

2022

**TECHNICAL SPECIFICATIONS
AND
STANDARD DRAWINGS
FOR
4" – 20" PIPELINE CONSTRUCTION**



**LOUISVILLE WATER COMPANY
LOUISVILLE, KENTUCKY**

**SPENCER W. BRUCE, P.E. – PRESIDENT
TIMOTHY KRAUS, P.E. – VICE PRESIDENT, CHIEF ENGINEER**

LOUISVILLE WATER COMPANY
TECHNICAL SPECIFICATIONS AND STANDARD DRAWINGS
4" – 20" PIPELINE CONSTRUCTION
2022

The Technical Specifications and Standard Drawings are provided as a technical resource for the construction of water projects managed and contracted by the Louisville Water Company. The Technical Specifications and Standard Drawings will apply to water projects with 4-inch through 20-inch pipeline sizes. All work shall be performed in accordance with accepted workmanship practices and the Technical Specifications and Standard Drawings.

The Technical Specifications and Standard Drawings revisions shall become effective immediately upon formal adoption by the Chief Engineer of the Louisville Water Company and shall supersede all former Technical Specifications and Standard Drawings for Pipeline Construction. Revisions are planned on a 5-year cycle. A copy of the current edition of the Technical Specifications and Standard Drawings may be obtained from the Chief Engineer at the 550 S. Third St. office, the Louisville Water Supervisor of Construction Inspection, Construction Inspection Services at the 4801 Allmond Ave. office, or at Louisville Water.com.

The Technical Specifications and Standard Drawings have been prepared under the direction of the Vice President / Chief Engineer on behalf of the Louisville Water Company and no part of the Technical Specifications and Standard Drawings may be reproduced or copied in any form without the written prior consent of the Vice President / Chief Engineer.

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TECHNICAL SPECIFICATIONS **FOR PIPELINE CONSTRUCTION**

1. GENERAL REQUIREMENTS

1.1 Pre-construction Valve Inspection

Prior to the beginning of construction, the Contractor shall be responsible for locating and inspecting all existing valves associated with the work to be done. Specific valve information and locations can be found in the **SUPPLEMENTARY SPECIFICATIONS**. Inspection work to be done on these valves shall be included in the Contractor's base bid, and shall consist of the following:

- A. Locate the valve in the field. Valve boxes that are paved over or buried shall be uncovered and made accessible.
- B. Inspect key tubes and operating nut. Key tubes shall be cleared of debris and the operating nut made accessible. Gate Keys must be placed and turned on Gate Valve Operating Nuts to ensure the functional operation of the valve. Company's Inspector must be present when operating gate valves.
- C. Valve boxes (round tops) and lids shall be raised to grade where necessary.

Any valve determined by the Company to be inoperative shall be excavated and repaired or replaced by the Contractor as deemed necessary by the Company's Project Manager. Unit costs shall be as submitted by the Contractor in the **BIDDER'S PROPOSAL** form.

Except in cases of emergency, the Contractor shall not operate any valve without the direct supervision of the Company's Project Manager or Inspector. In an emergency, the Company's Inspector and Company's Radio Room shall be immediately notified by the Contractor. The Company's Radio Room direct phone line is (502) 569-3600, ext. 2700.

1.2 Signage

1.2.1 Project Identification

The Contractor is required to install a project sign on each end of the project limits, at a minimum, unless on dead end roads where only one sign will be required. The sign shall be furnished by the Company and consist of a 4ft. x 4ft. or a 4ft. x 8ft. sheet of 1/4in. corrugated plastic board. The Contractor

shall supply the materials to install the sign using two – 4in. x 4in. posts by 10ft. in length set in concrete anchors with 18in. diameter and 3ft deep, primed and painted white, or other suitable posting method approved by the Company’s Inspector.

The Contractor shall supply the materials to mount the sign to the posts using three – 2 ½ in. galvanized lag bolts with 1in. diameter galvanized washers on each post. The Contractor must install the signs prior to beginning any work and not remove the signs until final restoration is approved. Project Identification signs may not be required on new development projects, Kentucky Transportation Cabinet projects, on non-public roadways or projects less than 500 ft. The Project Identification signs shall be returned to Allmond Avenue inspection after project completion by the Contractor.

1.2.2 Contractor Vehicle Signage

The Contractor is required to display Louisville Water Contractor magnetic signs on both sides of all licensed vehicles when performing Louisville Water project contract work. The Company’s Inspector will assign and collect magnetic signs on a project basis.

1.3 Traffic Control, Permits, and Regulations

1.3.1 Traffic Control

Wherever the excavation is in right-of-way, the Contractor shall conduct their operations so that at least one lane of traffic is always kept open, unless otherwise approved by the permitting agency. Where the excavation is performed in an intersection, the work shall be completed in one work day, including backfilling, placement of a concrete cap, or temporary bituminous pavement. Temporary paving restoration shall be adequately maintained until permanent pavement is placed.

A traffic control plan is required by the permitting agency and shall be provided by the Contractor to the Company’s Project Manager prior to the permit request. The plan shall be digitally drafted utilizing an approved software and shall be in accordance with the Kentucky Department of Highways and/or Louisville Metro Public Works regulations and templates. The traffic control plan will be prepared by the Contractor and submitted by the Company to the respective agencies with the requested permit.

Traffic control shall be in accordance with the Federal Highway Administration Part VI of the Manual on Uniform Traffic Control Devices (MUTCD) latest edition.

Traffic control on streets shall be in accordance with requirements of appropriate City or County jurisdiction.

Specific signing and traffic control are incidental to this project and shall be determined by representatives from the appropriate agencies. No extra payment will be made for placement of these traffic controls.

Specific traffic control signage referencing lane blockages, detours, flaggers, etc. shall be removed from the site or covered when not in use. Signs that provide general messages such as “Construction Ahead” shall be left in place throughout the completion of the project.

The contractor shall be responsible for establishing temporary “No Parking” zones. The zones shall be confined to the immediate work area and appropriate transition zones and shall be limited in duration to the length of time work is performed in that area.

All construction vehicles shall be legally parked. Privately owned vehicles including vehicles owned by the construction crew shall not be parked in the “No Parking” zones.

1.3.2 Encroachment Permits

A road permit will be required for work performed within the right-of-way limits. No construction work shall start until these permits are obtained and provided to the Contractor by the Company. A copy of any approved permits obtained by the Contractor shall be provided to the Company’s Project Manager and Inspector before work shall be begin.

Applicable permits shall be obtained by the Company from the appropriate agency: Louisville Metro Public Works, Louisville Metro Parks, Bullitt County Road Department, Oldham County Public Works, Kentucky Department of Highways and / or any other Jurisdictional Authority that governs the location within which work will be conducted for installing water mains in public right-of-way. The Contractor shall coordinate their time schedule for performing this work with the Company’s Project Manager in order that the appropriate authority can be notified of the progress of construction. Special attention is directed to the working hours as specified by any of these traffic control departments in their respective permit.

A minimum fourteen (14) day advanced notice of the need for a permit shall be provided to the Company’s Project Manager. Copies of the permit(s), along with the approved traffic control plan, shall be on-site, readily available, legible and displayed in construction vehicles used at the project site. The Contractor will be responsible for obtaining appropriate permits for

Joint-Bid Projects (i.e. Kentucky Transportation Cabinet (KTC) Projects, MSD Projects, or Developer Installed Projects, etc.).

The Contractor shall submit a traffic control plan to the Company's Project Manager with the request for the permit. As a minimum, the traffic control plan shall include lanes to be blocked, "No Parking" zones to be created, parking meters to be "bagged", method of controlling traffic, designated work hours, and proposed work schedule. Contractors must use certified traffic control devices and not deviate from the approved Traffic Control Plans unless directed by the Jurisdictional Authority and any such deviation shall be documented.

Unless specifically approved by the Permitting Agency, all roadways (including side roads) shall remain open, with traffic maintained in a safe manner. Outside the designated work hours, all travel lanes shall be temporarily restored and reopened to traffic, and all construction vehicles, equipment, and personnel removed from the roadway.

1.3.3 Crossing of Roads

With respect to all roadways: water main crossings, fire hydrant crossings, and/or service crossings shall be bored, jacked, or tunneled as specified within these Contract Documents. Any alteration(s) to the above shall require written approval from both the Company's Project Manager and the Jurisdictional Authority prior to the work being performed. Any additions and/or deletions in roadway bores/jacks/tunnels from those included in the project's scope of work shall require compensation adjustment in accordance with the BIDDER'S PROPOSAL form's Supplementary Unit Prices (if applicable) or with CHANGES IN THE WORK, in the TERMS AND CONDITIONS (if said Supplementary Unit Prices are not applicable).

1.3.4 Parking Meter Permit

The Contractor shall arrange for and pay for a permit as required by Louisville Metro Public Works Ordinance Title VII Traffic Code: Chapter 72: Parking Regulations for the bagging of all parking meters affected by the construction. Issuance and enforcement are administered by the Louisville Metro Public Works. Information may be obtained at the following address. All costs shall be included in the Contractor's base bid.

Louisville Metro Public Works
444 South 5th Street
Louisville, Kentucky 40202

1.3.5 Soil Erosion and Sediment Control Permit

The Contractor shall abide by and shall arrange for and pay for any and all permits involving the Kentucky Division of Water regulations pertaining to erosion and sediment control requirements as administered by the Louisville and Jefferson County Metropolitan Sewer District (MSD) or other jurisdictional authority where required. The Contractor shall comply with the applicable provisions of KRS Chapters 220 and 224 of the State Water Pollution Control Laws and other applicable statutes relating to the prevention and/or abatement of water pollution.

Projects involving disturbed areas of more than one (1) acre shall require the Contractor to submit a "Notice of Intent" Letter to the Kentucky Division of Water, as well as an "Erosion and Sediment Control" plan submitted to MSD for MSD's approval where required.

In any event, regardless of the size of the project, the Contractor shall: exercise every reasonable precaution at all times to prevent water pollution by the erosion and deposition of sediment in streams, lakes, and reservoirs; conduct and schedule operations so as to avoid or minimize the muddying or siltation of areas adjacent to the construction site including streets, storm sewers, vacant lots, etc.; and not leave partially completed areas of work in a manner that will contribute to erosion during the period in which work is suspended.

For each stream crossing (a "stream" being defined as a so-called blue-line stream, either solid or broken, as shown on the United States Geological Survey (USGS) quadrangle map), the Company shall apply for a construction permit, or for an exemption thereto, from the Kentucky Division of Water, if applicable, (see Section 1.3.6). In any event, the Contractor shall: utilize adequate and environmentally-responsible construction practices, placing silt control prior to the start of construction and maintaining it until vegetation has been established; revegetate all disturbed areas upon completion of construction; maintain at least three and one-half feet (3 ½') of cover over the top of pipe with respect to the stream bed elevation; and obtain approval from MSD where required, prior to the start of construction, of an "Erosion and Sediment Control" plan.

Louisville Water hereby gives notice to Contractors (and, Contractors are directed to provide notice to their employees, agents, assigns and Contractor's subcontractors, their employees, agents and assigns, and Contractor's suppliers, their employees, agents and assigns on the project site) that Louisville Water holds an Erosion Prevention Sediment Control Plan General Permit issued by MSD, pursuant to the Louisville/Jefferson County Metro Government Code of Ordinance No. 186, Series 2007 (amending Jefferson County Ordinance Chapter 159), Erosion Prevention

and Sediment Control, and, that certain activities require additional Individual Site Disturbance Permits, also issued by MSD, pursuant to the Louisville/Jefferson County Metro Government Code of Ordinance No. 186, Series 2007, Erosion Prevention and Sediment Control.

Pursuant to the requirements of that General Permit where required and any required individual site disturbance permits, Louisville Water further gives notice to Contractors of the County's Erosion Prevention and Sediment Control Ordinance. Louisville Water hereby expressly requires Contractors, their employees, agents, and assigns and Contractor's subcontractors, their employees, agents and assigns, and Contractor's suppliers, their employees, agents and assigns on the project site to comply with the provisions of that Ordinance and all permits, General and Individual, as part of the required compliance with "any federal, state or local government statute, ordinance, regulation and law which controls or limits in any way the actions of persons working on the project and which affects the purchase, installation, or disposition of any materials related to the project" —set out in **CONTRACTOR'S RESPONSIBILITIES**, in the **TERMS AND CONDITIONS**.

