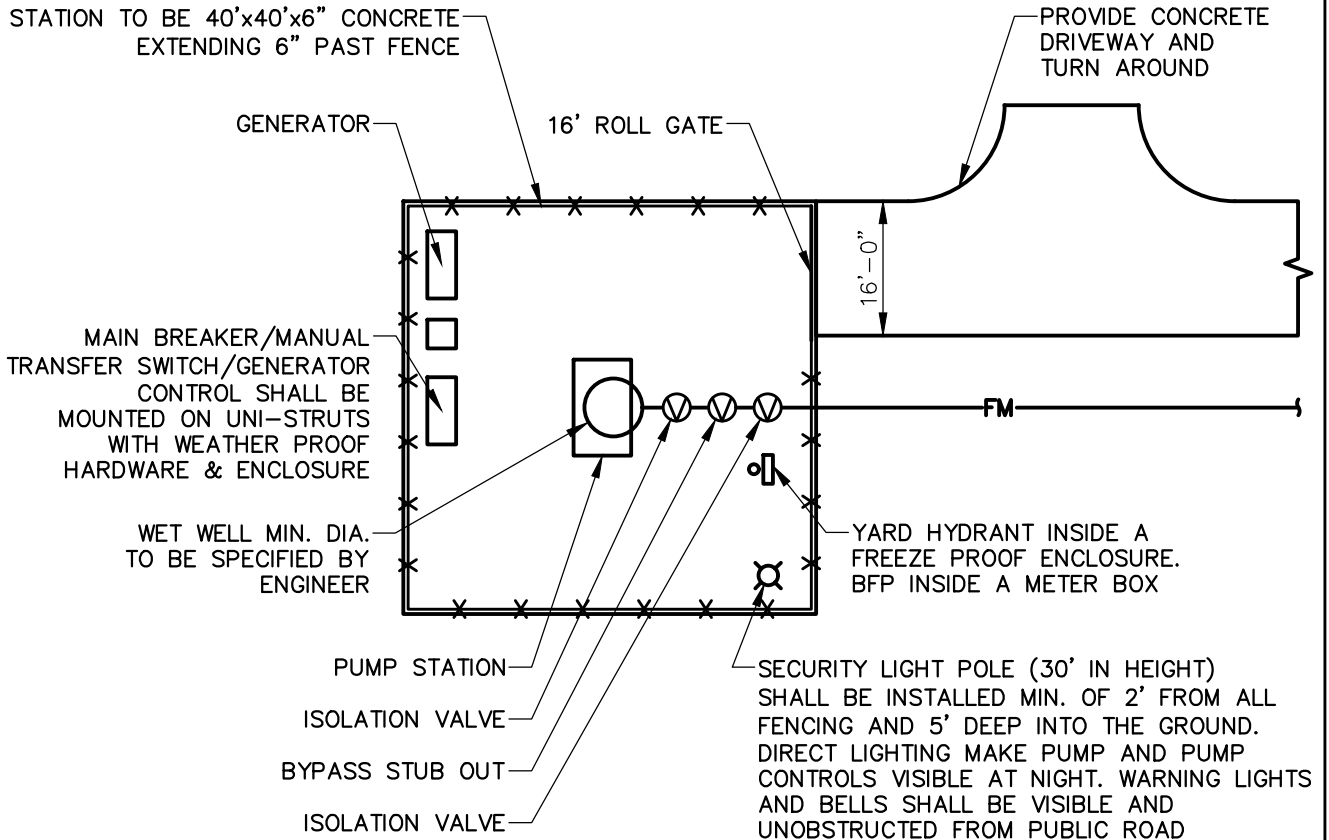
SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: S-9B

NOTE:

1. ALL CONDUIT ENTERING PUMPING STATION SHOULD BE SEALED AIR TIGHT AT THE WETWELL AND AT THE MOTOR CONTROL CENTER.
2. THE PUMPING STATION SHALL HAVE POTABLE WATER SUPPLY. SERVICE LINE TO THE STATION MUST BE PROTECTED WITH A BACKFLOW PREVENTION DEVICE DESIGNED FOR SUCH APPLICATIONS AND INSTALLED IN ACCORDANCE WITH THE GEORGIA PLUMBING CODE.
3. THE PUMP MOTORS SHALL BE THREE PHASE POWER.
4. PROVIDE GENERATOR.
5. THE PUMP STATION SECURITY FENCE SHALL BE CHAIN LINK WITH THREE STRAND BARBED WIRE WITH A MINIMUM TOTAL HEIGHT OF 8'.
6. EMERGENCY BYPASS GATE VALVES AND BALL VALVES SHALL BE THE SAME DIAMETER AS FORCE MAIN.
7. PUMP SYSTEM TO BE FURNISHED BY SMITH & LOVELESS INC. OR FLYGT ON CASE BY CASE BASIS ONLY. NO SUBSTITUTIONS.
8. CONTROL PANEL TO BE FURNISHED BY PUMP STATION MANUFACTURER.



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CITY OF DALLAS
PUMP STATION
SITE PLAN

DRAWN BY: PBH

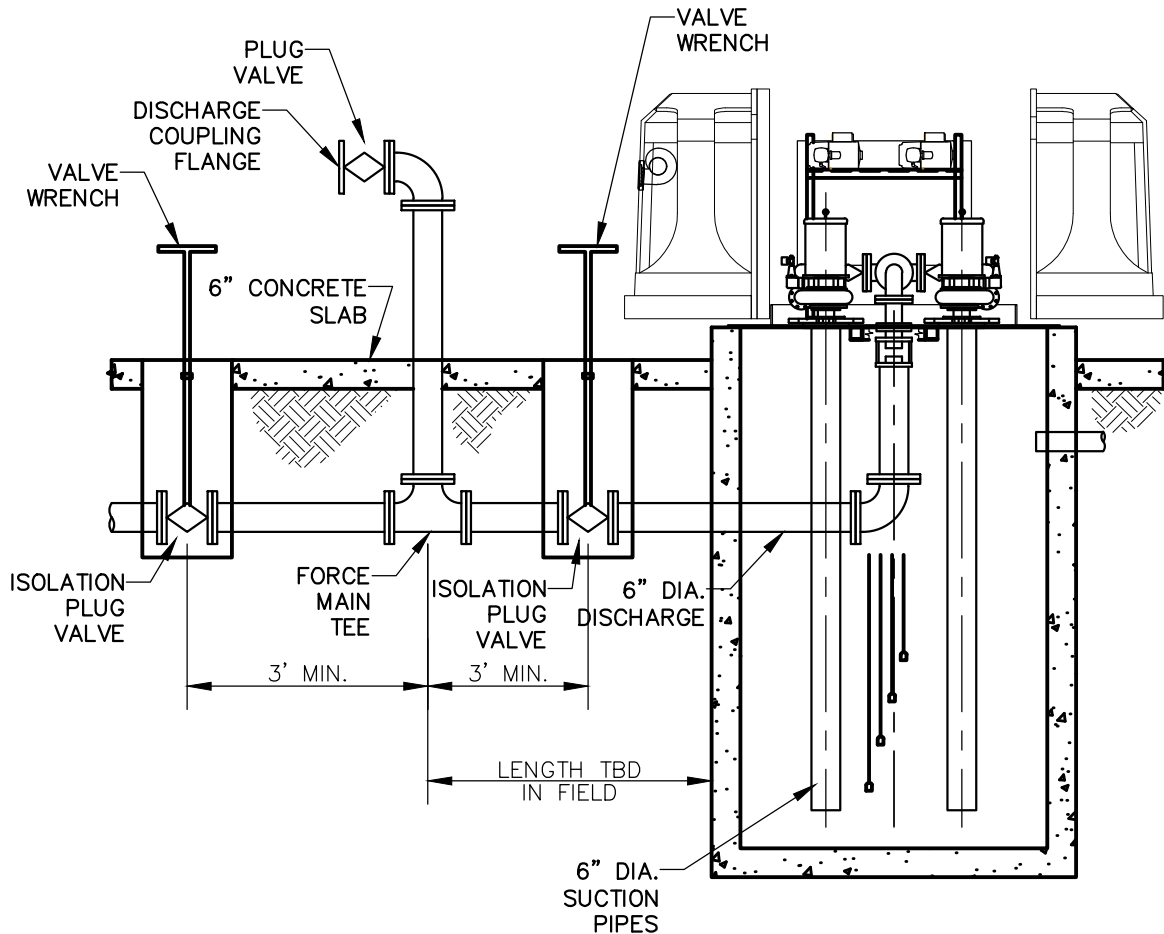
SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: S-10

NOTE:

1. BYPASS PIPING AND VALVES SHALL BE EQUAL TO OR GREATER THAN FORCE MAIN DIA.
2. DISCHARGE COUPLING FLANGE SHALL BE STANDARD 150 PSI 8 BOLT PATTERN.



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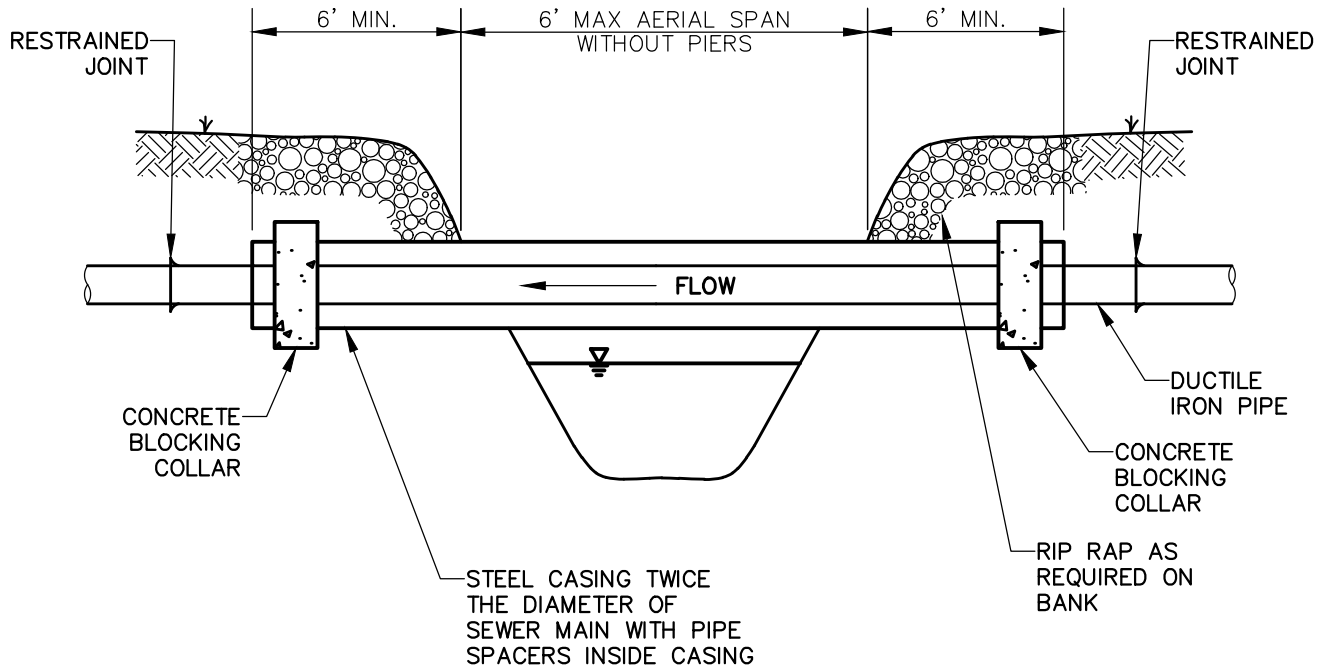
**SEWER DETAILS
BYPASS PUMPING FORCE MAIN
AND VALVE ARRANGEMENT**

DRAWN BY: TGA

SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: S-11



NOTE:

1. AERIAL CROSSINGS MUST BE APPROVED BY CITY OF DALLAS.
2. PIPE CONNECTIONS (I.E. JOINTS) SHALL NOT BE EXPOSED ON AERIAL LINES EXCEPT WITH PIERS.
3. CASING IS REQUIRED ON ALL EXPOSED AERIAL LINES.
4. DO NOT PLACE RIP RAP BELOW NORMAL HIGH WATER LEVEL OF CREEK