The Contractor's responsibility for compliance with the Erosion Prevention and Sediment Control Ordinance is in addition to those set out in **CONTRACTOR'S RESPONSIBILITIES**, in the **TERMS AND CONDITIONS**.

See Standard Drawing: 4501 in Appendix of Drawings.

1.3.6 Stream – Wetland Crossing Permit

The Kentucky Division of Water (KDOW) requires a General Water Quality Certification (W.Q.C.) Permit #12 for the crossing of streams or wetlands. It is not necessary to apply for an individual General Water Quality Certification (W.Q.C.) Permit #12 unless the stream is classified as an Outstanding, Exceptional, or Cold Water stream (Special Waters) by the KDOW. Listings of streams with these classifications can be found on KDOW's webpage: eec.ky.gov

For subfluvial (streams and rivers) pipe crossings, a flood plain construction permit will not be required pursuant to KRS 151.250 if the following requirements of 401 KAR 4:050 Section 2 are met:

- No material shall be placed in the stream or in the flood plain of the stream to form construction pads, coffer dams, access roads, etc. during construction of pipe crossings.
- Crossing trenches shall be backfilled as closely as possible to the

original contour.

- All excess material resulting from construction displacement in a crossing trench shall be disposed of outside the flood plain.
- For erodible channels, there must be at least three and one half (3.5) feet of backfill on top of all pipe or conduit (casing) points in the crossing.
- For non-erodible channels, pipes or conduits (casing) in the crossing shall be encased on all sides by at least six (6) inches of concrete with all pipe or conduit (casing) points in the crossing at least six (6) inches below the original contour of the channel.

For subfluvial (streams and rivers) pipe crossings greater than fifteen (15) feet in width:

- The water main shall be of special construction, having flexible, restrained, or welded watertight joints.
- Valves shall be provided at both ends of the water crossings so that the section can be isolated for testing or repair.
- Valves shall be easily accessible, not subject to flooding, and if closest to the supply source, shall have a meter vault installed with permanent taps made on each side of the valve to allow insertion of a small meter to determine leakage and for sampling purposes.

See Standard Drawings: 1608 & 4501 in Appendix of Drawings.

1.4 Project Drawings and Specifications

1.4.1 General

The Contractor shall make available a set of stamped plans and specifications at the job site at all times, including all addendums, revisions, changes, etc.

1.4.2 Combined Specification

This specification discusses the installation of ductile iron pipe, PVC (polyvinyl chloride) pipe, ductile iron appurtenances, and other project specified piping and materials.

The type of pipe to be installed is specified on the stamped plans or in the **SUPPLEMENTARY SPECIFICATIONS.**

1.5 Daily Materials Installed Form

The Contractor shall maintain the Daily Materials Installed forms supplied by the Company as a record of the pipe, fittings, and valves installed each day, and shall provide same to the Company's Inspector daily. Pipeline materials shall be listed on the form in the same sequence as installed.

1.6 Video Recording

Prior to the start of construction, the Contractor shall provide one (1) original walking, narrative continuous DVD video, or other acceptable media approved by the Company's Project Manager representative of the complete project area. The video should include narration of the video footage, verbal descriptions of the locations shown, and at a speed which clearly shows the condition of all areas which could be affected by project construction.

2. CONDUCT OF WORK

2.1 Safety

Wherever necessary, to prevent caving during the excavating of sand, gravel, sandy soil, or other unstable material, the trench shall be adequately sheeted, braced, and drained. The trench shall be maintained in accordance with OSHA regulations so that workers may work thereon safely and efficiently, and vehicular and pedestrian traffic, livestock, and animals are protected at the worksite. It is essential that trench pumps discharge into natural drainage channels or drain toward storm drains in compliance with regulatory agency requirements.

Any excavated materials to be stockpiled, shall be piled in a manner that will not endanger personnel, property, adjacent properties and pedestrians, and will not obstruct driveways, sidewalks, or thoroughfares. Drainage lines shall not be obstructed.

With respect the entry of and/or working within confined spaces, the Contractor shall abide by the KOSHA Standards referenced by 803 KAR 2:300 thru 2:320 for General Industry and 803 KAR 2:240 thru 2:423 for Construction Standards, plus any and all additional related regulations required by the Commonwealth of Kentucky.

For questions or concerns relating to this matter, the Contractor shall contact the KOSHA-Kentucky Occupational Safety & Health Program, (phone (502) 564-3070).

2.2 Jobsite / Work Area Cleanliness

The Contractor shall routinely and regularly remove all dirt and rubbish resulting from its operations and shall keep the jobsite or work area neat and tidy.

When its work is complete, it shall at once remove from the premises all tools and machinery belonging to the Contractor and all rubbish in connection with the work and render the jobsite or work area clean and free from all obstructions, delivering the work at completion whole, clean, tight, and ready for use, with the grounds in a neat and presentable condition.

2.3 Cooperation

The Contractor shall cooperate with local governing agencies, Kentucky Department of Highways, Louisville Water, other utilities, and other contractors to cause as little interference as possible, to avoid inconvenience and delay, and to facilitate prompt completion of the work.

The Contractor shall coordinate and schedule with the Company's Inspector valving off mains for each connection or change in existing mains, and will conduct the work to cause the shortest possible interruption of service.

3. SITE WORK

3.1 Utilities

3.1.1 General

The Company has endeavored to locate sub-surface obstructions from available records, and such structures are shown on the project drawings. The Company does not guarantee the accuracy of the information there shown, although it has undertaken to present available data. The project drawings do not show the size or location of services.

Wherever the Contractor deems it necessary to determine the exact location of existing pipe, valve, or other underground structures, the Contractor may make any examinations that it may determine desirable in advance of the work and no added compensation will be paid. Only in the event that the Company's Project Manager by written order directs the Contractor to make additional exploration and excavation will extra compensation be allowed.

The Contractor's attention is directed to the Kentucky 811 (811 or 1-800-752-6007), which has been established to provide accurate locations of below-ground utilities. The Contractor shall notify Kentucky 811 a minimum of two (2) business days in advance of any construction on this

project. Additional information for Kentucky 811 can be found at www.kentucky811.org.

3.1.2 Utilities in Conflict with the Pipeline

In excavating trenches and installing pipe, where any existing utilities (including water pipe, sewer pipes, inlets and drains, gas pipes, electric lines and conduits, telephone lines and conduits, cable television lines and conduits, communication – fiber optic lines and conduits, service connections from these utilities, trolley tracks used for cathodic protection, traffic signal loop detector system or street light system), cross the trench, they shall be protected, supported, and maintained in service and restored to the condition in which they were found, all at no additional cost to the Company.

Where because of location or grade, such utilities cannot be replaced to occupy their original location, they shall be changed at no additional cost to the Company and as directed by the Company's Project Manager and utility owner to accomplish their original purpose with adequate provision for drainage over or under the pipe as circumstances require.

Where any utility facility, including service connections, is touched or endangered by the work, the utility's management shall be notified by the Contractor, and the Contractor shall cooperate with the utility and pay the cost of protection and repair if damaged.

The Contractor shall protect all abandoned trolley tracks. If abandoned trolley tracks are damaged, the Contractor shall contact Pipeline Integrity Group of Louisville Gas and Electric Company at (502) 627-4427 prior to the repair of any cut or damaged rail. Repair, if required, shall be as directed by Louisville Gas and Electric Company.

3.1.3 Utilities Parallel to the Pipeline

Where utilities exist parallel to the water main and at a location which will interfere with its installation, they shall be handled as follows:

A. The affected utility shall be notified at least five days in advance, if possible, of the time necessary to do the work. The cost of temporary hook-up and any charges from the utility will be paid by the Contractor unless previously authorized by The Company.

B. Gas, sewers, telephone, or electric facilities shall be gently uncovered, and personnel from the pertinent utility must remove its facility after accomplishing a temporary hook-up to prevent loss of service. After the water main has been placed, the utility line will be reinstalled near its

original location and grade by the utility personnel, and the Contractor will complete the necessary backfill.

3.1.4 Water / Sewer Main Separation

Water mains shall be installed in accordance with Kentucky Division of Water regulations and Recommended Standards for Water Works (Ten States Standards).

Water mains shall be installed at a minimum of ten feet (10') horizontally from any existing or proposed non-storm sewer main or non-storm sewer manhole; measured from the outside diameters. ("Non-storm sewer" is defined as sanitary sewer, combined sewer, septic tank, or subsoil treatment system.)

When crossing over or under a non-storm sewer main, the water main shall maintain one and one-half feet (1.5') vertical separation with one (1) full length of the water pipe located so that both joints of the water pipe will be as far from the non-storm sewer as possible. Special structural support for the non-storm sewer and water pipes may be required.

When ten feet (10') of horizontal separation or one and one-half feet (1.5') of vertical separation cannot be maintained, the Company's Project Manager must be notified for resolution. There shall be no deviation from the above ten feet (10') horizontal and one and one-half feet (1.5') vertical separation requirements when water pipes are crossing non-storm sewer force mains. Only in the event that the Company's Project Manager directs the Contractor by written order may changes be made to these minimum separations.

3.1.5 Water Service Line Depth and Service / Non-Storm Sewer Separation

Water service lines shall be installed at the standard depth of forty-two inches (42"). Service lines crossing over or under a non-storm sewer shall maintain a minimum vertical separation of one and one-half feet (1.5').

See Standard Drawing: 1000 in Appendix of Drawings.

3.2 Laying Out the Work

The location of the work shall be defined by lines and elevations furnished by the Company's Project Manager on project drawings or specifications. The Contractor shall layout their own work, lines, measurements, bench marks, levels and grades, right-of-way and easement lines. The Contractor shall contact the Company's Project Manager prior to entering a property

on which the pipeline is being installed in an easement to ensure that the easement has been obtained.

Unless otherwise directed by the Company's Inspector or Project Manager, the Contractor shall complete each block of water main installation, or in the absence of intersecting streets, every 500 feet of water main installation in urban areas, every 1,000 feet of water main installation in suburban / residential areas, or 1,500 feet in rural areas before proceeding. This includes chlorination, pressure testing, service work, and permanent restoration of all areas affected by the construction.

The pipeline shall be installed throughout the public right-of-way or in easements as indicated on the project drawings. Generally, all work must be confined to the public right-of-way or easement provided; however, the Contractor may make arrangements for more operating room at its own expense and responsibility.

The Contractor shall obtain written permission for use of private property by the property owner and furnish an affidavit to the Company's Project Manager that proper arrangements are made prior to occupation of the property. Otherwise, the Contractor shall conduct its operations in a manner that will not interfere with adjacent property owners.

3.3 Stakes

The Contractor shall furnish and set all stakes necessary in laying out the location of lines and grades, shall protect all stakes by suitable guard stakes, and shall be responsible for maintenance of all stakes after being set.

3.4 Temporary Contractor Facilities

3.4.1 Power

The Contractor shall arrange and pay for all power required for construction purposes.

3.4.2 Heat and Enclosures

The Contractor shall furnish at its own expense, all temporary heat and/or enclosures that may be deemed necessary.

3.4.3 Light

The Contractor shall provide and pay for temporary electric light necessary for the execution of the work. This will include all necessary wiring, fixtures, and electric bulbs. Torches or other sources of light which can

cause damage by fire or smoke shall not be used.

3.4.4 Water

The Contractor may purchase water from the Company for use in construction operations. The Contractor shall include the cost of Temporary Water Service, and cost of water purchased, in the base bid.

3.4.4.1 Temporary Water Service

Water used by the Contractor or Company for disinfection, flushing, pressure testing, and leakage testing will be supplied by the Company at no cost. If water is needed for other purposes, the Contractor may obtain a temporary water service meter as outlined below. The Contractor will be responsible for fees and usage charges for the temporary water service.

To obtain a temporary water service meter, an application, with deposit, must be completed in Metering Services offices at 4801 Allmond Avenue between the hours 9:00am to 3:00pm Monday through Friday. Applications can be obtained in Metering Services or at LouisvilleWater.com.

Routine questions regarding a temporary service meter or billing concerns may be directed to our Call Center, (502) 583-6610.

Use of temporary services must comply with all Louisville Water Service Rules and Regulations found at LouisvilleWater.com. The Company prohibits the unauthorized use of fire hydrants and will work with law enforcement officials to pursue each incident to the extent allowed by law.

The Contractor is responsible to protect the fire hydrant temporary service meter and fire hydrant wrenches from loss and theft. Fire hydrant temporary service meters must be dismantled when not in use to protect from theft or freezing weather. Fire hydrant wrenches shall never be left unattended on a fire hydrant.

Fire Hydrants must be turned on completely to prevent flooding through the hydrant's weep holes. Flow shall be regulated by the temporary meter assembly valve. The Contractor must notify the Louisville Water Radio Room (569-3600, ext. 2700 or 2701) of all hydrants flowed between November 1 and March 31, or as freezing conditions dictate, so the hydrant can be winterized after use to prevent freezing.

Some fire hydrants have a locking device attached to prevent unauthorized use. The Contractor shall notify the Company's Project Manager or Inspector 48 hours in advance of the need to use such a fire hydrant, so the lock can be removed by Company personnel. The Contractor shall immediately notify the Company's Project Manager or Company

Inspector when the fire hydrant is no longer needed so the lock can be re-installed.

It is the responsibility of the Contractor to properly protect the fire hydrant temporary service meter, and to ensure that proper replacement techniques be applied, including placement of gasket to prevent water loss upstream of the meter.

3.4.4.2 Water Uses Excluded in Temporary Water Service

Any water used from a fire hydrant or blow off shall be metered or estimated. In some instances, the Company Inspector may approve non-metered water use (e.g. filling the main, flushing of hyper-chlorinated or potable water where practical.)

See Standard Drawing: 1601 in Appendix of Drawings.

3.4.5 Temporary Toilets

The Contractor shall provide in the vicinity of the work at locations satisfactory to the Company, and maintain in a sanitary condition, suitable temporary toilets for the use of the workers and Company personnel.

Upon completion of the work, the temporary toilets shall be removed, and the premises left in a sanitary condition. The temporary toilets shall be satisfactory to the governing jurisdiction's Board of Health.

3.4.6 Temporary Fencing

The Contractor shall supply and install temporary fencing when necessary to control livestock or property owner's animals requiring containment. The Contractor shall make arrangements with the property owner for removal / containment of the animals during any removal of existing fencing and placement of the temporary fencing.

3.4.7 Contractor Communications

The Contractor shall supply a 24 hour emergency contact number to allow direct communication from the project site or after working hours with the Company's Project Manager or Company Inspector.

4. PIPELINE MATERIALS

4.1 Pipe and Fittings

4.1.1 Pipe and Fittings Furnished by the Company

Pipe and fittings to be furnished by the Company shall be as specified in the Contract Documents.

4.1.2 Pipe and Fittings Furnished by the Contractor

Materials provided for “Furnish and Install” projects shall be as specified in the Contract Documents.

The Company’s Inspector shall verify that all materials meet project specifications prior to installation.

The Contractor retains ownership of all Contractor furnished materials under “Furnish and Install” contracts until the project is completed and accepted by the Company. Materials not installed cannot be returned to the Company.

4.2 Furnished to the Contractor

4.2.1 Materials

The Contractor shall requisition and haul, on appropriate vehicles, all Company supplied materials from the Company’s warehouse to the points of their respective installation.

The Contractor shall protect pipe and fittings to avoid vehicle exhaust, debris, and damage during transit from the Company’s warehouse to being installed.

As referenced in the current edition of the Company's "Process for Job Site Delivery of Line Pipe" Document, a copy of which is available from the Company’s Project Manager, pipe delivery from the pipe manufacturer to the jobsite is available if the Contractor makes arrangements as stated in said Document.

4.2.2 Requisition and Return of Materials

The Contractor shall requisition and return materials per current warehouse procedures, and shall account for or promptly return all materials so requisitioned.

Any unused materials shall be returned within five (5) working days after the date of substantial completion of the work as specified by the Company's Inspector. The cost of any unused materials not returned to the warehouse by this date shall be billed to the Contractor.

Below is a list of guidelines to draw or return materials from the Company's Allmond Avenue warehouse:

- A. Call (502) 569-3633 or email warehouse@lwcky.com to make an appointment with the Warehouse. Appointments are scheduled for 30 minutes in length. Email or fax a copy of the materials list to the warehouse at 569-0812.
- B. Appointments, including standing appointments, will be scheduled on a first-come first-served basis. Appointments are not required for emergency situations but must be approved by the Company's Project Manager.
- C. Issues and returns are considered equal in regard to scheduling.
- D. Warehouse office hours are 7:30 a.m. - 4:00 p.m., Monday thru Friday (except Company's holidays). Appointments are scheduled from 8:00 a.m. - 2:00 p.m.
- E. All returned material must be in the same condition as it was when issued - clean and with all accessories. Returns of dirty, corroded, and/or rusted material, and/or fittings missing accessories, or otherwise damaged shall not be accepted.
- F. The Contractor shall not return cut pieces of pipe to the Company's Warehouse. Contractors shall make best use of pipe, minimize cut pieces of pipe and shall not install more than two (2) pieces of cut pipe adjacent in a straight run. Only whole – uncut pipe may be returned to the Company's Warehouse and it must be clean and in good condition.

4.2.3 Loading and Unloading Procedures

Refer to **PIPE AND PIPE APPURTENANCES FURNISHED BY THE COMPANY**, in the **TERMS AND CONDITIONS**.

4.2.4 Pressure Test Pump

For pressure and leakage testing, the Company shall issue a test pump and meter kit to the Contractor. Contractors may furnish their own test pump if it is equipped with a quick-connect coupling to allow placement of the Company Inspector's pressure gauge and the test pump meter is approved

by the Company's Inspector.

The Contractor is to: notify the Gate Shop (502) 569-3600, ext. 2766, at the Warehouse at least two days in advance of the day of intended use; pick up the test pump kit between the hours to 7:30 a.m. and 3:30 p.m.; have the test pump kit for 48 hours at no charge (Saturdays and Sundays are excluded from the allowed time frame); and return the test pump kit to the Gate Shop within 48 hours of pick-up. If outstanding for more than two days, beginning on the third day, a rental fee will be charged to the Contractor; this fee shall be waived only if the Company's Inspector notifies the Warehouse Office or the Gate Shop at the Warehouse of special circumstances.

The Contractor shall be held responsible for the test pump and all test kit contents and shall be invoiced for all cleanup and/or repair costs. The Company does not loan or lease hoses and/or tools, including tapping machines.

4.3 Storage of PVC Pipe (Polyvinyl Chloride)

When storing PVC (polyvinyl chloride) pipe, caution should be exercised to avoid compression, damage, or deformation to the pipe, including the bell ends. Ensure that the weight of the upper units does not cause deformation to the lower units. All pipe shall be placed on wooden skids or other suitable material, be stored in accordance with AWWA's M23 Manual and be stored in a manner to prevent deformation and dirt, debris, foreign objects, or any other substance from entering the pipe.

5. EXCAVATION

5.1 Rock Excavation

5.1.1 Definition of Rock

Rock, for the purpose of this contract, shall mean boulders, pieces of concrete or masonry of sufficient size, and solid ledge rock (usually limestone) which, in the opinion of the Company's Project Manager, requires mechanical removal or drilling and blasting as approved by the Company's Project Manager. All rock shall be Unclassified. Unclassified rock shall mean any rock which has to be removed for construction and the cost of removal shall be included in the base bid price.

5.1.2 Trench Dimensions

Trench rock excavation shall be based on a trench width of eighteen inches (18") wider than the outside diameter of the pipe, equally spaced at nine

inches (9”) on each side of the pipe and a trench depth of six inches (6”) below the outside bottom of the pipe.

5.2 Rock Soundings

The Company does not know or pretend to know, nor does it undertake to state, the nature of all materials which will be necessary to excavate in order to construct the work contemplated herein. The Contractor is advised to perform rock soundings or subsurface investigations where feasible on all projects prior to bid. If rock sounding information is provided on the plans, the Contractor is advised that the rock sounding location is approximate and that the location and quality of rock can be highly variable and if the Contractor uses such data he/she does so at their own risk. The Contractor shall assume all risks arising from, or out of, the nature of all forms of materials necessary to be excavated, except as otherwise specified.

It shall be distinctly understood that reference to rock, earth, or any other material on the Plans or in the Contract, whether in numbers, words, letters, or lines, is not to be taken as a complete indication of classified rock excavation or the quantity or quality of either rock, earth, or any other material involved. The Contractor is advised to draw their own conclusions regarding the actual conditions to be encountered. The Company does not provide a guarantee as to the accuracy of the data and no claim will be considered for additional compensation when the materials encountered are not in accordance with the classification shown.

5.3 Rock Blasting Requirements

All blasting for excavations shall be conducted by a blaster licensed in the State of Kentucky in compliance with provisions of KRS 351 and KAR 803 and 805. Blasting will be permitted only after securing the approval of the Company’s Project Manager and only when proper precautions are taken for the protection of persons or property. Any damage caused by blasting, including damaged or raised pavement, shall be repaired by the Contractor at their expense.

The Contractor shall abide by all Federal, State, and Local laws and regulations regarding the storage and use of blasting materials (KRS 351 and KAR 803 and 805). The hours of blasting will be fixed by the Company’s Project Manager and adhere to state and federal guidelines. A blasting log must be kept, and a copy furnished to the Company.

5.4 Excavation in Streets and Parking Areas

5.4.1 Procedure

Where a specific road permit exists, it shall take precedence; otherwise, the following language shall apply.

Wherever the excavation is in paving, whether in the streets or in parking lots, the Contractor shall so conduct their operations that at least one lane of traffic is kept open at all times. Where the excavation is performed in a traveled lane, the trench shall be made safe during non-working hours by installing backfill and temporary bituminous pavement, backfill and concrete subbase, or plates (see "Plating" Section 5.4.3).

Where the excavation is performed in an intersection, the work shall be completed in one work day, including backfilling and temporary bituminous pavement. Temporary paving restoration shall be adequately maintained until permanent pavement is placed.

Traffic warning signs shall be placed and maintained on the streets being crossed, in accordance with the applicable agency as described in "Traffic Control" (Section 1.3.1).

5.4.2 Twelve-Inch (12") Cutback Requirement

The Contractor shall make two pairs of straight paving cuts of uniform width: the first pair being along the edges of the anticipated trench location, to be performed prior to excavating the pipe trench; and the second pair being along the anticipated twelve-inch (12") cutback locations, to be performed upon completion of trench backfill placement up to the subbase bottom elevation and prior to subbase placement.

Saw cuts shall be of sufficient penetration of the pavement base to ensure straight edges during pavement removal. Irregular edges shall be sawcut to provide straight edges at a uniform width.

Twelve-Inch (12") Cutback Requirement is not required when backfilling the trench with flowable fill (Controlled Low Strength Cementitious Material).

5.4.3 Plating

5.4.3.1 General

Recessed and surface mounted plates shall have a minimum thickness of one inch (1") and shall be placed on a minimum bearing area of one foot of pavement bordering the perimeter of the excavation.

All plates, whether or not in a traveled lane, are to have 45-degree beveled edges along the entire perimeter. All plates must have readily identifiable markings to reflect Contractor ownership.

If plates are unable to be recessed and must be pinned due to other utility encumbrances, the appropriate Road Maintenance Agency or property owner must be notified immediately.

5.4.3.2 Traveled Lanes

In traveled lanes, the Contractor shall provide plates recessed flush with the pavement for any excavation and trenches must be backfilled to subbase prior to placing plates. Any lane that is open to the traffic at any time during the day is defined as a traveled lane.

5.4.3.3 Non-Traveled Lanes

In non-traveled lanes, the Contractor shall also provide recessed plates where required by the Company's Project Manager and as described in the **SUPPLEMENTARY SPECIFICATIONS**. Otherwise, for non-traveled lanes and parking lots, surface mounted plates, properly secured to pavement, shall be provided, with the exception that all plates are to be recessed from November 15th thru March 31st, so as to minimize the potential hazards to snow removal vehicles, or as specified by the permitting authority.

See Standard Drawing: 4000 and 4100 in Appendix of Drawings.

5.5 Trenching

5.5.1 General

The Contractor shall make all excavations for pipe, blow-off connections, valves and vaults, etc. which may be required for this project. All excavations shall be backfilled or plated overnight with open pipe ends plugged or capped.

5.5.2 Alignment and Grade

The trench shall be excavated to the alignment and depth required and only so far in advance of pipe installation as the Company's Inspector shall permit. All pipe shall be installed and maintained to the lines and grades shown on the project drawings.