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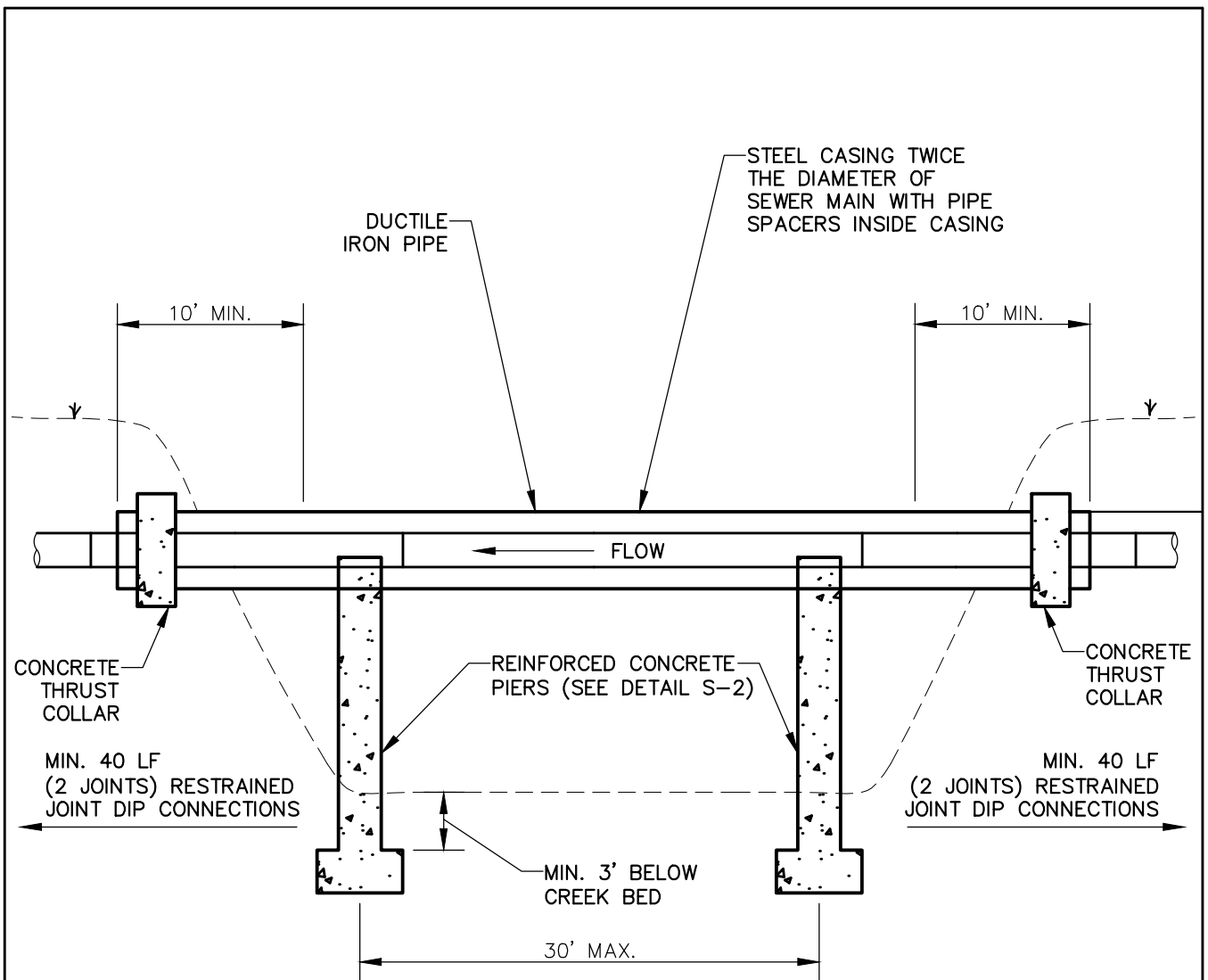
**SEWER DETAILS
 SEWER MAIN CREEK CROSSING
 (WITHOUT PIERS)**

DRAWN BY: TGA

SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: S-12



NOTE:

1. WHENEVER POSSIBLE NO PIERS SHALL BE PLACED WITHIN THE NORMAL FLOW OF CREEK. FOOTINGS SHALL BE PLACED 3 FEET MINIMUM BELOW CREEK BED.
2. REINFORCED CONCRETE PIERS SHALL BE PLACED SO THAT NO SPAN IS GREATER THAN 30 FEET.
3. ALL PIER PLACEMENT SHALL BE APPROVED BY CITY OF DALLAS.
4. DEVELOPER/CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL PERMITS REQUIRED FOR STREAM CROSSING, STATE AND/OR FEDERAL.
5. ELEVATION OF THE BOTTOM OF THE PIPE SHALL BE AT OR ABOVE THE 50-YEAR FLOOD ELEVATION.



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**SEWER DETAILS
 SEWER MAIN CREEK CROSSING
 (WITH PIERS)**

DRAWN BY: TGA

SCALE: NTS

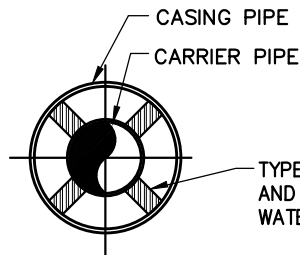
DATE: JUNE 5, 2017

DWG. NO.: S-13

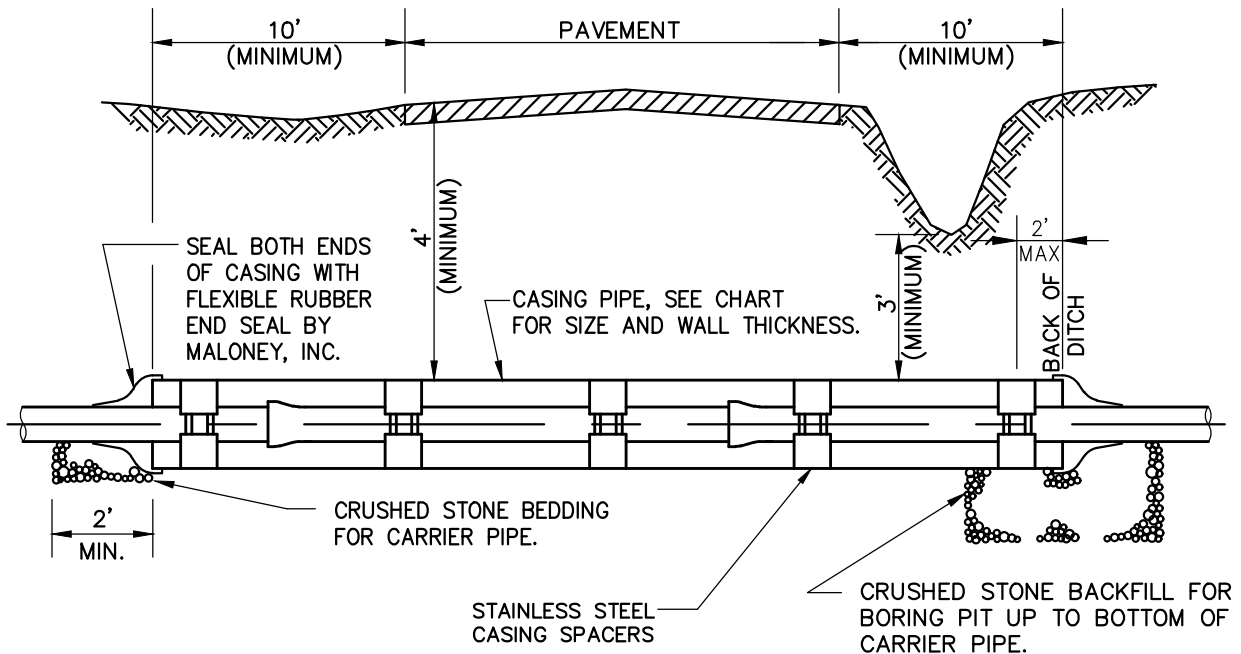
NOTES

1. INSTALL CASING BY BORING AND JACKING, UNLESS OTHERWISE NOTED.
2. CARRIER PIPE IN CASING SHALL BE DUCTILE IRON PIPE, PUSH-ON JOINTS WITH RESTRAINED JOINTS, U.S. PIPE FIELD LOK OR EQUAL.

DUCTILE IRON CARRIER PIPE		STEEL CASING PIPE	
INSIDE DIA.	MAX O.D.	NOMINAL DIA.	WALL THICK.
6"	9"	12"	0.250"
8"	11 1/4"	16"	0.250"
10"	13 1/2"	18"	0.250"
12"	15 1/2"	20"	0.375"
14"	17 3/4"	22"	0.375"
16"	20"	24"	0.375"
18"	22 1/4"	28"	0.375"
20"	24 1/4"	30"	0.375"
24"	28 1/2"	36"	0.500"



TYPE 304 STAINLESS STEEL CASING SPACERS WITH PVC LINERS AND LOW FRICTION POLYMER RUNNERS. MANUFACTURED BY CASCADE WATERWORKS MFG. CO. OR EQUAL. (2 REQUIRED PER JOINT)



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**SEWER DETAILS
 HIGHWAY CROSSING**

DRAWN BY: PBH

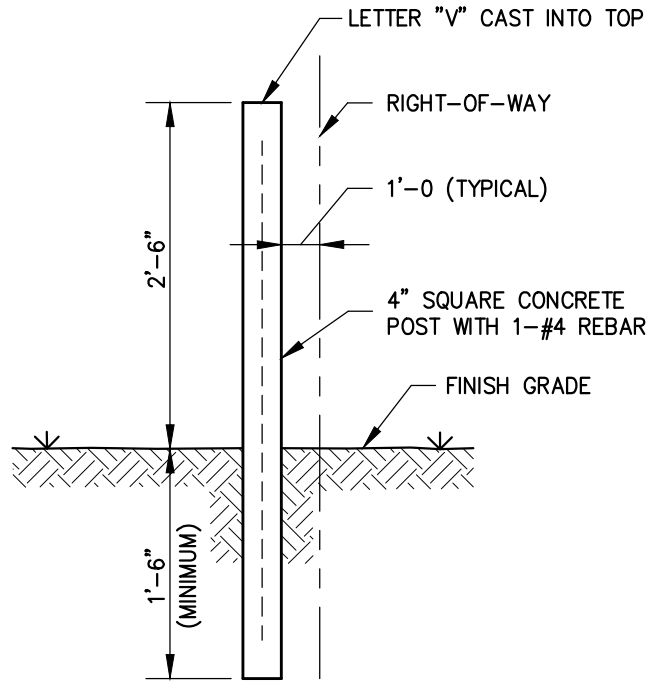
SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: S-14

NOTES

1. PLACE MARKER IN A PROTECTED LOCATION AT EDGE OF RIGHT-OF-WAY.
2. MARKER REQUIRED FOR ALL VALVES.



ELEVATION



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**SEWER DETAILS
VALVE MARKER**

DRAWN BY: PBH

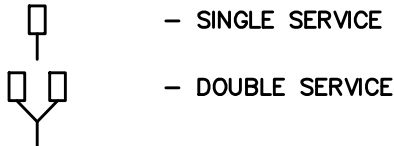
SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: S-15


WATER NOTES:

1. MINIMUM COVER 42" OVER WATER LINES.
2. WATER LINES SHALL BE 9' FROM BACK OF CURB ON SOUTH AND WEST SIDES OF ROADWAYS UNLESS OTHERWISE NOTED.
3. SERVICES SHALL BE IN ROAD R/W.
4. SEE DETAIL SHEETS FOR WATER AND SEWER DETAILS.
5. METERS AND METER BOXES SHALL BE INSTALLED AS DIRECTED BY CITY OF DALLAS WATER DEPARTMENT.
 - A. ALL WATER METERS 3/4" AND 1" IN SIZE SHALL BE SENSUS IPERL. 2" AND LARGER SHALL BE SENSUS C2 OR T2.
 - B. ALL WATER METER BOXES SHALL BE A FORD METER BOX #LYLBBP-244-233-LLTQ OR EQUAL.
6. WATER VALVES SHALL BE LOCATED PER CITY OF DALLAS PUBLIC WORKS DIRECTOR.
7. APPROVED PVC OR POLY SHOULD BE USED FOR WATER MAINS AND WATER SERVICES.
8. THRUST BLOCKS SHALL BE USED AT ALL BENDS, TEES, AND PLUGS (SEE DETAIL SHEET) WITH MEGA LUGS.
9. ALL BRANCH WATER LINES SHALL HAVE AT LEAST A TWO-WAY VALVE SYSTEM.
10. LONG SERVICES SHALL BE 1" INSIDE 2" PVC CASING.
11. COMPACTION EQUIPMENT SHALL BE USED ON WATER MAIN AND SERVICES UNDER PAVEMENT.
12. WATER MAINS SHALL BE MARKED WITH TAPE AND TRACER WIRE.
13. NO TAPS TO BE MADE TO WATER LINE AFTER 2.00 P.M.
14. THE ENGINEER OR SURVEYOR WILL BE REQUIRED TO FURNISH THE CITY OF DALLAS AS-BUILTS FOR ALL RESIDENTIAL DEVELOPMENTS.
15. THE DEVELOPER SHALL NOTIFY THE WATER INSPECTOR 48 HOURS PRIOR TO TAPPING THE WATERLINE.
16. ALL DESIGN TO BE IN ACCORDANCE WITH THE CITY OF DALLAS WATER SYSTEM STANDARDS.
17. ALL CONSTRUCTION MUST CONFORM TO CITY OF DALLAS SPECIFICATIONS, ORDINANCES, AND PROCEDURES.
18. PRIOR TO BEGINNING ANY CONSTRUCTION CONTACT THE UTILITIES LOCATION SERVICE (811) THREE DAYS IN ADVANCE FOR ON-SITE LOCATIONS.
19. CURB SHALL BE STENCILED WITH "W" WHERE WATER SERVICES INTERSECT CURB.
20. METER BOX TO BE FLUSH WITH FINISHED GRADE.
- 21.