5.5.3 Trench Width

The trench width shall be as narrow as practicable to permit the pipe to be installed and jointed properly with a minimum of nine inches (9") of separation between outside of the pipe and each sidewall of the trench. Trench width must allow for the backfill to be placed and compacted around the pipe. Vertical trench sides are desired where the nature of the excavated material and depth of trench will permit.

A trench width of eighteen inches (18") plus the outside pipe diameter shall be the pay width for any items of work for which compensation is made where trench width is a factor in computing the value of work done.

5.5.4 Trench Depth

The pipe trench shall be excavated to such depth as to provide for six inches (6") of depth under and a minimum forty-two inches (42") of cover over the outside of the pipe barrel. Unless otherwise specified, the trench shall have a flat bottom conforming to this grade. Any pipe installed with more than fifty-four inches (54") or less than forty-two inches (42") of cover must have written approval from the Company's Project Manager.

Any part of the trench excavated below grade (grade being six inches (6") under the pipe) shall be backfilled to grade with the same backfill material used to bed the pipe or other material approved by the Company's Project Manager, and compacted to ninety percent of Modified Proctor as required in "BACKFILLING PROCEDURES AND TAMPING" (Section 7).

Unstable soil material shall be excavated from the trench, and the trench backfilled and compacted as described above.

Backfill greater than a depth of forty-two inches 42" shall be provided where indicated on the project drawings with no additional compensation.

The pipe trench shall not be excavated to exceed forty-eight inches (48") of cover over the outside of the pipe barrel under normal conditions unless indicated on the project drawings.

In locations where pipe is installed on a sloped surface the minimum depth of cover of forty-two inches (42") must be maintained at all points along the pipe.

Variations from these required depths will be allowed only on written authority from the Company's Project Manager.

5.5.5 Minimum Clearances

Boulders, large stones, and rock (including shale) shall be removed to provide a clearance of at least six inches (6") below the barrel of the pipe, valves, or fittings and to provide a clear width of at least nine inches (9") on each side of all pipe and appurtenances.

Bell holes of ample dimension shall be dug to permit jointing to be made properly and to ensure that the pipe is evenly supported throughout in length rather than on bells or couplings.

5.5.6 Contaminated Soil

In the event the Contractor suspects encountering contaminated soil (i.e., soils containing asbestos, PCBs, petroleum products, hazardous waste, radioactive material, and/or any other substance that presents a potential danger to persons or property exposed thereto), the Contractor shall take the following steps:

- Immediately secure the work site to prevent access by unauthorized personnel;
- Notify the Kentucky Department for Environmental Protection, if reportable, (reportable is when an actual spill or release of a hazardous material occurs or when there appears to be a threat of severe environmental harm), at (502) 564-0323;
- Immediately notify "Emergency Response" at 911;
- Immediately stop all work in the vicinity of the contaminated soil, and notify the Company's Inspector, Project Manager, and Safety Representative.
- Follow the instructions from the Kentucky Department for Environmental Protection for disposal of excavated soils which are contaminated.
- Water lines installed or replaced in areas of organic contamination or in areas within 200 feet of underground or petroleum storage tanks or petroleum pipelines require ductile iron or other non-permeable materials and shall be used in all portions of the water line installation or replacement as approved by the Company's Project Manager. These particular water lines shall also be installed with nitrile gaskets or other petroleum resistant gasket as approved by the Company's Project Manager.

- Resume work only after receiving approval by the Company's Project Manager.

5.5.7 Preservation of Landscape

See also "RESTORATION" (Section 11).

Trees and shrubs shown on the project drawings identified for protection are to be protected from any damage both above and below ground, and the property owner is to receive full remuneration for any damage. Trees at other locations shall not be damaged or removed without explicit instructions from the Company's Project Manager and owner or responsible agency. Any limbs damaged during construction shall be trimmed and pruned to the approval of the Company's Inspector.

The project drawings may call for certain shrubs and trees in private roadways or easements to be transplanted until operations are completed and replaced in their original location or replaced with new stock.

5.5.8 Preservation of Historical Construction Materials

When historical construction materials (such as cobblestones, large brick, granite blocks, limestone, or other large stone building blocks used in the course of pavement, curbs, and sidewalks) are encountered in public streets or alleys, they shall be replaced with like material. The Contractor may request a waiver when this is not possible from the Company's Project Manager for approval. Brick masonry pavers that cannot be incorporated back into the work shall be palletized and delivered to Louisville Metro Public Works for preservation and maintenance of existing brick streets and alleys – See Section 7.02 M of the latest edition of Louisville Metro Public Works & Assets' Right-Of-Way Guide & Utility Policy.

5.5.9 Preservation of Boundary Monuments

Contractors shall be responsible for the location and protection of any boundary monuments locating property lines, property corners or right-of-way lines within project limits. If any monuments are removed or disturbed during construction, the Contractor will be responsible for replacement of the monuments by a Professional Land Surveyor of the State of Kentucky.

5.5.10 Archaeological

Contractors shall immediately stop work, if during the execution of work; they encounter any archaeological artifacts, skeletal remains, abandoned cemeteries or burial grounds within the work area and immediately notify the Company's Project Manager or Inspector.

6. INSTALLATION

6.1 Handling Pipe and Appurtenances

6.1.1 General

Proper equipment, tools, and facilities satisfactory to the Company's Project Manager shall be provided and used by the Contractor for the safe and convenient progression of the work. Slings used in handling the pipe shall be made of non-abrasive materials such as nylon. Chains or any sharp abrasive material shall not be used to lift or move pipe. Pipe fittings, valves, and other accessories shall at all times be handled with care to avoid damage.

The method of handling, hauling, and placing pipe in the trench shall be such that it will not damage the ductile iron pipe and its coating or polyethylene wrap or the PVC (polyvinyl chloride) pipe, and shall be done in accordance with the latest edition of AWWA's M23 & M41 manuals. The Contractor shall pay to replace all pipe and/or appurtenances that are damaged.

In loading and unloading, pipe shall be lifted in such manner as to avoid shock. Under no circumstances shall the pipe be dropped. Forklifts' forks or other tools and equipment shall not be inserted into the barrels of pipe, valves or other fittings to lift or move them.

6.1.2 PVC Pipe (Polyvinyl Chloride)

When handling PVC (polyvinyl chloride) pipe, the Contractor shall avoid abrasion damage and gouging or cutting by metal surfaces or rocks, and any stressing of bell joints and damage of bevel ends.

Avoid severe impact, particularly in subfreezing temperatures. In subfreezing temperatures, caution is advised in handling to prevent impact damage.

6.2 Installing Pipe and Appurtenances

6.2.1 General

All pipe installation shall be done under the supervision of an experienced superintendent who will be present on the job site during all construction activities.

Full pipe lengths shall be carefully lowered into the trench, individually, installed and backfilled, in such a manner as to prevent damage.

Unless shown otherwise on the project drawings, PVC (polyvinyl chloride) and Ductile Iron pipe joints will be rubber ring gasketed bell end type.

The Contractor shall furnish all equipment and materials necessary to make all joints completely assembled, except as described in "Furnished to the Contractor" (Section 4.2).

All pipe shall require a six inch (6") undercut and a six inch (6") compacted depth layer of backfill to ensure proper bedding for the pipe. These requirements are described in the sections "Trenching" and "BACKFILLING PROCEDURES AND TAMPING" (Sections 5.5 and 7, respectively).

The interior of all pipe, fittings, and other accessories shall be kept free from dirt and foreign material at all times. All pipe shall be clean and kept clean.

The exposed ends of pipe in the trench shall be closed by a water tight plug at all times when pipe installation is not actually in progress. See Section 6.14 "Plugging Ends of Pipe."

6.2.2 PVC Pipe (Polyvinyl Chloride)

All PVC (Polyvinyl Chloride) pipe installation shall be in accordance with AWWA's Manual No. M23 "PVC Pipe - Design and Installation", unless otherwise specified herein.

Wherever either horizontal or vertical curves or angles are shown on the project drawings, or found to be needed, appropriate ductile iron bends shall be used with PVC (Polyvinyl Chloride) pipe.

Under no circumstances will the bending of PVC pipe be allowed.

Backfilling procedures and mechanical tamping of backfill material shall be strictly adhered to as specified in the "BACKFILLING PROCEDURES AND TAMPING" (Section 7) of these specifications.

When installing PVC pipe, joint deflections shall not exceed that of the manufacturer's recommendations.

6.2.3 Ductile Iron Pipe

All ductile iron pipe installation shall be in accordance with the latest editions of AWWA's Standard Specification C600, "AWWA Standard for Installation of Ductile Iron Water Main and Their Appurtenances", and

AWWA's M41 manual, unless otherwise specified herein.

Wherever either horizontal or vertical curves or angles are shown on the project drawings, or found to be needed, appropriate ductile iron bends shall be used with ductile iron pipe.

When installing ductile iron pipe, joint deflections shall not exceed that of the manufacturer's recommendations.

Backfilling procedures and mechanical tamping of backfill material shall be strictly adhered to as specified in the "BACKFILLING PROCEDURES AND TAMPING" (Section 7) of these specifications.

Maximum Deflection for Full Length Ductile Iron Pipe @ 3 degrees (Push on Joint Pipe)		
Pipe Size	4" - 20"	
Pipe Length	18 feet	20 feet
Maximum Offset (inches)	15 in.	12 in.
Approx. Radius of Curve Produced by Succession of Joints (feet)	255 ft.	285 ft.

6.3 Boring and Tunneling

When boring is required, the Contractor shall use a boring tool of the proper size to form a tunnel for the purpose of installing the pipe from one excavation to the other without disturbing the surface. Where such methods are used, a plug or suitable closure shall be inserted in the end of the pipe to exclude any earth from the inside of said pipe.

Where it is necessary to cut the paved surfaces to accomplish the above boring beyond the limits of the excavation necessary to make the tap, the cost of making such pavement repairs shall be borne by the Contractor.

When installing main within the dripline of any tree with a diameter of 6 inches or larger, the root system shall be free bored. All tree root systems that require boring shall be free bored a minimum of 20 feet; 10 feet either side of the tree trunk. The bore shall be located a minimum of 4 feet below the ground surface and a minimum of 5 feet from the center of the tree. If the Contractor requests to bore utilizing Horizontal Directional Drilling methods, the Contractor must make the request in writing to the Company's Project Manager in advance. Regardless of the method selected, the cost of the tree bore shall be considered incidental to the installation of the pipeline,

and no extra compensation will be provided. The Contractor shall be responsible for the survival of the trees disturbed by the bore installation for a period of two (2) years after final contract payment for the project.

Whenever water main is to be installed through casing pipe, the water main shall be ductile iron pipe with restrained joints. Casing runners (spacers) shall be used to prevent damage during installation and to provide long term support. Pipe shall not rest on bells. Casing runners (spacers) shall provide sufficient height between bell joint and casing wall and should be fastened securely to the pipe.

Unless otherwise stated in the **BIDDER'S PROPOSAL** form and/or the **SUPPLEMENTARY SPECIFICATIONS**, there shall be three (3) casing runners (spacers) for each full pipe length, to be placed at the center and 3-foot from each end of each section of pipe. Ends of casing pipes must be grouted or End Seals installed to prevent debris and seepage from entering the casing pipe. The casing pipe shall extend a minimum of five (5) feet beyond the edge of pavement, unless otherwise noted on the project drawings.

Pipe may be installed in the casing using winch-drawn cable or jacking. Exercise care to avoid damage to the pipe, bell joints, interior and exterior coatings and polywrap.

For ease of installation, use a lubricant such as flax soap or drilling mud between casing runners and casing. Do not use petroleum products such as oil or grease.

Any rock encountered in the construction of bore pits and/or receiving pits shall be unclassified.

If voids shall develop or if the excavation is greater than the outside diameter of the casing pipe or tunnel liner by more than approximately one inch (1"), they shall be filled by pressure grouting. In the case where sections of casing pipe are field welded in order to meet the plan requirements, the Contractor shall weld the casing pipe fully around the entire circumference of the casing pipe and make the casing pipe available for weld inspection prior to installation of the water main.

All interior weld beads or slag shall not extend more than 3/32 inch from the interior pipe face.

See Standard Drawing: 1500 in Appendix of Drawings.

6.4 Mechanical and Push-on Joint Assembly

6.4.1 General

All rubber-gasket joints for Ductile Iron pipe shall be made in accordance with the current edition of AWWA's Standard Specifications C111 "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings", as recommended by the manufacturer, and as described in the following Sections: 6.4.2; 6.4.3; and 6.4.4.