23. DEVELOPER SHALL ATTEND A PRE-CONSTRUCTION CONFERENCE AT THE PROJECT SITE WITH REPRESENTATIVES OF THE CITY OF DALLAS. PLEASE CONTACT PUBLIC WORKS FOR APPOINTMENT (770-443-8117)
24. ALL WATER LINES TO BE C-900 DR-18, BLUE IN COLOR UNLESS NOTED TO BE DIP

					NOTE: THESE NOTES SHALL APPEAR ON ALL SHEETS OF CONSTRUCTION PLANS PERTAINING TO WATER SYSTEM INSTALLATION.
1	02-18-21	PWK	REVISED PER CITY OF DALLAS		
NO.	DATE	BY	REVISION		

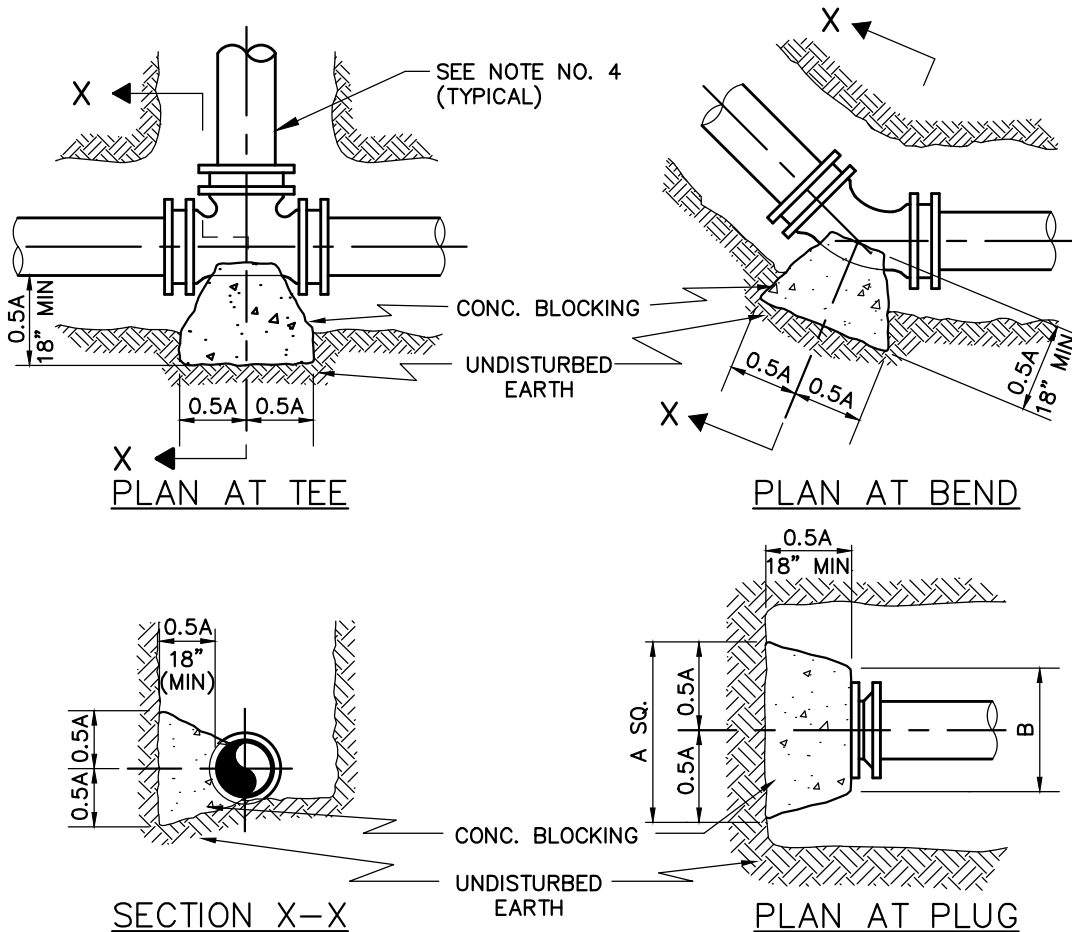
	<p>CITY OF DALLAS, GEORGIA PUBLIC WORKS DEPARTMENT TELEPHONE (770) 443-8117</p>	<p>WATER DETAILS NOTES</p>
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DRAWN BY: TGA	SCALE: NTS	DATE: JUNE 5, 2017	DWG. NO.: W-1
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NOTES

1. USE READY-MIX CONCRETE WITH 3,000 PSI STRENGTH @ 28 DAYS.
2. PLACE CONCRETE BEARING SURFACES AGAINST UNDISTURBED EARTH.
3. PLACE CONCRETE CLEAR OF JOINT AND JOINT ACCESSORIES.
4. PROVIDE THRUST BLOCKING FOR ALL FITTINGS.
5. SEE CONCRETE PIPE ANCHOR DETAIL FOR DEADMAN AT END OF LINE.

FITTING DIAMETER	90° BEND	45° BEND	22.5° BEND	11.25° BEND	TEES	PLUGS	
	A	A	A	A	A	A	B
4"	15"	12"	12"	12"	12"	12"	10"
6"	20"	16"	12"	12"	18"	18"	12"
8"	30"	20"	15"	12"	24"	24"	12"
10"	36"	26"	18"	14"	30"	30"	14"
12"	40"	32"	20"	16"	36"	36"	16"
14"	48"	36"	26"	18"	40"	40"	18"
16"	64"	42"	32"	20"	48"	48"	20"



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 PUBLIC WORKS DEPARTMENT
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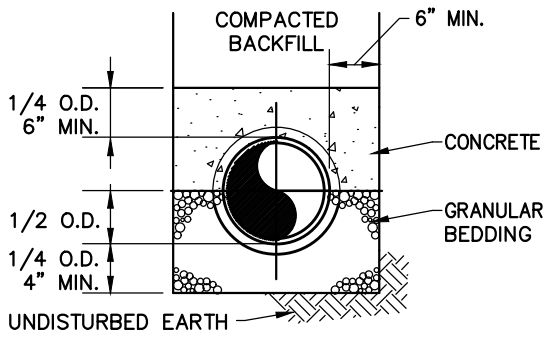
**WATER DETAILS
 THRUST BLOCKING**

DRAWN BY: TGA

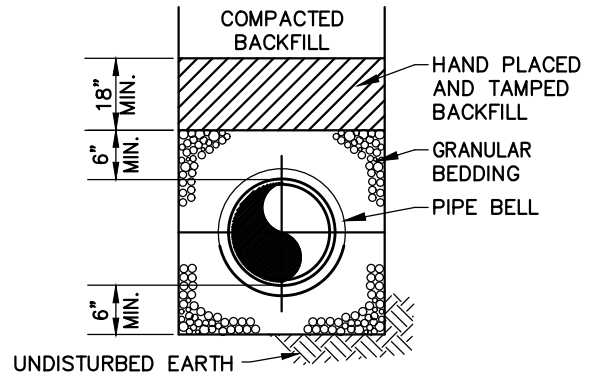
SCALE: NTS

DATE: JUNE 5, 2017

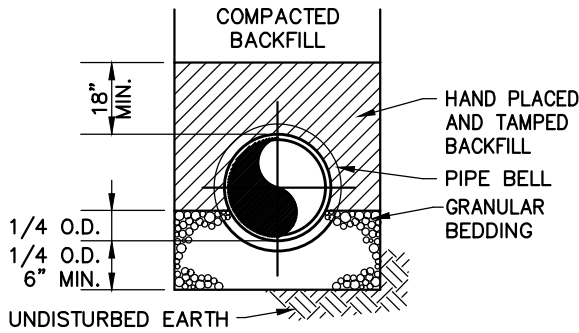
DWG. NO.: W-2A



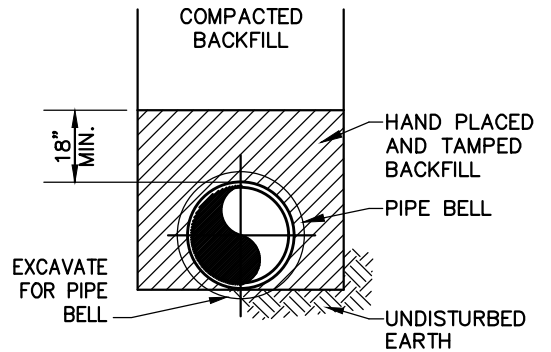
CLASS "A" TYPE 2
WITH DIP



CLASS "B MODIFIED"
WITH PVC SEWER



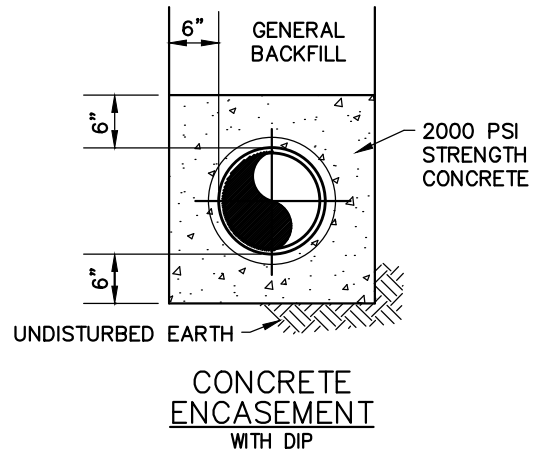
CLASS "C"
WITH DIP IN ROCK
OR WET EARTH TRENCH
OR DIP SEWER



***CLASS "D"**
DRY EARTH TRENCHES ONLY
WITH DIP
(WATER ONLY)

COMPACTION REQUIREMENTS

1. PROVIDE 95% COMPACTION (STD. PROCTOR) FOR HAND PLACED BACKFILL.
2. PROVIDE 95% COMPACTION (STD. PROCTOR) IN AREAS TO BE PAVED AND ROADWAY SHOULDERS IN 6" TO 8" LAYERS. ALL OTHERS AREAS TO BE COMPACTED TO 85% MIN. (STD. PROCTOR)
3. TOP 12" MIN. OF ROAD SUBGRADE TO BE COMPACTED TO 100% (STD PROCTOR)
4. IF JOB SPECS., DOT OR RAILROAD REQUIRE HIGHER COMPACTION FOLLOW REQUIRED SPECS.
5. PROVIDE CITY WITH COMPACTION TEST RESULTS.