All rubber-gasket joints for PVC (polyvinyl chloride) pipe shall be made in accordance with the current edition of AWWA's Standard Specification C900 "Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch Through 12-inch, for Water Distribution", as recommended by the manufacturer, and as described in the following Sections: 6.4.2; 6.4.3; and 6.4.4.

6.4.2 Mechanical Joint

The inside of the bell and the outside spigot end shall be thoroughly cleaned to remove oil, dirt, grit, excess coating, and other foreign matter from the joint, and then painted with a manufacturer's approved lubricant.

The ductile iron gland shall then be slipped on the spigot end of the pipe with the lip extension of the gland toward the joint. The rubber gasket shall be painted with the lubricant and placed on the spigot end with the thick edge toward the gland. The entire section of pipe shall be pushed forward to seat the spigot end in the bell.

The gasket shall then be pressed into place within the bell with care being taken so that the gasket shall be evenly located around the entire joint.

The ductile iron gland shall then be moved along the pipe into position for bolting, all of the bolts inserted, and the nuts screwed up tightly, with the fingers. Nuts spaced 180 degrees apart shall be tightened alternately, in order to produce an equal pressure on all parts of the gland.

The torque applied for various sizes of bolts shall be as follows, unless otherwise specified by the manufacturer:

Mechanical Joint Bolt Torque Table:

5/8"	45-60 ft.-lbs
3/4"	75-90 ft.-lbs
1"	100-120 ft.-lbs
1-1/4"	120-150 ft.-lbs

Any mechanical joint restraints or gripper rings shall be retightened to Bolt Torque Table specifications no sooner than thirty (30) minutes after initial tightening, or as directed by the manufacturer.

All bolts installed above ground shall be rechecked for proper torque after placement in the excavation.

6.4.3 Push-on Joint

The inside of the bell and the outside of the spigot end shall be thoroughly cleaned to remove oil, grit, excess coating, and other foreign matter. If placement of the gasket occurs in the field, the circular rubber gasket shall be flexed inward and inserted in the gasket recess of the bell socket. A thin film of gasket lubricant shall be applied to the spigot end of the pipe.

Lubricant shall be applied evenly over the entire surface requiring lubrication, but avoid using an excessive amount. Use only lubricant approved by the pipe manufacturer. Failure to do so may promote bacterial growth or damage to the gaskets or the pipe.

Correct alignment of the pipe is essential for ease of assembly. The spigot end of the pipe shall be entered into the socket with care to keep the joint from contacting the ground.

The PVC (polyvinyl chloride) pipe shall be inserted into the bell or coupling by application of firm and steady pressure by hand or by block assembly until the spigot end slips through the gasket. The spigot end of the pipe is marked by the manufacturer to indicate the correct depth of insertion. Over-insertion (over-belling) of the pipe shall not be permitted and can cause rolled gaskets, split bells, failure of hydrostatic pressure test, and damage to previously assembled joints.

Ductile iron pipe joints shall be completed by forcing the spigot end to the bottom of the socket using a pry bar, backhoe, jack-type tool, or other device recommended by the manufacturer or approved by the Louisville Water Project Manager. When using a backhoe to home a section of pipe, a timber header should be used to protect the pipe from damage.

6.4.4 Field Cut Pipe

Field-cut ductile iron or PVC (polyvinyl chloride) pipe requires a cut perpendicular to the pipe. It is recommended that the pipe be marked around its entire circumference prior to cutting to ensure a perpendicular cut.

The end shall be beveled by using a beveling tool, rasp or grinder as appropriate to assemble the push-on joint. Round-off any sharp edges on

the leading edge of the bevel. Reinstall depth mark using original mark by manufacturer as a guide.

Mechanical Joint Assembly: When field-cut PVC (polyvinyl chloride) pipe is to be inserted into a mechanical joint end, the beveled end shall not be inserted into the MJ end. The above-stated requirements for a square cut, rounding off sharp edges, and establishing a correct-depth marker shall be performed.

6.5 Tie-ins to Existing Mains

The Contractor shall install the necessary pipe and fittings for the connections to the existing mains, as shown on the project drawings, and shall make the connections complete, ready-for-use.

It is imperative that the sequence of work involving an interruption of service be such that all operations be completed and the new pipeline ready to be connected prior to shutting off existing mains that are serving customer connections. Except for filling of the main, tie-ins shall not be accomplished until the main has passed pressure testing and disinfection.

All pipe, fittings and materials installed for tie-ins or taps not exposed to pipeline chlorination / dechlorination shall be disinfected with an adequate chlorine solution.

When tapping a main, the Contractor shall make the tap only after a hydrostatic pressure test of 125 psi is applied for fifteen (15) minutes with no leakage to the tapping sleeve and gate valve assembly. Before cutting an existing main under pressure, the Contractor shall ensure the adjacent existing valve and fittings are sufficiently secure. The Contractor shall be responsible to provide the tapping coupon to the Company's Inspector.

When connections to existing pressurized PVC water mains are to be made with a tapping sleeve and gate valve, the tapping sleeve and gate shall be installed a minimum distance of twenty-four inches (24") from any fitting end or pipe end.

The Contractor shall be responsible for a minimum advance notification of forty-eight (48) hours to the Company's Inspector to make connections to existing mains.

The Contractor shall be responsible to make up to three (3) connection attempts in situations due to circumstances outside of their control such as inoperable valves or unavailable Company assistance.

Subsequently, water mains abandoned in-place shall be capped at all open

ends as shown on the project drawings or as directed by the Company's Project Manager.

In cases where the water main must be put into service as soon as possible, very early strength concrete and mechanical joint restrained glands (gripper glands) can be specified by the Company's Project Manager for thrust restraint.

6.6 Transition of Pipe Materials (Ductile Iron Pipe and PVC Pipe)

All pipe material transitions (locations where ductile iron pipe is connected to PVC pipe, or vice versa) shall be made at a ductile iron fitting (tee, valve, coupler, sleeve, bend, reducer, etc.).

The joining of pipe ends by inserting the spigot to bell of different pipe materials will not be allowed.

6.7 Removal of Asbestos-Cement (AC or Transite) Pipe

Any required cutting or tapping of asbestos-cement pipe shall be performed by qualified Company personnel, or the Contractor as approved by the Company's Project Manager, and shall follow current Company Work Instructions for handling and cutting AC pipe. Any cutting or tapping shall be in compliance with all OSHA requirements. This work shall be coordinated by the Contractor through the Company's Inspector.

6.8 Setting Valves and Fittings

Valves, air valves, blow offs, and drains shall be assembled, and joints made up, both flanged and mechanical joint, as indicated on the project drawings. All valves and all reducers must be anchored by coated and deformed reinforcing bars, as detailed per the Company's Standard Drawing 1400, wrapped around each end of the valve or reducer, and cast in a cast-in-place concrete anchor block under each valve or reducer.

The weight of each valve shall be supported by solid pre-cast concrete bricks. Bricks should not be removed prior to concrete placement and shall not inhibit installation of polywrap. Cast-in-place concrete shall then be poured up to the bottom of the valve. In no instance shall the weight of the valve be supported by the adjacent pipe.

If PVC pipe is used with iron fittings, the weight of each fitting shall be supported by a two feet (2') x two feet (2') width x one foot (1') depth cast-in-place concrete support block; rod anchorage is required at vertical bends which require the placement of the thrust block under the fitting.

The concrete support block shall bear against undisturbed earth, as shall the

other above-mentioned types of concrete blocking. In cases where the water main must be put into service as soon as possible, very early strength concrete and mechanical joint restrained glands (gripper glands) can be specified by the Company's Project Manager for thrust restraint.

See Standard Drawing: 1400 in Appendix of Drawings.

6.9 Polyethylene Wrap for Ductile Iron Pipe and Fittings

Polyethylene wrap shall be installed in accordance with the current edition of AWWA Standard Specification C105 (ANSI A21.5) for American National Standard for Polyethylene Encasement, unless otherwise specified herein.

The Contractor shall cut the polyethylene roll in tubes 2 feet (2') longer than the standard length of pipe. Each tube shall be slipped over the length of ductile iron pipe, with centering to allow a one-foot overlap on each adjacent pipe section. After the lap is made, slack in the tubing shall be taken up for a snug fit, and the overlay shall be secured with polyethylene tape. Each length of ductile iron pipe shall receive two separate polyethylene wraps as described above.

Ductile iron pipe shall not be wrapped for more than 5 days in advance of placement into the trench. Pipe to be wrapped shall include ductile iron and ductile iron restrained-joint pipe and iron fittings. For any pipe that is wrapped prior to installation, Contractor shall use a method to lift and carry the pipe, such as canvas/nylon strapping, that will prevent damage to the wrapping.

Odd shaped appurtenances such as valves, tees, fittings, and other ferrous metal pipeline appurtenances shall be wrapped by using a flat sheet of polyethylene. Wrapping shall be done by placing the sheet under the appurtenances and bringing it up around the item to be wrapped. Seams will be made by bringing the edges together, folding twice, and taping down. Each appurtenance shall receive two separate polyethylene wraps as described above.

Care shall be taken when backfilling to prevent damage to the polyethylene wrapping. Sections of wrapping having cuts, tears, punctures, or other damage shall be repaired or replaced.

PVC (polyvinyl chloride) pipe requires no polyethylene wrap.

AWWA Standards for installing polyethylene wrap and the manufacturers' recommended methods for installing polyethylene wrap can be made available for review by the Company's Project Manager at the request of the Contractor.

See Standard Drawing: 1200 A-C in Appendix of Drawings.

6.10 Installation of Tracing Wire for PVC Pipe

The Contractor shall install tracer wire along with the PVC pipe and it shall be installed directly over the water main. For open trench installation, tracer wire shall be 12 AWG copper clad steel with a minimum of 30 mil blue HDPE or HMWPE insulation. For directional drill, boring, or other trenchless method installation, tracer wire shall be 12 AWG high strength copper clad steel with a minimum of 45 mil blue HDPE or HMWPE insulation. All tracer wire shall be rated for direct burial at 30 volts. The wire shall also be connected to each end of the water main. The tracing wire shall be wrapped once around each copper or ductile iron service line. The wire shall be stripped of insulation and connected or wrapped with each valve, and service line.

At each and every valve: the wire shall be directly connected to one of the valve joint bolts and shall extend upward along the outside of the key tube but inside the round top frame. The wire shall be looped upward along the outside of the key tube to maintain the wire continuity. This wire shall be taped securely to the top of the pipe at the midpoint and bell of each section of pipe.

6.11 Identification Ribbon

The Contractor shall install Identification Ribbon (I.D. Tape) on all PVC, Ductile Iron, and any other direct bury pipe four-inch (4") through twenty-inch (20") in diameter. Under paved or unpaved surfaces, this ribbon shall be installed at approximately eighteen inches (18") below the surface or finished grade and directly over the water main.

6.12 Frames and Covers (Lids)

The Contractor shall set all frames and covers (lids) for air valves, blow-offs, and meter vaults. These frames and covers (lids) shall be set to grade and maintained in the proper position for the duration of the period covered by this contract.

Frames and covers (lids) shall be removed on all discontinued vaults, and surfaces shall be restored in accordance with the appropriate requirements of the sections "BACKFILLING PROCEDURES AND TAMPING" and "RESTORATION" (Sections 7 and 11, respectively). All removed frames and lids shall be returned to the Allmond Avenue warehouse.

6.13 Valve Boxes

Standard valve boxes consisting of key tubes, valve extension rods, and round tops and lids shall be installed on all valves by the Contractor. The box shall be centered on the operating nuts, shall be vertical, shall be set to grade, shall be placed and maintained in the proper position, and shall be free of dirt or other matter for the duration of the period covered by this contract.

Styrofoam collars or polywrap tape may be placed around each valve round top before placement of concrete and in such a manner to allow the valve box to be raised to grade without demolishing the concrete subbase.

Valve extension rods shall be placed on gate valve operating nuts to extend to within two feet (2') and three feet (3') of ground elevation. Valve extension rods may be welded together to reach the appropriate length. Valve extension rods are available at Louisville Water's warehouse if the project is a Company Supplied project.