CONCRETE ENCASEMENT
WITH DIP



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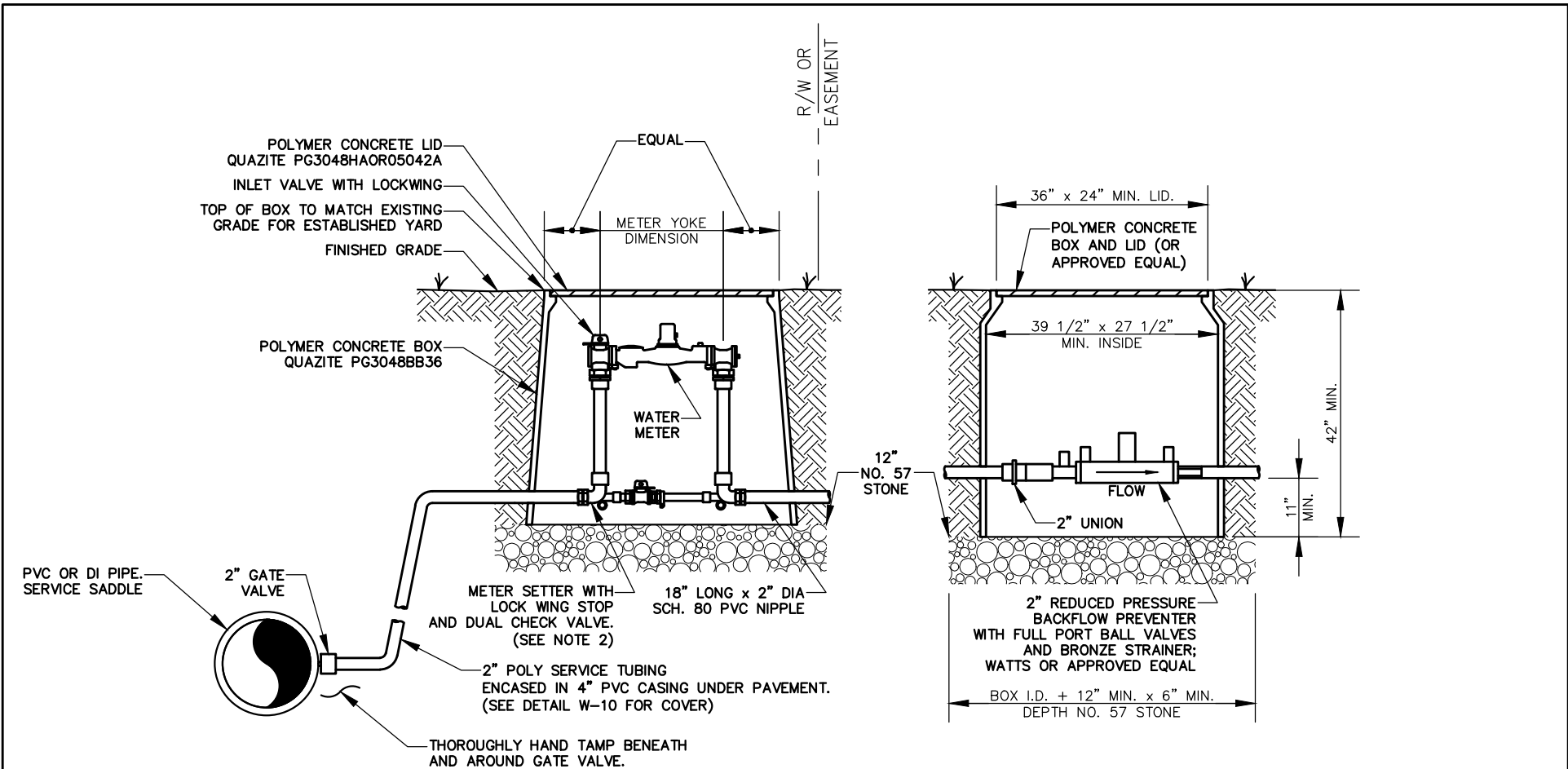
WATER DETAILS
PIPE BEDDING

DRAWN BY: DJH


SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: W-2B



1	02-15-21	PWK	REVISED PER CITY OF DALLAS
NO.	DATE	BY	REVISION


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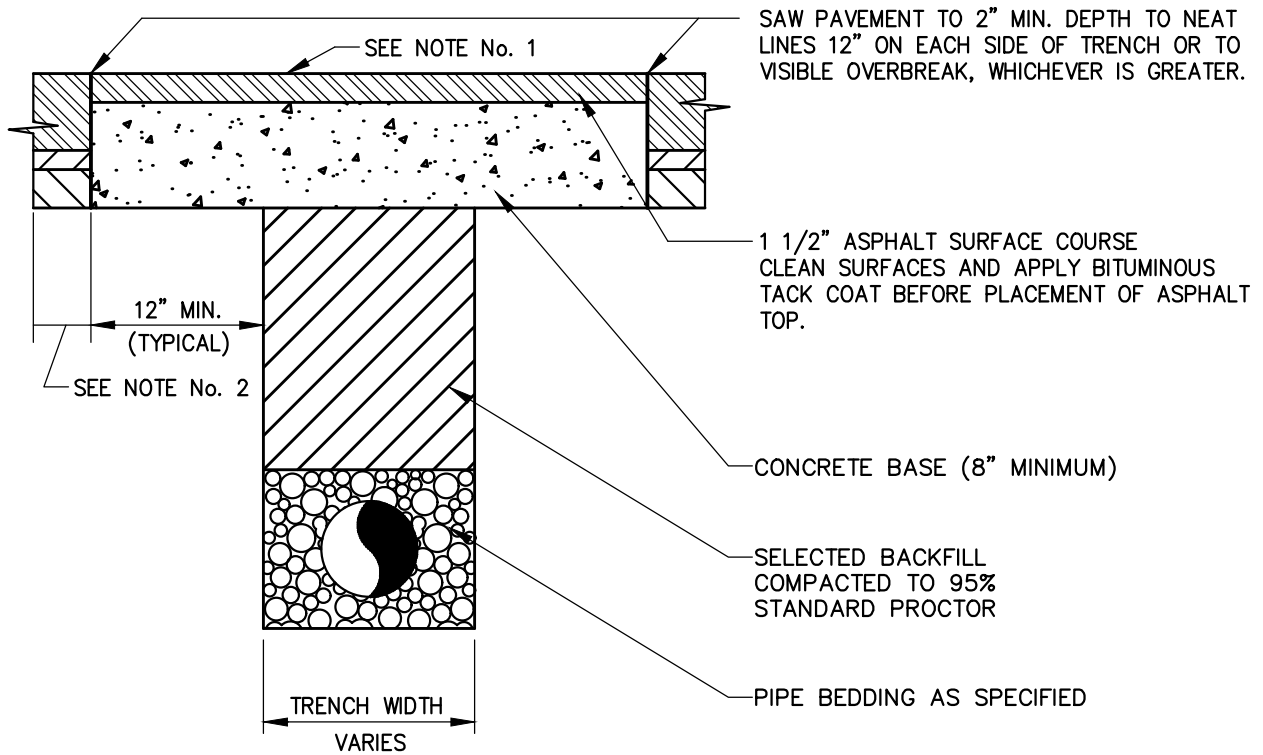
WATER DETAILS
2" SERVICE CONNECTION

DRAWN BY: PBH	SCALE: NTS	DATE: JUNE 5, 2017	DWG. NO.: W-3
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- NOTES**
- SEE SPECIFICATIONS FOR WATER SERVICE CONNECTIONS
 - 2" METER SETTER TO BE FORD METER BOX CO. 70 SERIES COPPERSETTER MODEL VBHH77-24BHC-44-77-Q-NL
 - VERIFY METER TYPE ON SERVICE APPLICATION

NOTES

1. IN AREAS WHERE TRAFFIC MUST BE MAINTAINED, COVER PAVEMENT CUTS WITH STEEL PLATES OF SUFFICIENT THICKNESS TO SPAN CUT AND SAFELY CARRY TRAFFIC.
2. REMOVE AND REPLACE BASE AND PAVEMENT TO OUTER EDGE OF EXISTING PAVEMENT IF REMAINING PAVEMENT WIDTH IS 24" OR LESS.
3. REPLACE CONCRETE DRIVEWAY PAVEMENT WITH 6" OF READY-MIX CONCRETE WITH 3000 PSI STRENGTH @ 28 DAYS.



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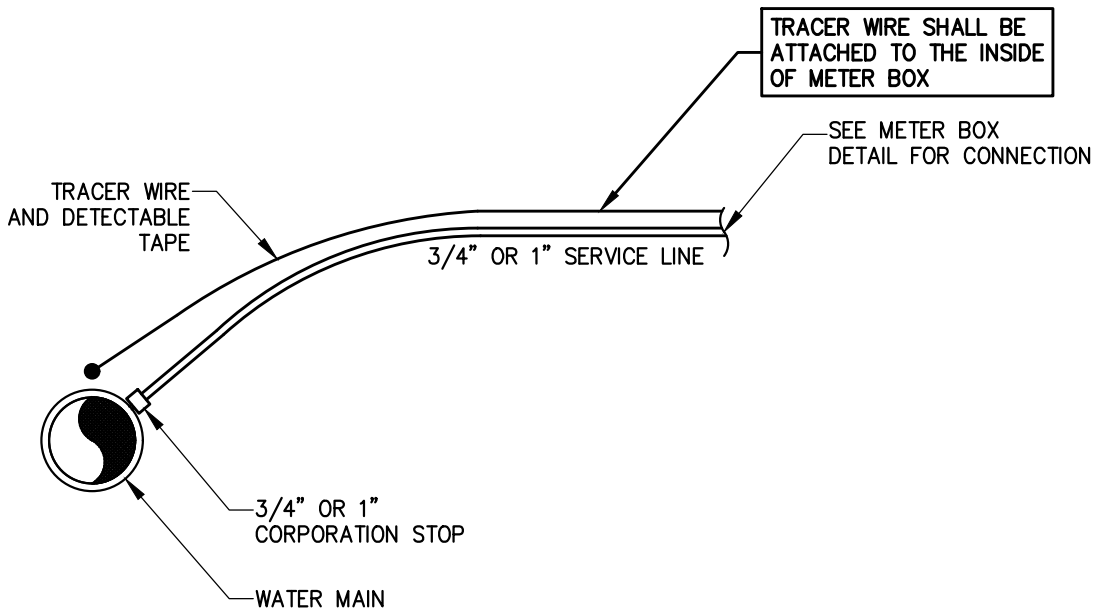
**WATER DETAILS
PAVEMENT REPLACEMENT**

DRAWN BY: TGA

SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: W-4



TYPICAL 3/4" OR 1"
WATER SERVICE CONNECTION
 NTS



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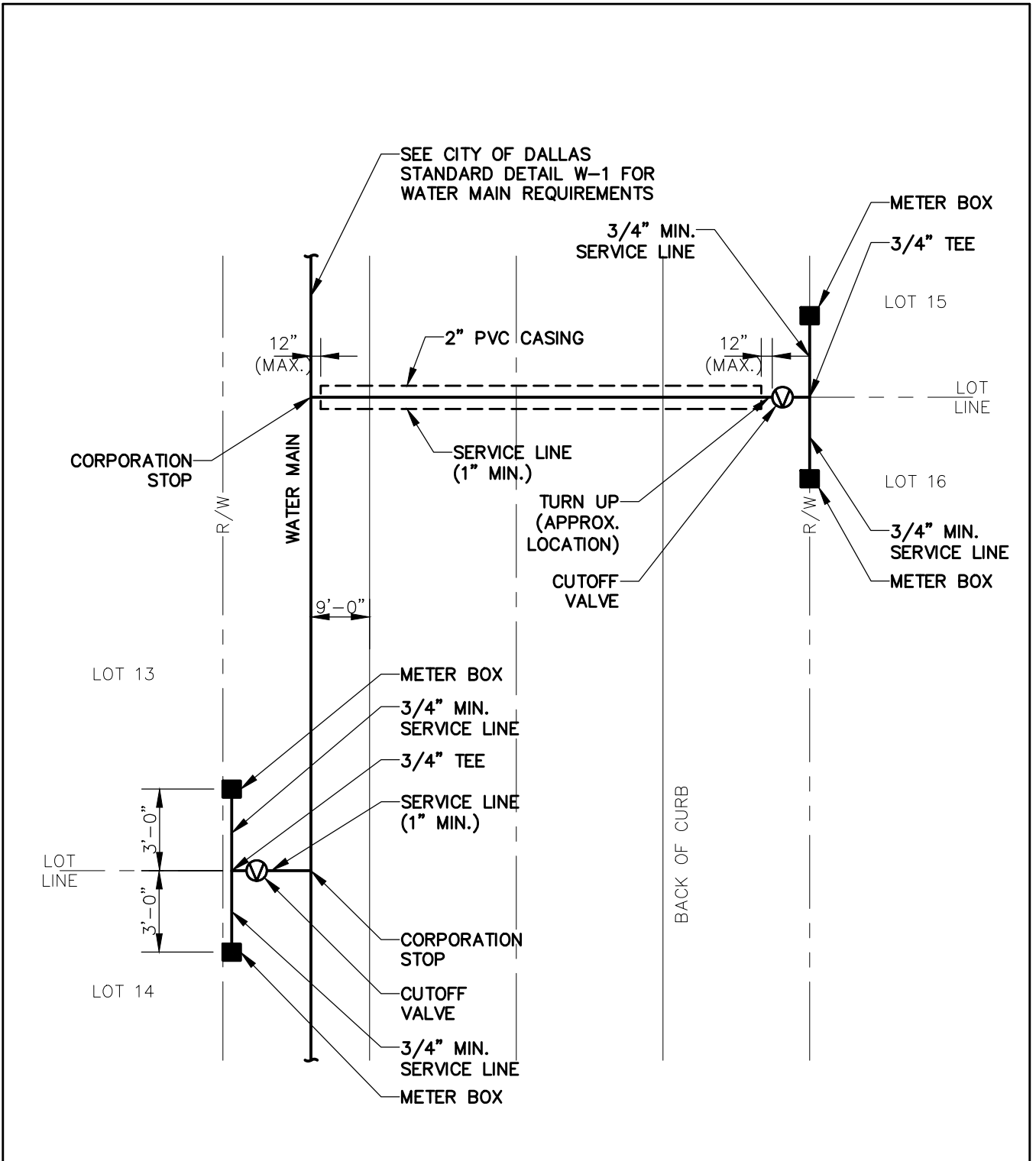
WATER DETAILS
WATER SERVICE CONNECTION