Round tops and lids on all valves that are to be abandoned shall be removed and returned to the Allmond Avenue warehouse. The key tube shall be filled with concrete in paved areas; with compacted stone in other areas and surfaces restored in accordance with the appropriate requirements of the sections "BACKFILLING PROCEDURES AND TAMPING" and "RESTORATION" (Sections 7 and 11, respectively).

6.14 Plugging Ends of Pipe

When work has stopped at the end of a day, a cap or plug shall be installed in place in the open end of the pipe to maintain a water tight seal. If trench water or debris enters the pipeline or trench, it shall be removed from the pipe and trench before work proceeds. Permanent plugs or caps shall be installed where shown on the project drawings and shall be securely braced as shown on the thrust anchor details included on the detail sheet of the project drawings. Permanent plugs shall not be installed on PVC mains; only mechanical joint caps will be allowed. Plastic tape over pipe ends will only be permitted on non-standard / oversized pipe with approval of the Company's Inspector.

6.15 Thrust Anchors, Counterweights, and Restrained-Joint Hardware

The Contractor shall install concrete thrust anchors or counterweights (3,500 psi concrete) at all bends, reducers, deflection couplings, tees, offsets, gate valves and plugs/caps against undisturbed soil to withstand maximum test pressure. The Contractor shall provide all labor and material to construct the thrust anchors, piers, and counterweights, for all fittings, both horizontal and vertical. These concrete thrust anchors shall have

minimum dimensions as indicated on the thrust anchor schedule shown on the detail sheet in the project drawings.

If field conditions prevent standard concrete thrust anchors placement as shown in project drawings, the Company's Project Manager must approve any modification. Concrete thrust anchors in solid rock trenches may be modified with approval of the Company's Project Manager.

The Company's Inspector may require forming (plywood or steel) in order to properly locate and position concrete thrust anchors. Restrained-joint hardware is not intended to be used in lieu of concrete thrust anchors and counterweights. Such hardware is to be used only when it is necessary to return a water main to service immediately, as when making tie-ins or at the specific instructions of the Company. The Company Inspector may require restrained joint hardware in areas where the water main may be disturbed after installation by other utility crossings or nearby excavation.

Whenever restrained-joint hardware is used to restrain fittings, the Contractor must also pour a concrete thrust block. In no instances, shall restrained-joint hardware alone be accepted as a permanent thrust restraint. Mechanical joint restraining glands (gripper glands) are not to be used on plain end fittings.

Any mechanical joint restraints or gripper glands shall be retightened to Bolt Torque Table specifications no sooner than thirty (30) minutes after initial tightening, or as directed by the manufacturer.

All bolts installed above ground shall be rechecked for proper torque after placement in the excavation.

See Standard Drawing: 1400 in Appendix of Drawings.

7. BACKFILLING PROCEDURES AND TAMPING

7.1 General

In general, trench dimensioning and backfill materials shall be as follows: six inches (6") of vertical clearance with the bottom of the trench, and the subsequent layered placement of pit run sand, DGA or manufactured sand bedding along the bottom of the pipe; nine inches (9") of horizontal clearance with each side of the trench, and the subsequent layered placement of pit run sand, DGA, or manufactured sand backfill along each side of the pipe; the layered placement of pit run sand, DGA, or manufactured sand to the elevation of twelve inches (12") above the crown of the pipe; and, if in a lawn area, the remainder of the backfill to be common (but acceptable) fill, or, if in a paved and/or a to-be-paved area,

the remainder of the backfill to be the layered placement of pit run sand, DGA, manufactured sand, #57 stone or flowable fill up to the bottom elevation of the respective pavement restoration scheme. All bedding and backfill material shall be uniform and continuous for the entire trench excavation limits.

The total depth of cover (i.e., the vertical distance from crown-of-pipe to ground/pavement surface) shall be at least forty-two inches (42"). The cost of applicable backfill material, backfilling, and required tamping shall be covered in the base bid as shown on the **BIDDER'S PROPOSAL** form.

All backfill (except flowable fill) shall be properly compacted by pneumatic, vibratory, or other approved compaction equipment. A backhoe bucket is not an approved compaction device. The compaction effort and lift thicknesses shall be performed in a uniform and consistent manner in accordance with these specifications. The Company reserves the right to conduct compaction testing and observation, and such testing or observation will not relieve the Contractor of any future warranty responsibilities. When instructed by the Company's Project Manager, the Contractor shall excavate backfilled material to a particular grade for testing. Backfilled areas which do not pass this test shall be excavated and re-compacted until they meet compaction specifications. Areas excavated for testing shall be re-compacted in accordance with this compaction specification. The cost of this work shall be included in the base bid.

Appropriate and sufficient backfill material shall be furnished by the Contractor to replace material deemed unsatisfactory by the Company's Project Manager or Inspector.

Unsatisfactory material includes unsuitable soil as described in "FINAL BACKFILLING" (Section 7.6) and frozen or exceptionally wet backfill material and may include backfill material excavated for testing purposes or backfill material excavated for failure to meet compaction requirements. See Standard Drawing: 4300 in Appendix of Drawings.

7.2 Acceptable Backfill Materials

7.2.1 Pit Run Sand (Natural Sand)

Pit Run Sand is sand resulting from the natural degradation of rock and shall meet the material and gradation requirements of Section 804 Fine Aggregates of the current edition of the Kentucky Department of Highways "Standard Specifications for Road and Bridge Construction".

7.2.2 Dense Graded Aggregate (Kentucky DGA or Indiana #73)

Dense Graded Aggregate shall meet the material and gradation requirements of Section 805 Coarse Aggregates of the current edition of the Kentucky Department of Highways “Standard Specifications for Road and Bridge Construction”.

7.2.3 Flowable Fill (Controlled Low Strength Cementitious Material)

Flowable fill, a quick-setting, cementitious, self-compacting, shrinkless fill material, may only be used with the prior written approval of the Company’s Project Manager.

The mix design must be approved prior to placement by the Company’s Project Manager. The 28-day compressive strength of said fill shall not exceed 150 psi, and the minimum strength shall be 25 psi. The mix shall include sand, cement, fly ash with water not included as part of the volume mix. Fly ash shall have a pH value of no less than 7.0 and no greater than 12.5. The pipe shall be enveloped with pit run sand, manufactured sand or dense graded aggregate and backfilled in accordance with “Initial Backfilling” (Section 7.5).

7.2.4 Manufactured Sand (Kentucky 3/8” Manufactured Sand)

Manufactured Sand shall be the material resulting from the crushing and classification by screening, or otherwise, of rock and gravel. Manufactured Sand shall be washed and contain no fine particles and or dust.

The Contractor shall be responsible for all dust control associated with the use of Manufactured Sand. Manufactured Sand shall meet the material and gradation requirements of Section 804.08 Pipe Bedding of the current edition of the Kentucky Department of Highways “Standard Specifications for Road and Bridge Construction”.

7.2.5 Kentucky #57 Stone (or Indiana #8 Stone)

Kentucky #57 Stone shall only be used for creating a firm base in undercut excavations when wet or excessively soft soil conditions are encountered. Any other use shall be approved by the Chief Engineer. Kentucky #57 stone shall not be used as bedding, initial backfilling, or for trench backfill in paved areas. Kentucky #57 Stone shall meet the material and gradation requirements of Section 805 Course Aggregates of the current edition of the Kentucky Department of Highways “Standard Specifications for Road and Bridge Construction”.

7.2.6 Kentucky #3 Stone (or Indiana #2 Stone)

Kentucky #3 Stone shall only be used for Fire Hydrant Drainage Pits. (See Section 9.2 Drainage Pit). Kentucky #3 Stone shall meet the material and gradation requirements of Section 805 Coarse Aggregates of the current edition of the Kentucky Department of Highways "Standard Specifications for Road and Bridge Construction".

7.2.7 By-Product of Trench Rock Excavator

The by-product of trench rock excavator equipment may be acceptable for pipe bedding and/or backfill material if prior written approval is granted by the Company's Project Manager.

The Company's Project Manager must review the material and be assured of the Contractor's ability to compact the material. The Contractor must wash the material thoroughly (i.e., no dust particles); and to sieve the material thoroughly so that no individual rock pieces exceed sieve size of one inch (1") (25.0mm).

7.3 Un-Acceptable Backfill Materials

Un-washed Manufactured Sand, Black Sand (coal or coke by-products), slag, or foundry by-products will not be allowed as pipe bedding and / or backfill material.

7.4 Bedding

For the entire length of the trench, the excavation shall provide a six inch (6") space below the pipe, which shall be placed and firmly compacted with approved backfill materials, pit run sand, manufactured sand, Dense Graded Aggregate, or #57 stone, as specified by the Kentucky Transportation Cabinet Department of Highways Standard Specification for Road and Bridge Construction, (latest edition) "Fine Aggregates" or "Coarse Aggregates," to form bedding for the pipe.

The bedding shall be excavated at bells, valves, and fittings so the barrel of the pipe will have bearing on the bedding for its full length.

See Standard Drawing: 4300 in Appendix of Drawings.

7.5 Initial Backfilling

Initial backfill should occur as soon as possible after the installation of pipe, so as to prevent the pipe from shifting. After the pipe has been placed on the bedding, pit run sand, manufactured sand, #57 stone, or Dense Graded Aggregate, shall be deposited in the trench by mechanical equipment and

distributed in six inch (6") layers on both sides of the pipe for the full width of the trench, the trench width having nine inches (9") of horizontal clearance along each side of the pipe. The initial backfill shall be tamped in six-inch (6") layers and thoroughly compacted under the centerline and on each side of the pipe. Backfill shall be placed and tamped to a height of at least twelve inches (12") above the top of the pipe.

See Standard Drawing: 4300 in Appendix of Drawings.

7.6 Final Backfilling

When not under paved surfaces or surfaces where paving is not intended, the remainder of the trench shall be backfilled with soil that is not excessively wet, and is free from brush or vegetative matter, rocks larger than fist-size, pieces of concrete larger than fist-size, cinders, or any other matter which could prevent proper consolidation. Place in 12-inch lifts and compact with hand-held mechanical plate compactor, rammer or a sheepsfoot roller. Use a minimum of two passes.

When under paved surfaces or surfaces where paving is intended, the remainder of the trench shall be backfilled for the full depth with pit run sand, manufactured sand, Dense Graded Aggregate, or #57 stone as specified by the Kentucky Department of Highways Standard Specification for Road and Bridge Construction, (latest edition) "Fine Aggregates" or "Coarse Aggregates." Flowable Fill may be used if approved by the Company's Project Manager. At pavement crossings, this pavement backfill shall extend five feet (5') beyond each end of the paving or proposed paving.

The final backfill in paved areas shall be placed and compacted in accordance with the following table.

Trench Backfill and Compaction Requirements Beneath Pavements						
	Max. Loose Lift Thickness (inches)				Min. # of Passes	Example Models
	MFD* Sand	Pit Run Sand	DGA	No. 57 Stone		
Lightweight Vib. Plate Compactors (100-220lbs)	8	8	6	8	3	Wacker-Neuson WP 1540; MBW GP18
Mediumweight Vib. Plate Compactors (220-660lbs)	12	12	9	12	3	MultiQuip MVH206GH; MBW GPR77H
Heavyweight Vib. Plate Compactors (>660lbs)	18	18	12	18	3	Wacker-Neuson BPU 4045A; MBW GPR135H
Smooth Drum Vibratory Rollers	12	12	9	12	3	Wacker-Neuson RTLx with Smooth Drum Att.
Equipment Mounted Compactors	24	24	24	24	3	Allied 1000B; Caterpillar CVP 110

*MFD=Manufactured

The total depth of cover (i.e., the vertical distance from crown-of-pipe to ground/pavement surface) shall be at least forty-two inches (42”) and no more than forty-eight inches (48”) unless approved prior to installation by the Company’s Project Manager.

See Standard Drawing: 4300 in Appendix of Drawings.

8. PLACING WATER MAIN IN SERVICE

8.1 General

After a section of main has been properly installed and valved, the main shall be filled, disinfected, pig cleaned, flushed, and pressure and leakage tested before being placed in service. The Company’s Project Manager or Inspector may require for the pressure test to be performed prior to the disinfection process.

The Contractor shall provide adequate personnel to assist the Company’s Inspector on-site for placing the water main in service.

The pig shall be inserted into the pipeline at the time of installation. Pipe soap shall not be applied directly to pigs. Pipeline pigs shall be supplied by the contractor unless otherwise specified in the Supplementary Specifications.