DRAWN BY: PBH


SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: W-5



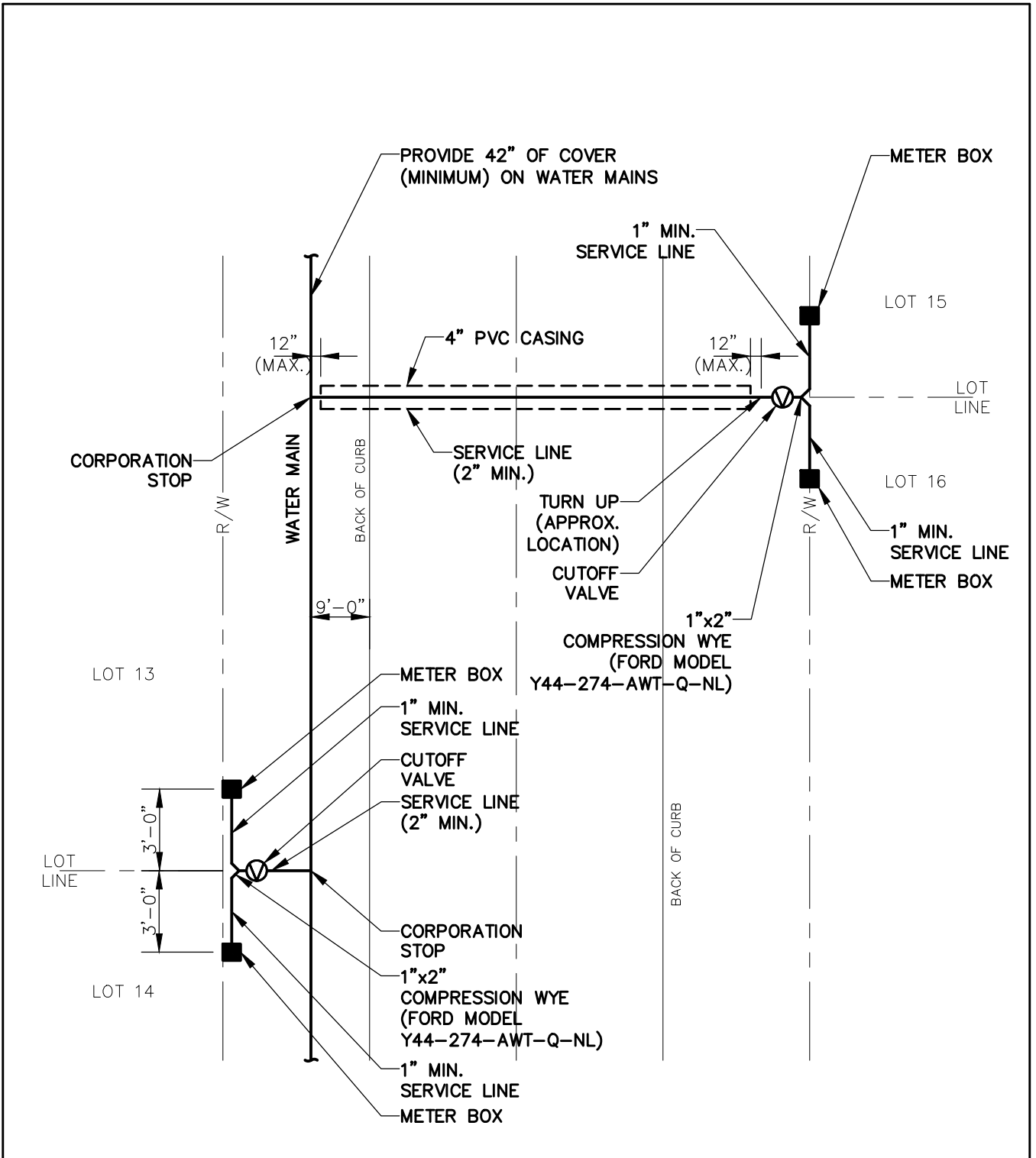
1	02-15-21	PWK	REVISED PER CITY OF DALLAS
NO.	DATE	BY	REVISION




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**WATER DETAILS
 TYPICAL 3/4"
 SERVICE CONNECTION**

DRAWN BY: TGA	SCALE: NTS	DATE: JUNE 5, 2017	DWG. NO.: W-6A
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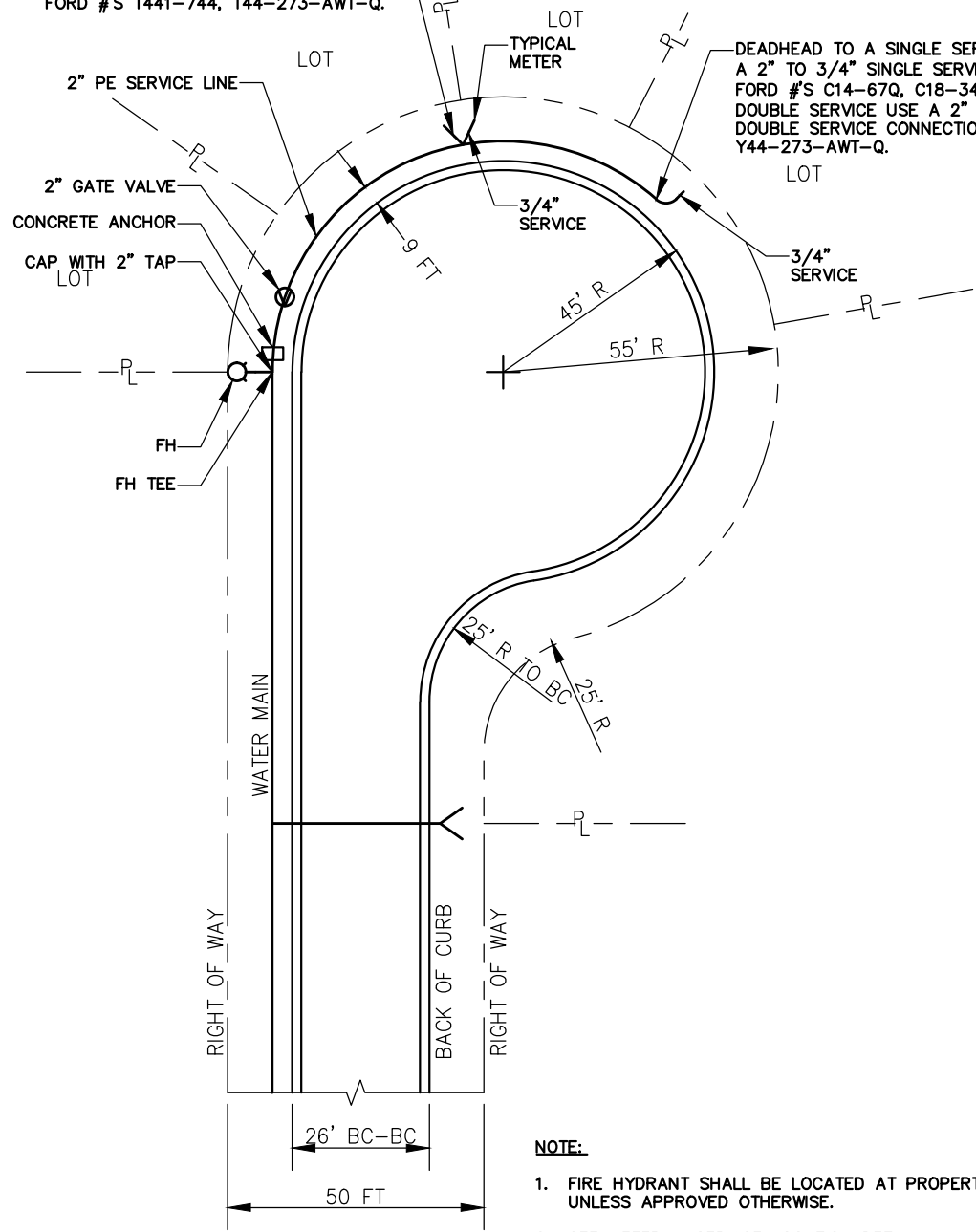
1	02-18-21	PWK	REVISED PER CITY OF DALLAS
NO.	DATE	BY	REVISION

 <p>CITY OF DALLAS, GEORGIA PUBLIC WORKS DEPARTMENT TELEPHONE (770) 443-8117</p>	<h2>WATER DETAILS</h2> <h3>TYPICAL 1" SERVICE CONNECTION</h3>	
	<p>DRAWN BY: TGA</p>	<p>SCALE: NTS</p>

DRAWN BY: TGA	SCALE: NTS	DATE: JUNE 5, 2017	DWG. NO.: W-6B
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FOR DOUBLE SERVICE USE A 2" TEE WITH A 2" TO 3/4" DOUBLE SERVICE CONNECTION FORD #S T441-744, T44-273-AWT-Q.

DEADHEAD TO A SINGLE SERVICE USE A 2" TO 3/4" SINGLE SERVICE CONNECTION FORD #S C14-67Q, C18-34, C84-43Q. DOUBLE SERVICE USE A 2" TO 3/4" DOUBLE SERVICE CONNECTION FORD # Y44-273-AWT-Q.



- NOTE:**
1. FIRE HYDRANT SHALL BE LOCATED AT PROPERTY LINE UNLESS APPROVED OTHERWISE.
 2. SEE METER & SERVICE LOCATION DETAIL.
 3. MAIN SHALL END AT PROPERTY LINE BEST SUITED FOR OVERALL MAINTENANCE (COORDINATE ACTUAL LOCATION WITH CITY OF DALLAS).
 4. ALL WATER MAINS SHALL INCLUDE TRACER WIRE AND TAPE.

NO.	DATE	BY	REVISION
1	02-18-21	PWK	REVISED PER CITY OF DALLAS



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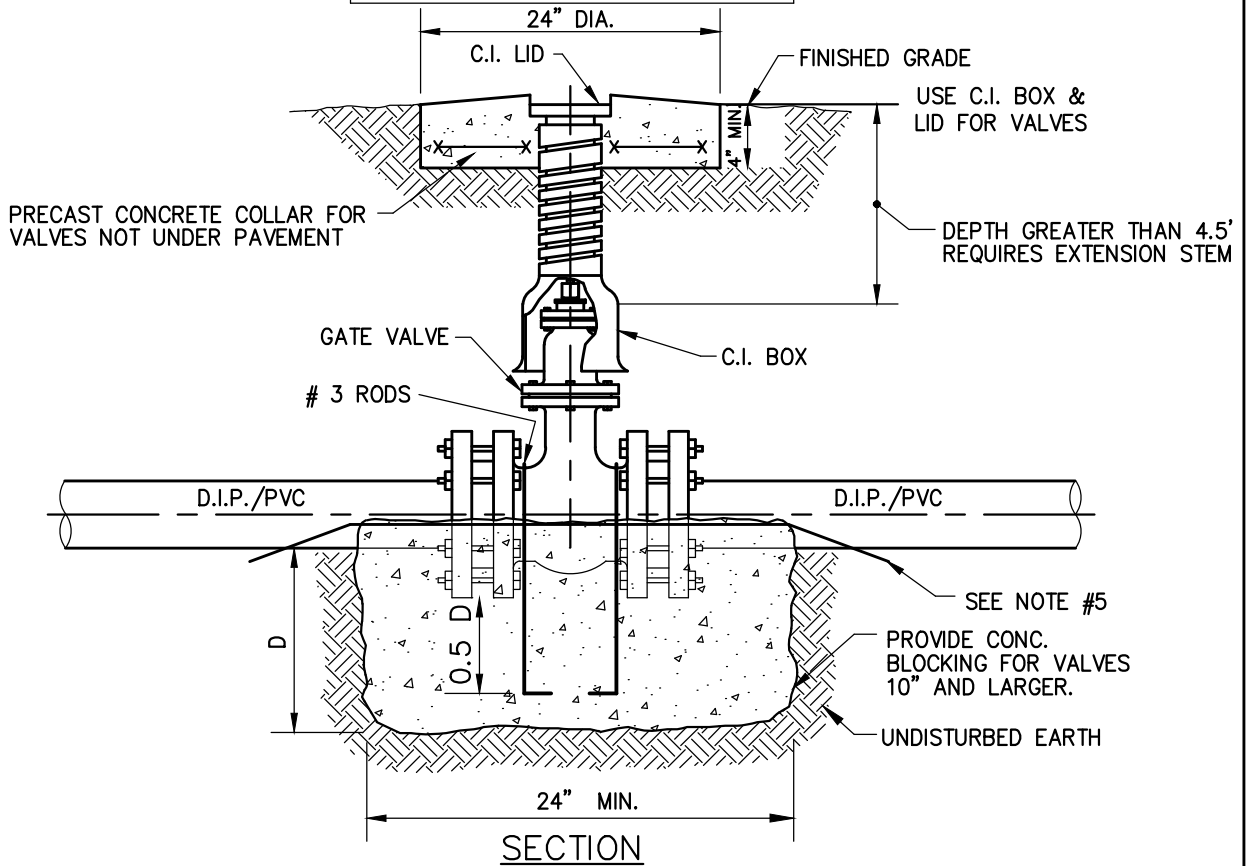
WATER SYSTEM DETAILS
TYPICAL DETAIL FOR WATER SERVICE AT CUL-DE-SAC

DRAWN BY: PBH	SCALE: NTS	DATE: JUNE 5, 2017	DWG. NO.: W-7
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NOTES

1. DIMENSIONS ARE BASED ON 200 PSI STATIC PRESSURE PLUS AWWA WATER HAMMER (FS = 1.5).
2. ALL BLOCKING SHALL BE CARRIED TO UNDISTURBED GROUND.
3. ALL CONCRETE SHALL BE 3,000 PSI @ 28 DAYS, READY-MIX ASTM C-94.
4. DIMENSIONS ARE BASED ON 3,000 PSF SOIL BEARING. IF SOIL OF LESSER BEARING CAPACITY IS ENCOUNTERED, OBTAIN MODIFIED DIMENSIONS FROM THE ENGINEER.
5. PROVIDE 10 MIL. PLASTIC MEMBRANE WRAP BETWEEN VALVE AND CONCRETE TO PROTECT JOINTS & JOINT ACCESSORIES.

VALVE SIZE	CONCRETE DEPTH "D"	CONCRETE WIDTH
10"	27"	52"
12"	32"	63"
16"	37"	74"



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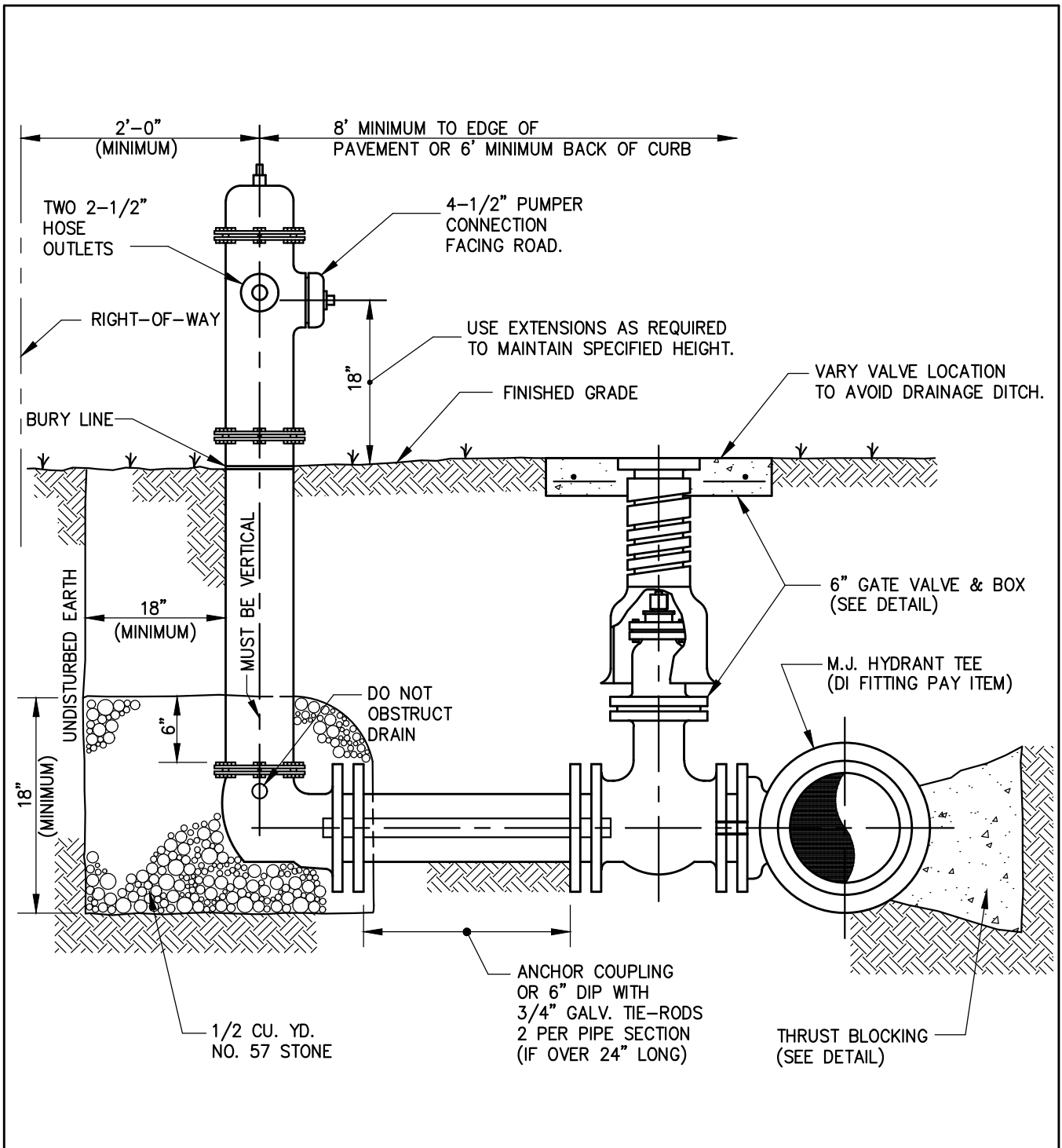
**WATER DETAILS
 GATE VALVE**

DRAWN BY: TGA

SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: W-8



NOTE:

1. FIRE HYDRANT SHALL HAVE 5-1/4" VALVE OPENING.
2. FIRE HYDRANT SHALL BE MUELLER A423MJ OR M&H 129MJ.



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**WATER DETAILS
 FIRE HYDRANT**

DRAWN BY: TGA

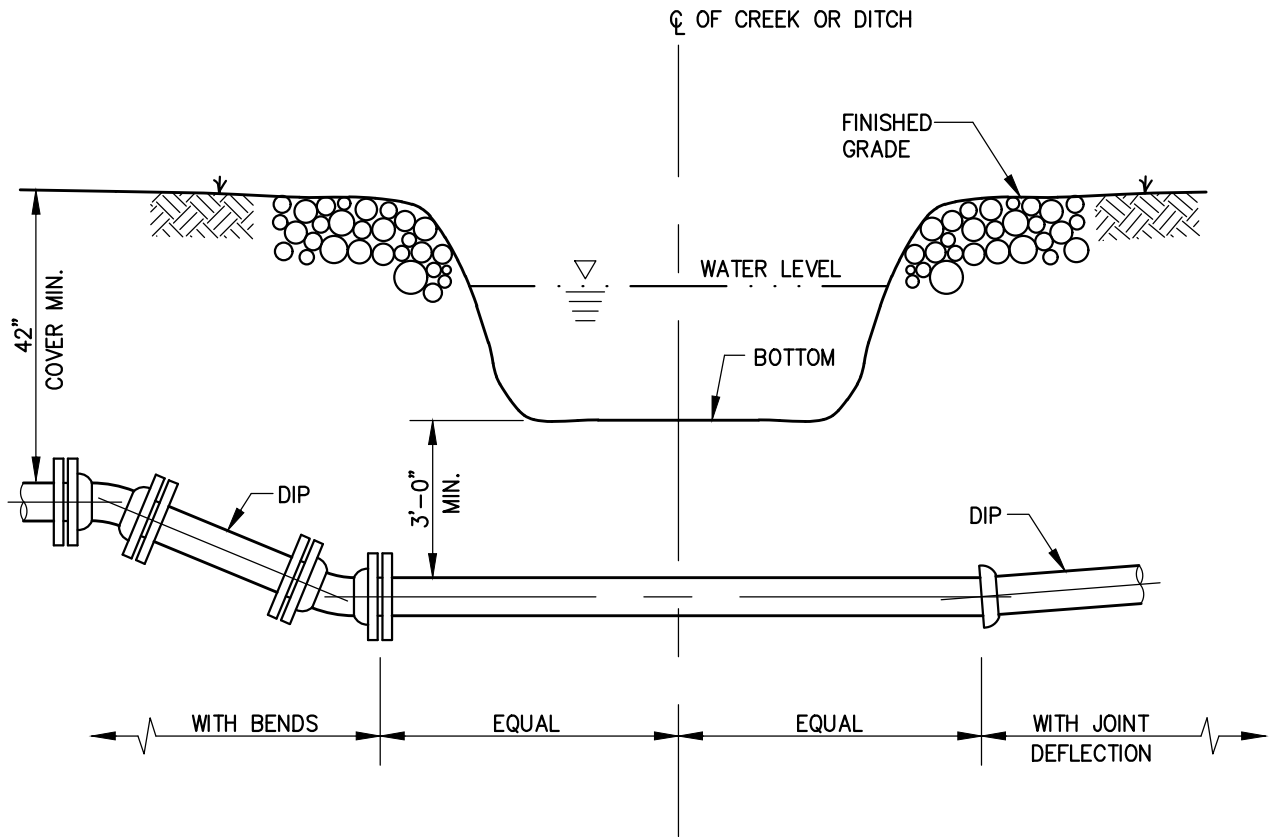
SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: W-9

NOTES

1. RESTRAINED PUSH-ON JOINTS (US PIPE FIELD LOCK GASKET OR EQUAL) REQUIRED BELOW CREEK OR DITCH AND ANY PIPE JOINT WITH GREATER THAN SIX (6) FOOT COVER.
2. M.J. BENDS REQUIRE M.J. RESTRAINTS (MEGALUG OR EQUAL).
3. MAXIMUM PUSH-ON JOINT DEFLECTION TO BE 4° (15" IN 18') OR PER PIPE MANUFACTURER RECOMMENDATION IF LESS THAN 4°.