Disinfection, cleaning, and flushing of the water main must result with subsequent water samples passing all of the Company’s water quality tests.

8.2 Filling and Disinfection of the Water Main

8.2.1 Filling of the Water Main

The main shall be chlorinated prior to beginning the pigging operation and shall be filled from downstream of the pig. Contractors must use a flushing meter assembly with check valve for filling mains to account for water usage and provide backflow prevention.

The main shall be filled with hyperchlorinated water for at least 24-hours prior to the beginning of flushing operations.

The primary method of disinfection shall be the tablet method using a tablet chlorinator supplied by the Company’s Inspector. Use of granular calcium hypochlorite (HTH or equal) must be approved by the Company’s Project Manager or Inspector only if the tablet method is not feasible. If the granular method is approved, the granular calcium hypochlorite (HTH or equal) must be applied into each section of pipe during installation and prior to filling the water main. See Section 8.2.2.

While the pipe is filling, air shall be expelled through fire hydrants, air valves, or flushing connections as directed by the Company's Inspector.

The Contractor may be instructed to install additional taps as needed to facilitate the filling or expelling of air and they shall be provided at no additional cost to the Company. Abandoned taps shall be protected by covering with concrete.

All flushing connections, fill connections, discharge connections, and check valves shall be installed by the Contractor at locations indicated on the project drawings or as directed by the Company's Project Manager or Inspector if a fire hydrant or service connection cannot be utilized.

If not specified to be furnished by the Company, particular components of flushing/discharge hardware shall be furnished by the Contractor.

8.2.2 Disinfection of the Water Main

New or relocated water mains shall be disinfected in accordance with the requirements of the Kentucky Division of Water, Natural Resources and Environmental Cabinet and AWWA Standard C651 upon completion of construction and before being placed in service.

The primary method of disinfection shall be accomplished by using a tablet chlorinator while filling. The granular method is not the preferred method and must be approved by the Company's Project Manager or Inspector. For large volumes of water, the Company's chlorination trailer may be utilized using liquid chlorine (Sodium Hypochlorite 12.5%) supplied by the Contractor.

The tablet method utilizes a tablet chlorinator supplied by the Company's Inspector. Calcium Hypochlorite disinfecting tablets (Norweco Bio-Sanitizer or equal) shall be inserted into the tablet chlorinator. The tablet chlorinator must be fed by a 2" hose with a check valve placed upstream of the chlorinator, and shall then be connected to the water main by a 2" hose. All hoses used for the feed or supply line shall be supplied by the Company. If discharge hoses are needed, they shall be supplied by the Contractor. The Contractor shall lay out the hoses for the chlorination operation at the direction of the Company's Inspector.

The granular method is not preferred, but may be used for special circumstances as approved by the Company's Project Manager or Inspector. Use of this method requires the application of chlorine or chlorine compounds (calcium hypochlorite granules - HTH or equal) to each pipe length at the time of installation. The Contractor shall supply granular calcium hypochlorite or sodium hypochlorite as needed. Granular calcium

hypochlorite shall conform to ANSI / AWWA B300 and contain a minimum of 65% available chlorine by weight and be stored in a cool, dry, and dark environment to minimize its deterioration in accordance with the manufacturer's recommendation. Granular calcium hypochlorite must meet NSF /ANSI Standard 60 requirements.

For large volumes of water, the Company's chlorination trailer may be utilized using liquid chlorine (sodium hypochlorite 12.5%) supplied by the Contractor. Sodium hypochlorite liquid shall conform to ANSI / AWWA B300 and contain a minimum of 12.5% available chlorine by volume and the storage conditions and time must be controlled to minimize deterioration. Sodium hypochlorite liquid (12.5%) will freeze at -10 degrees Fahrenheit (F). Sodium hypochlorite liquid must meet NSF /ANSI Standard 60 requirements.

Any other disinfection methods not listed in this specification must be in accordance with the Kentucky Division of Water, Natural Resources and Environmental Cabinet and AWWA Standard C651 and shall be approved by the Company's Project Manager.

The chlorination method selected shall provide a concentration of at least fifty (50) ppm and a residual of at least twenty-five (25) ppm at the end of 24 hours, to be followed by thorough flushing in compliance with 401 KAR 8:150 "Disinfection, Filtration, and Recycling ", Sections 4(1) and 4(2).

The following amounts of calcium hypochlorite tablets or granules or sodium hypochlorite liquid (@ 12.5 %, per 100 linear feet of pipeline, should produce fifty (50) ppm of chlorine:

Amount of Tablet or Granular Chlorine or Sodium Hypochlorite per 100 Linear Feet of Pipeline:			
Pipe Size	Number of calcium hypochlorite Tablets	Volume of calcium hypochlorite Granules	Volume of Sodium Hypochlorite @12.5% solution
4"	1/2 tablet	1/8 cup	0.031 gallons
6"	1/2 tablet	1/4 cup	0.072 gallons
8"	1/2 tablet	3/8 cup	0.126 gallons
12"	1-1/2 tablets	7/8 cup	0.286 gallons
16"	2-1/2 tablets	1-1/2 cups	0.501 gallons
20"	3-1/2 tablets	2-1/2 cups	0.787 gallons

After the disinfection procedure has begun, the Contractor shall tag-out and not operate any valves, including those newly installed, without consent and presence of the Company's Project Manager or Inspector.

The Contractor shall perform the chlorination under the complete control of the Company's Project Manager or Inspector.

8.3 Pigging and Flushing the Water Main

8.3.1 Pigging the Water Main

At the beginning of the pigging operation and under the direction of the Company's Inspector, the upstream valve (feeder valve) shall be partially opened first and adjusted as needed after the pigging operation has begun. Next, the valve downstream of the pig (outlet valve) shall be opened immediately allowing the pig to move at approximately one (1) foot per second. When pushing the pig fed by a blow-off, flushing connection, or a tap, a check valve is required. All new ductile iron and PVC pipe installations shall be pigged. Pipeline pigs shall be supplied by the Contractor unless otherwise specified in the Supplementary Specifications. Pigs shall be used one time and discarded.

At no time shall trench water be allowed to enter the pipeline during or after the pigging operation. If trench water enters the pipe, the Company's Inspector may require the water main to be disinfected and pigged again. Hyperchlorinated water shall be discharged through the end of the pipeline from which the pig shall be removed in accordance with the requirements of Section 8.4, "DISCHARGE OF HYPERCHLORINATED WATER".

Following are the Outside Diameters (O.D.) for the Pigs. Due to the manufacturing process these can vary, + / - , by 1/8 to 1/4 inch.

C900 PVC Pipe (Blue Pigs)

4" DR 14	Pig O.D. = 4 - 1/8"
6" DR 14	Pig O.D. = 6"
8" DR 14	Pig O.D. = 7 - 7/8"
12" DR 14	Pig O.D. = 11 - 1/2"

4" DR 18	Pig O.D. = 4 - 3/8"
6" DR 18	Pig O.D. = 6 - 1/4"
8" DR 18	Pig O.D. = 8 - 1/8"
12" DR 18	Pig O.D. = 11 - 7/8"

Ductile Iron Pipe (Red Pigs)

4" PC 350	Pig O.D. = 4 - 1/2"
6" PC 350	Pig O.D. = 6 - 5/8"
8" PC 350	Pig O.D. = 8 - 3/4"
12" PC 350	Pig O.D. = 12 - 3/4"
16" PC 350	Pig O.D. = 17"

8.3.2 Flushing the Water Main

With respect to flushing, the Company's standard operating procedure is as follows. The flushing assembly is to be checked-out from the Company's Meter Shop by the Contractor and shall be returned in same or better condition by the Contractor within 5 days of the end of the flushing operations. The Company reserves the right to bill the Contractor for unreturned materials and/or repairs.

The meter/check valve portion of the flushing assembly is not to be installed until after the completion of disinfection and pigging operations (so as to protect the meter/check valve from internal damage caused by debris). Upon the completion of pigging operations and prior to the start of flushing operations, the meter/check valve is to be installed.

The Contractor is to supply a two inch (2") minimum sized discharge hose to be used during flushing operations. The Company's Inspector shall supply the feeder hose.

No flushing device, blow-off, or air relief valve shall be directly connected to any non-storm sewer ("Non-storm sewer" is defined as a sanitary sewer, combined sewer, septic tank or subsoil treatment system), storm sewer, or storm drain, and shall be located at a distance greater than ten (10) feet from any non-storm sewer.

See Standard Drawing: 1601, 1602, and 1603 in Appendix of Drawings.

8.4 Discharge of Hyperchlorinated Water

Discharge of hyperchlorinated water can be directed to combined or sanitary sewer facilities only after the Company's Project Manager has received approval from the Permit Section Supervisor of the Louisville and Jefferson County Metropolitan Sewer District (MSD) or other jurisdictional sewer agency authority. Flushing outside the MSD service area shall be in accordance with Kentucky Division of Water requirements. All flushing operations shall be in accordance with the governing authority's requirements, including rain event requirements.

The Contractor shall provide 72 hours of notice to the Company's Project Manager of their intent to discharge hyperchlorinated water. In locations

where discharge of hyperchlorinated water is restricted, the Company's Project Manager may approve tanker truck transportation for disposal at other sites. If hyperchlorinated water cannot be discharged to a combined or sanitary sewer, the hyperchlorinated water shall be neutralized to a chlorine concentration of less than 0.019 ppm (mg/L) before discharge to a storm drain or onto the ground surface in a manner which will not violate 401 KAR 5:031 Surface Water Standards.

The Contractor shall be responsible for all chlorinated water disposal (neutralized to acceptable levels per regulations prior to release) and adherence to "LWC Best Management Practice & Procedures on Chlorinated Water Disposal" and 401 KAR 5:031 and 401 KAR 8:020. The Contractor's disposal methods must have the approval of the Company's Project Manager. The Contractor is responsible for supplying all BMP's necessary to protect all storm inlets and waterways as required per Louisville and Jefferson County Metropolitan Sewer District or the applicable jurisdictional storm water authority.

The Company shall furnish all dechlorination hardware necessary for the dechlorination operation. The Contractor will be responsible for furnishing hoses and fittings required for the flushing operation.

The Company's Project Manager or Inspector shall reserve the right to postpone the dechlorination operation in the event of an anticipated major rain event or sub-freezing temperatures.

The Company's Project Manager or Inspector shall reserve the right to dechlorinate water with calcium thiosulfate (Captor), sodium thiosulfate, or other approved method supplied by the Company. For large volumes of water when the chlorination trailer is utilized, the Contractor shall supply the calcium thiosulfate or sodium thiosulfate in liquid form.

Calcium thiosulfate (Captor) will dechlorinate water with 50 ppm chlorine at a rate of one gallon of Captor per 4,000 gallons of hyperchlorinated water.

8.5 Pressure and Leakage Test

Before the hydrostatic test is begun, the Contractor shall: backfill all pipe, provide all temporary and permanent thrust anchor blocking, and install taps for releasing air at all points of highest elevation where no fire hydrant or flushing connection has been installed. All valves within the test area shall be fully open including valves on fire hydrant supply pipes.

It shall be the Contractor's responsibility to locate and repair any and all leaks that may develop.

The water main (ductile iron and PVC) and appurtenances shall be discharged of hyperchlorinated water, flushed and filled with potable water prior to performing the pressure and leakage test, unless directed otherwise by the Company's Project Manager or Inspector.

The water main shall then be subject to a hydrostatic pressure of 200 PSI for ductile iron pipe, 200 PSI for PVC DR-14, and 150 PSI for PVC DR-18 or at a pressure specified by the Company's Project Manager at the lowest point along the section being tested for a period of two (2) hours with the test pressure not dropping more than 5 PSI during the test. At elevated sections of the pipeline the minimum test pressure shall be 75% of the hydrostatic test pressure. In special circumstances, such as extreme elevation differential, the pressure test may be divided into multiple sections as directed by the Company's Inspector or Project Manager.

In conjunction with the hydrostatic test, a leakage test shall be conducted at the same pressure and for the same period of time.

The leakage allowed will be as given by the following table. All of this testing shall be accomplished in the presence of the Company's Project Manager or Inspector.