CROSS SECTION



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WATER DETAILS
CREEK OR DITCH CROSSING

DRAWN BY: TGA

SCALE: NTS

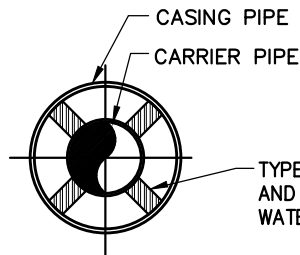
DATE: JUNE 5, 2017

DWG. NO.: W-10

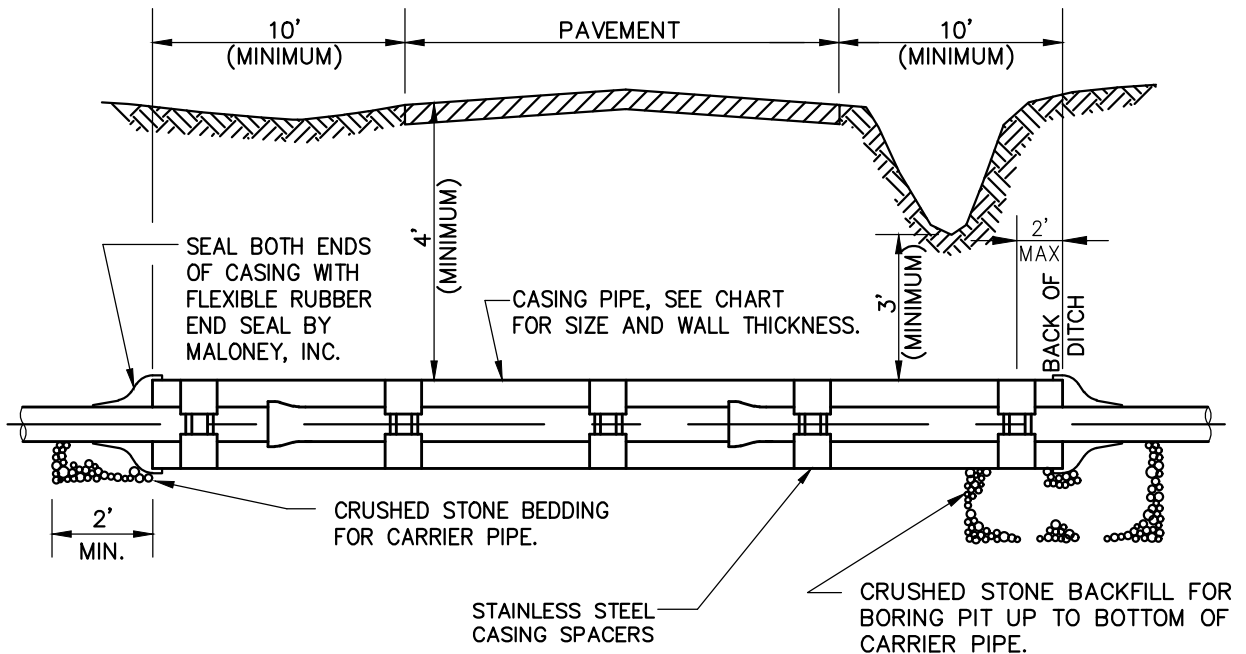
NOTES

1. INSTALL CASING BY BORING AND JACKING, UNLESS OTHERWISE NOTED.
2. CARRIER PIPE IN CASING SHALL BE DUCTILE IRON PIPE, PUSH-ON JOINTS WITH RESTRAINED JOINTS, U.S. PIPE FIELD LOK OR EQUAL.

DUCTILE IRON CARRIER PIPE		STEEL CASING PIPE	
INSIDE DIA.	MAX O.D.	NOMINAL DIA.	WALL THICK.
6"	9"	12"	0.250"
8"	11 1/4"	16"	0.250"
10"	13 1/2"	18"	0.250"
12"	15 1/2"	20"	0.375"
14"	17 3/4"	22"	0.375"
16"	20"	24"	0.375"
18"	22 1/4"	28"	0.375"
20"	24 1/4"	30"	0.375"
24"	28 1/2"	36"	0.500"



TYPE 304 STAINLESS STEEL CASING SPACERS WITH PVC LINERS AND LOW FRICTION POLYMER RUNNERS. MANUFACTURED BY CASCADE WATERWORKS MFG. CO. OR EQUAL. (2 REQUIRED PER JOINT)



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WATER DETAILS
HIGHWAY CROSSING

DRAWN BY: PBH

SCALE: NTS

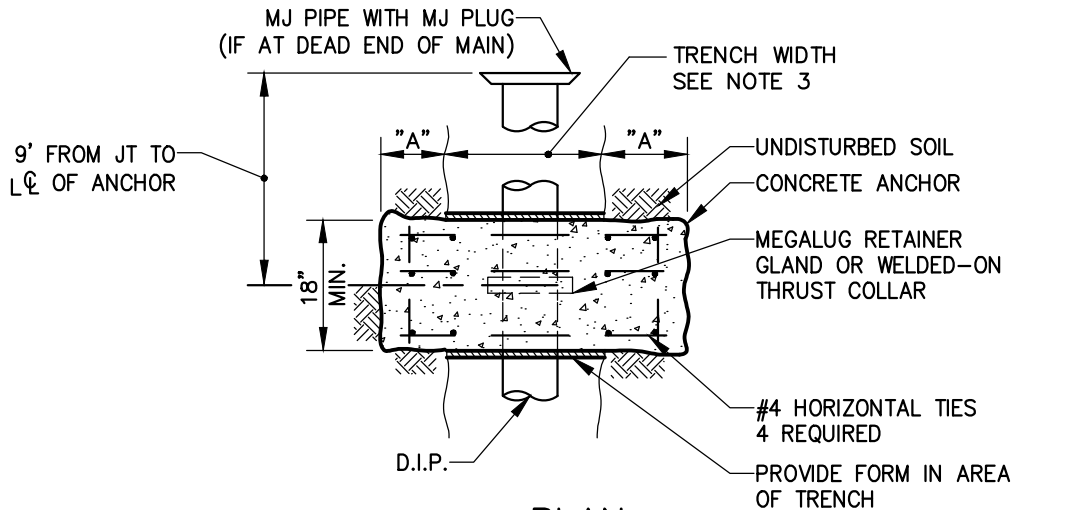
DATE: JUNE 5, 2017

DWG. NO.: W-11

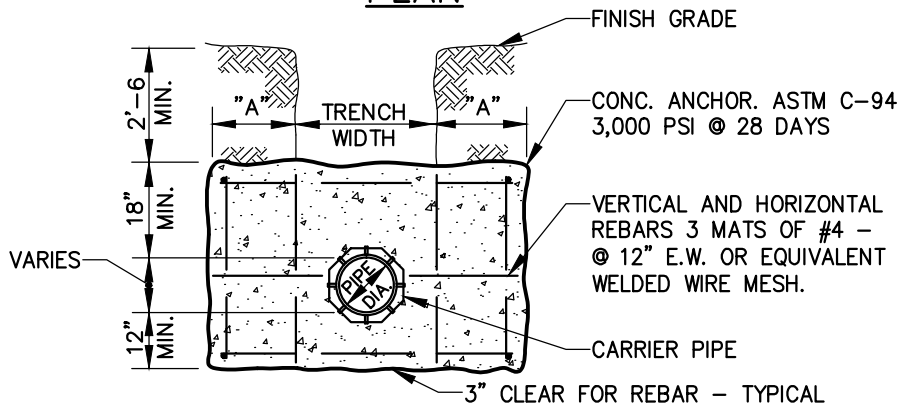
NOTES

1. DIMENSIONS BASED ON 200 PSI STATIC PRESSURE PLUS AWWA WATER HAMMER (FS = 1.5).
2. ALL BEARING SURFACES TO BE CARRIED TO UNDISTURBED GROUND. ANCHOR FORM MUST EXCAVATED PRIOR TO LAYING PIPE.
3. KEEP TRENCH AS NARROW AS PRACTICAL. NEVER MORE THAN O.D. + 15"
4. DIMENSIONS ARE BASED ON 3,000 PSF SOIL BEARING. IF SOIL OF LESSER BEARING CAPACITY IS ENCOUNTERED, OBTAIN MODIFIED DIMENSIONS FROM THE ENGINEER.

	PIPE DIAMETER			
	6"	8"	10" OR 12"	14" OR 16"
"A" (MINIMUM)	12"	18"	30"	48"



PLAN



SECTION

CONCRETE PIPE ANCHOR

NTS



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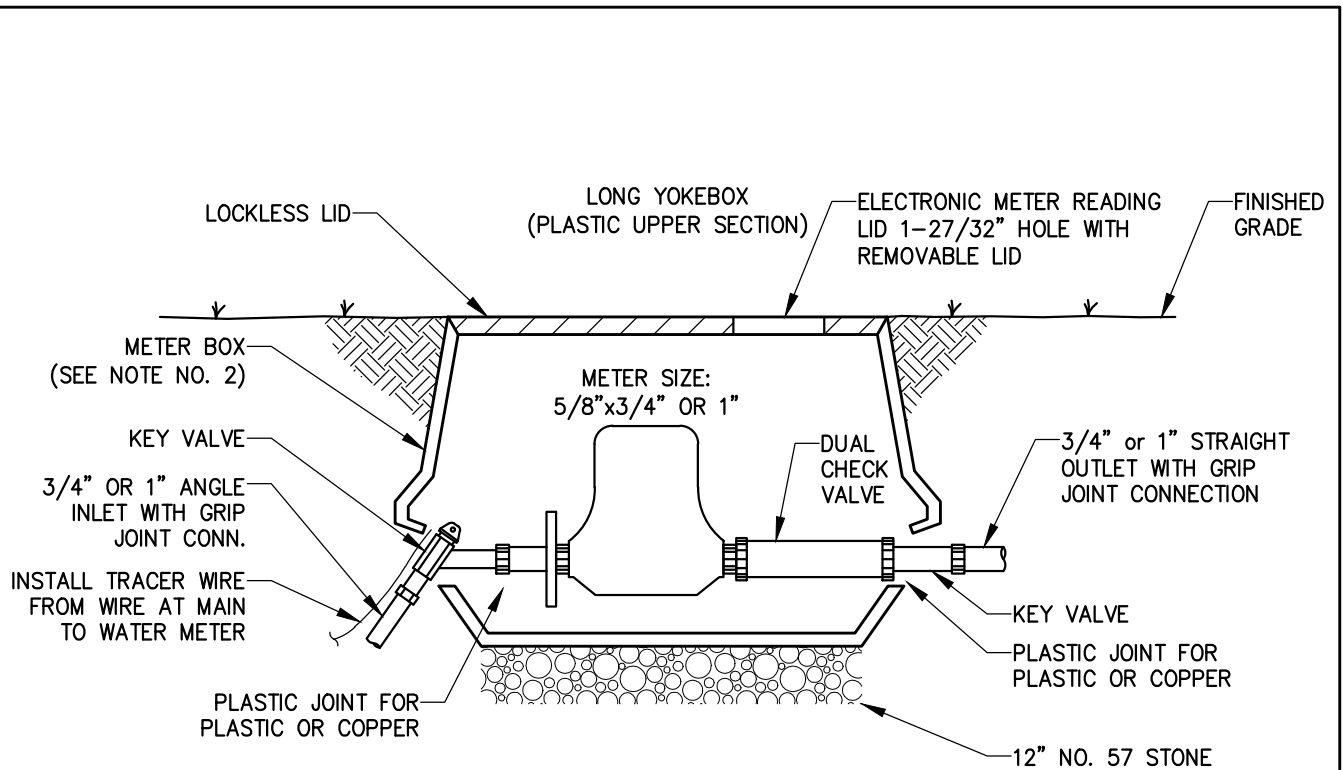
CONCRETE PIPE ANCHOR

DRAWN BY: PBH

SCALE: NTS

DATE: JUNE 5, 2017


DWG. NO.: W-12



NOTE:

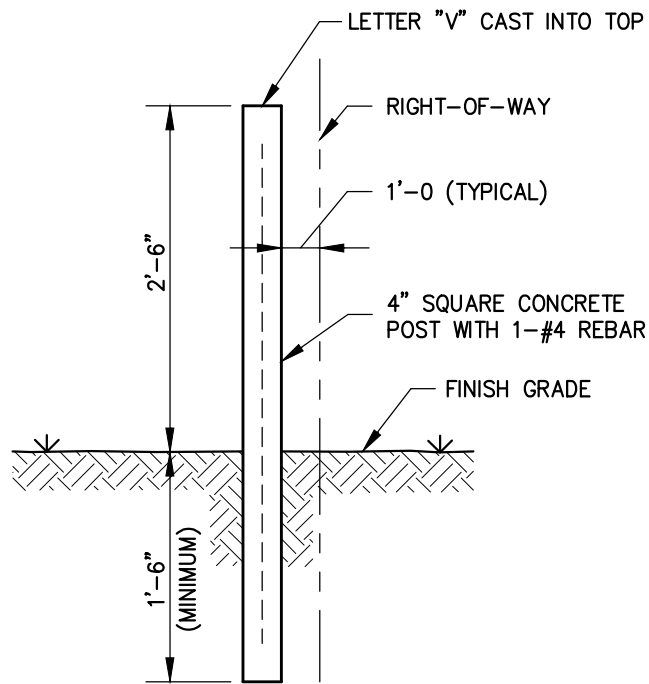
1. FOR FINAL APPROVAL ASSEMBLY MUST BE CENTERED IN METER BOX. METER BOX MUST BE FLUSH WITH GROUND. MATERIALS AS NOTED OR APPROVED EQUAL.
2. 5/8"x3/4" WATER METER BOX TO BE FORD METER BOX CO. LONG YOKEBOX MODEL LYLBPP-244-233-LLTP-Q
3. 1" WATER METER BOX TO BE FORD METER BOX CO. LONG YOKEBOX MODEL LYLBB-141-444-T-Q

1	02-15-21	PWK	REVISED PER CITY OF DALLAS
NO.	DATE	BY	REVISION

	<p>CITY OF DALLAS, GEORGIA PUBLIC WORKS DEPARTMENT TELEPHONE (770) 443-8117</p>	<p>WATER SYSTEM DETAILS 3/4" OR 1" METER INSTALLATION DETAIL</p>
<p>DRAWN BY: PBH</p>	<p>SCALE: NTS</p>	<p>DATE: JUNE 5, 2017</p>
		<p>DWG. NO.: W-13</p>

NOTES

1. PLACE MARKER IN A PROTECTED LOCATION AT EDGE OF RIGHT-OF-WAY.
2. MARKER REQUIRED FOR ALL VALVES EXCEPT AT FIRE HYDRANTS.



ELEVATION



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WATER DETAILS
VALVE MARKER

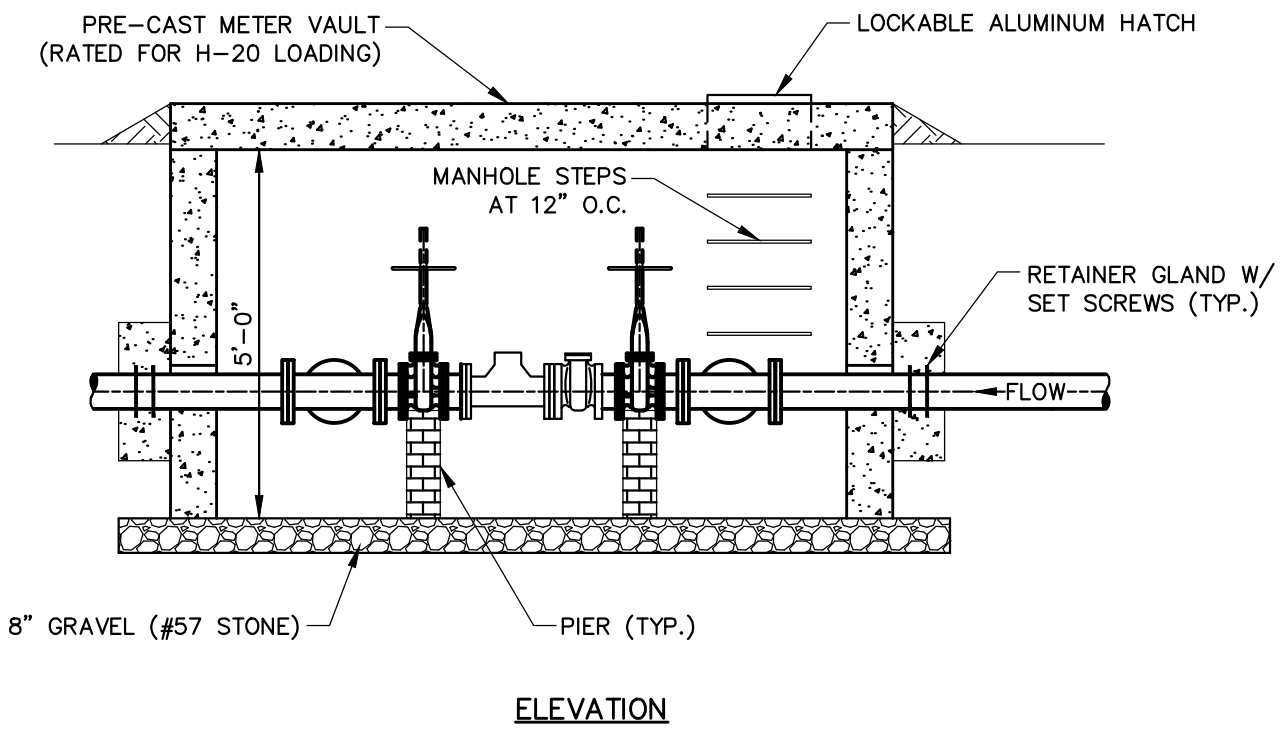
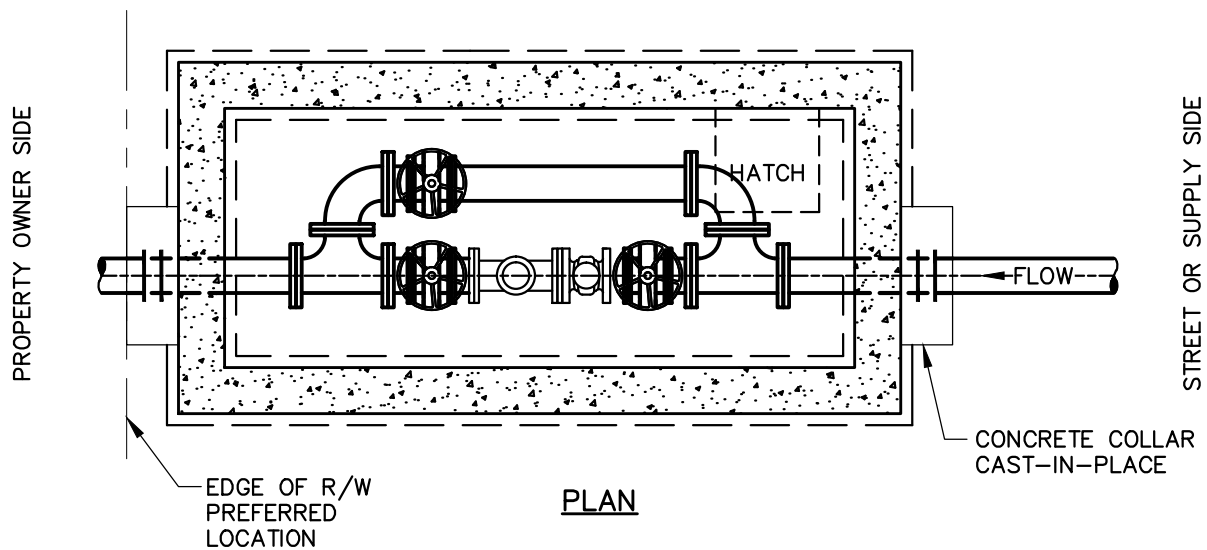
DRAWN BY: PBH


SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: W-14

STANDARD DIMENSIONS		
METER SIZE	VAULT SIZE	HATCH SIZE
4"	9'x6'	3'6"x3'6"
6"	12'x6'	3'6"x3'6"
8"	12'x7'	4'x6'
10"	14'x7'	4'x6'

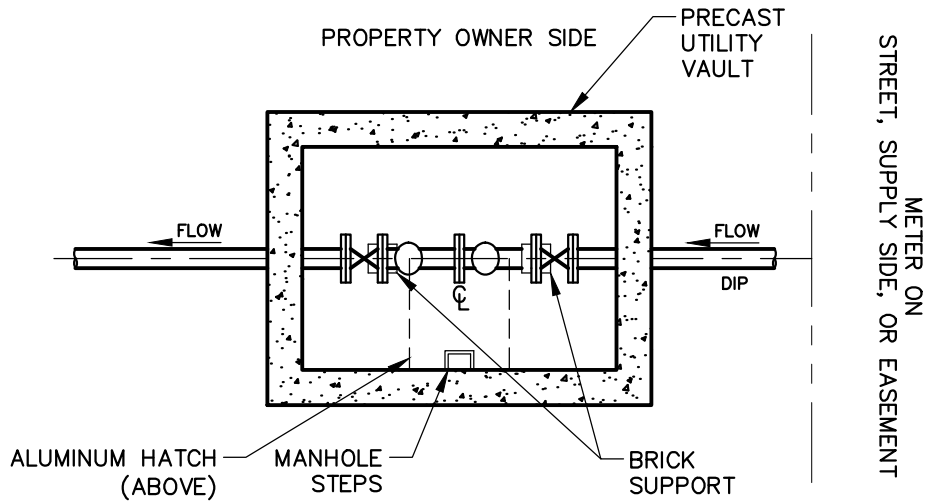


 <p>CITY OF DALLAS, GEORGIA PUBLIC WORKS DEPARTMENT TELEPHONE (770) 443-8117</p>	<h2>LARGE METER VAULT</h2>		
	<p>DRAWN BY: PBH</p>	<p>SCALE: NTS</p>	<p>DATE: JUNE 5, 2017</p>

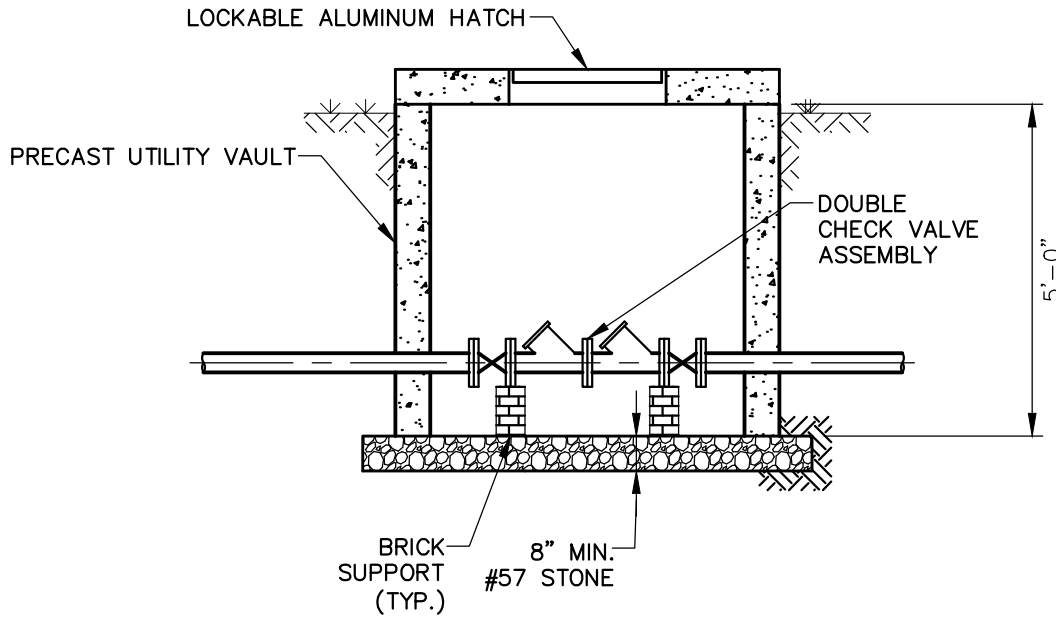
NOTES:

1. PROVIDE WATTS SERIES LF709 DOUBLE CHECK VALVE ASSEMBLY.

STANDARD DIMENSIONS		
METER SIZE	VAULT SIZE	HATCH SIZE
4"	8'x4'	3'6"x3'6"
6"	9'x4'	3'6"x3'6"
8"	10'x4'	3'6"x3'6"
10"	12'x4'	3'6"x3'6"



PLAN



SECTION



CITY OF DALLAS, GEORGIA
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TELEPHONE (770) 443-8117

LARGE DOUBLE CHECK
VALVE ASSEMBLY PIT

DRAWN BY: PBH

SCALE: NTS

DATE: JUNE 5, 2017

DWG. NO.: W-17