Allowable Leakage per 1000 feet of Ductile Iron or PVC Pipeline in gallons/hour.						
Pipe Diameter	4"	6"	8"	12"	16"	20"
D.I. or PVC DR14 Leakage @ 200 PSI (gal/hour)	0.38	0.57	0.76	1.15	1.53	1.91
PVC DR 18 Leakage @ 150 PSI (gal/hour)	0.33	0.5	0.66	0.99	1.32	1.66

All pipe, fittings, and other materials found to be defective under pressure and leak testing shall be removed and replaced. These tests shall be repeated until satisfactory to the Company's Project Manager and Inspector. All visible leaks shall be repaired regardless of the amount of leakage. The pressure test shall be voided until such visible leaks are repaired.

The required testing apparatus, consisting of a gasoline motor driven pump, valves, pressure gauge, meter, test pump hose, and connections, shall be checked-out from the Company at 4801 Allmond Ave by the Contractor and returned to same location, the day the test is to be run, and shall be returned in same or better condition. The Company reserves the right to bill the Contractor for unreturned materials and/or repairs.

The Contractor may furnish a test pump if approved by the Company's Inspector and it shall be disinfected at the direction of the Company's Inspector. The test pump must be equipped with a quick-connect coupling to allow the connection of the Company Inspector's pressure gauge.

The Contractor shall be responsible for all phases of testing the water main.

8.6 Coliform Monitoring

The water main shall be placed in service only after coliform monitoring (sampling and analysis) applicable to the water main does not show the presence of coliform. If coliform is detected, repeat flushing of the water main and coliform monitoring. If coliform is still detected, repeat disinfection and flushing as if the line has never been disinfected. Continue the described process until monitoring does not show the presence of coliform. The presence or absence of total coliform monitored by sampling and analysis as needed shall be determined for new, cleaned, repaired or relocated water main(s).

Water samples shall be taken within 1,200 feet of each connection point to existing lines, at one (1) mile intervals, and at each dead end, without omitting any branch of the new, cleaned, repaired or relocated water main(s).

Sample bottles shall be clearly identified with a unique project identification note and delivered to the Company's Water Quality Laboratory.

8.7 Air Relief Valves

Air relief valves or hydrants shall be placed at necessary high points in water mains where air can accumulate. The Contractor shall install air relief valves at all locations as identified on project plans. Additional air relief valves that may be required by the Company's Project Manager will be compensated as described in **CHANGES IN THE WORK**, in the **TERMS AND CONDITIONS**.

Corporation stops for air relief valves shall be installed with tapping saddles to minimize pig damage when pig cleaning the water main.

8.7.1 Automatic Air Relief Valves

Where practical, the open end of an air relief pipe from automatic valves shall be extended a minimum distance of one foot (1') above grade and provided with a screened, downward-facing elbow.

Automatic air relief valves shall not be installed in situations where the flooding of the manhole or chamber may occur.
See Standard Drawing: 1603 in Appendix of Drawings.

8.7.2 Manual Air Relief Valves

The open end of an air relief pipe from a manually operated valve shall be extended to the top of the pit and provided with a screened, downward-facing elbow if drainage is provided for the manhole.

Use of automatic air relief valves are recommended wherever possible.
See Standard Drawing: 1603 in Appendix of Drawings.

8.8 Leak Detection By-Pass Meter at Underwater Crossings

Leak Detection By-Pass Meters are required at all underwater crossings which are greater than fifteen feet (15') in width.

Water main valves shall be installed at both sides of the water crossing so that section can be isolated for testing or repair. The valves and meter vault shall be easily accessible and not subject to flooding. The valve closest to the supply source shall have permanent taps on each side to allow the installation of a meter to determine leakage and for sampling purposes.

See Standard Drawing: 1608 in Appendix of Drawings.

9. FIRE HYDRANT

9.1 Materials and Installation

The fire hydrant installation shall consist of the following items and shall be as shown on the project drawing's detail sheet.

The field location of fire hydrants shall be approved by the Company's Inspector prior to installation. Fire hydrants shall be installed to allow proper drainage. When fire hydrants are located on project drawings in areas of poor drainage, the Contractor shall contact the Company's Project Manager or Inspector for movement to a suitable location. The fire hydrant shall be furnished by the Company, designed for proper depth of bury, and shall be so installed that the barrel will properly drain. Effort shall be made to install the shortest hydrant possible, while complying with the requirements of this section.

The fire hydrant anchor tee and auxiliary gate valve shall be installed as the main is installed. A tapping sleeve and gate valve shall be installed if the main is in service. The auxiliary valve shall be installed at the main. Fire

hydrant supply pipe (pipe, fittings, gate valve, and fire hydrant) must be secured to the water main for proper thrust restraint. All joints in the fire hydrant supply pipe (between fire hydrant and the main to which it is connected) shall be installed using a restrained joint method. Concrete is not required on direct bolt non-friction type restrained joint fittings between the fire hydrant and the auxiliary valve.

The fire hydrant supply pipe shall be ductile iron pipe, in all cases, regardless of the type of main being connected to. The fire hydrant supply pipe shall be a minimum diameter of six (6) inches and connected to a main with a minimum diameter of six (6) inches.

The fire hydrant shall be set plumb and shall have the pumper nozzles set facing perpendicular to the curb. The bottom of the break-away flange bolts shall be located from two inches (2") to seven inches (7") above finished grade, with the center of the nozzle a minimum of eighteen inches (18") above finished grade.

The fire hydrant shall be set to established grade, with the center of the barrel two feet (2') back of the face of the curb line (eighteen inches (18") behind the back edge of the curb for rolled curbs) or as directed, or in the absence of a curb approximately five feet (5') to fifteen feet (15') from the edge of the pavement, no more than fifteen feet (15') from a hard traveled surface, in accordance with governing fire department ordinances and accessible to the fire department. The base of the fire hydrant shall be set on a precast concrete block. The back of the elbow shall be well supported against undisturbed earth by means of precast concrete blocks.

Where fire hydrants are installed along a roadway, parking within ten feet (10') will be prohibited. Fire hydrants installed in parking areas must allow ten feet (10') clear access to the hose connection side of the fire hydrant. In all locations a four feet (4') minimum clear radius around the fire hydrant is required.

Two layers of polyethylene wrapping shall be installed from the fire hydrant anchor tee to the base elbow of the fire hydrant, including the fire hydrant valve, connecting pipe, and thrust restraints. The wrapping shall not extend to the weep holes located on the hydrant elbow. Do not install polyethylene wrapping on the hydrant barrel.

Fire hydrant barrel extension kits shall not be used for new fire hydrant installations unless approved by the Chief Engineer or designee prior to requisitioning from the Company's Warehouse. No more than one (1) fire hydrant barrel extension kit shall be used on an existing fire hydrant when raising is required. All fire hydrant barrel extension kits must be installed by the Company's Fire Hydrant Crew. Unless, if approved by the

Company's Chief Engineer, the Contractor may install the extension kit in the presence of the Company's Inspector.

Fire hydrant wrenches shall never be left unattended on a fire hydrant.

When flowing a fire hydrant the operating nut must be opened completely to prevent flooding through the hydrant's weep holes. Flow shall be regulated by the temporary meter assembly valve attached to the fire hydrant's discharge nozzle. The Inspector must notify the Company's Radio Room (569-3600, ext. 2700 or 2701) of all hydrants flowed between November 1 and March 31 so the hydrant can be winterized after use to prevent freezing.

Some fire hydrants have a locking device attached to prevent unauthorized use. The Contractor shall notify the Company's Inspector 48 hours in advance of the need to use such a fire hydrant so the lock can be removed by the Company's personnel. The Contractor shall immediately notify the Company's Inspector when the fire hydrant is no longer needed so the lock can be re-installed.

The Contractor shall notify the Company's Inspector of any "Out of Service" fire hydrants. "Out of Service" fire hydrant tags shall be placed on the nozzle of all inoperable or "Out of Service" fire hydrants.

The Contractor shall paint fire hydrants after installation at the Company Inspector's request to cover scraped or chipped areas on the fire hydrant, or to match the fire hydrant color chosen by the local Fire District. Fire hydrant paint will be supplied by the Company's Warehouse. Fire hydrant attachment number labels shall not be painted over.

Fire hydrant attachment number labels shall be installed by the Company's personnel.

The Contractor shall assist the Company's Inspector in fire hydrant flow testing and perform any clean-up necessary after tests are completed.

See Standard Drawing: 2000 in Appendix of Drawings

9.2 Drainage Pit

Whenever a fire hydrant is set, a drainage pit shall be excavated for the fire hydrant. Dimensions of the pit shall be three (3) ft. long x three (3) ft. wide x four (4) ft. deep, with the pit centered about the barrel of the fire hydrant. Once the fire hydrant is installed and prior to filling the pit with washed #3 stone, the fire hydrant shall be pressurized, the weep holes flushed and then depressurized to ensure that the fire hydrant drains properly. Once the weep

holes have been flushed and proper drainage is verified, the drainage pit shall be filled compactly with washed #3 stone under and around the elbow of the fire hydrant and to a level of two feet (2') above the base of the elbow.

Before this dry well (drainage pit) is covered with backfill, the Contractor shall notify the Company's Inspector in order that each drainage system may be inspected. The top of the entire drainage pit shall be covered with geotextile fabric (four fire hydrant blankets or as many needed to cover the entire top) before backfilling.

Fire hydrant drainage pits shall not be connected to or located within ten (10) feet of non-storm sewers ("Non-storm sewers are defined as sanitary sewers, combined sewers, septic tanks and subsoil treatment systems), and where practical storm sewers or storm drains.

See Standard Drawing: 2000 in Appendix of Drawings

9.3 Removal of Fire Hydrants

Fire hydrants that are discontinued, abandoned or replaced shall be removed and returned with caps to the Allmond Avenue Warehouse. The Contractor shall be billed for any fire hydrants not returned. Surfaces shall be restored in accordance with Section 11: "RESTORATION".

9.3.1 Removal of Fire Hydrants on Active Water Mains

All discontinued fire hydrants shall be abandoned by turning off the fire hydrant's connecting valve and excavating and removing the fire hydrant and fire hydrant lead.

The hydrant's gate valve shall be turned off and a mechanical joint plug installed on the gate valve. A concrete thrust block shall be poured behind the plug. The fire hydrant gate valve's round top and lid shall be removed and the key tube filled with concrete.

9.3.2 Removal of Fire Hydrants on Abandoned Water Mains

Fire hydrants which are abandoned with the water main, in lieu of removal by excavation and with approval of the Company's Project Manager, the fire hydrant may be cut off no less than one foot (1') below finished grade, the abandoned barrel filled with concrete, the fire hydrant gate valve turned off, round top and lid removed, and key tube filled with concrete.

10. SERVICE WORK

10.1 Notification of Customers

It is the Contractor's responsibility to notify customers of upcoming interruption of service and to coordinate this notification with the Company's personnel. It is the intent of the Company not to interrupt service to existing customers, unless absolutely necessary. When it is necessary to interrupt service, all customers affected by the shut-off shall be notified in person, or in cases where the customer cannot be contacted, by a Louisville Water notification tag attached to the front door of their premises by the Contractor.

Such notification shall be made a minimum of twenty-four hours prior to shut-off and with the Company's approval, allowing sufficient time for the customer to draw and reserve an ample supply of water. Notification tags are available from the Company.

10.2 Service Installation - General

A service installation is defined to include all work necessary to install the copper tubing or pipe and all related items from the main to the property line. The installation shall include, the following: tapping of the main, installing the corporation stop or gate valve; service line tubing or pipe, meter vault, ductile or cast iron frame and lid/cover, water meter assembly, backfilling and restoring of paved and unpaved surfaces and flushing. Installation may require reconnection to existing service lines. Excavation, backfilling, and restoring paved and unpaved surfaces shall be done in accordance with these specifications.

Short services are defined as services to meters on the same side of the street as the water main to which it is connected.

Long services are defined as services to meters on the opposite side of the street of the water main to which it is connected and shall be bored or jacked under pavements unless an open cut is approved by the Company's Project Manager.

The Contractor must verify the service size with the Company's Project Manager or Inspector where any service length is greater than one hundred feet (100').

Where under pavement, tubing shall be installed continuously and in one piece without intermediate joints or couplings except at the terminals and except where the continuous length to be installed exceeds one hundred feet (100') for 3/4" and 1" sizes.

All taps in water mains shall be made by the Contractor, and corporation stops shall be inserted by means of a tapping machine in such manner that will permit continued conditions of water flow and pressure within these mains. The Contractor shall use care in inserting and tightening the corporation stop and shall reimburse the Company for any damage or expense caused by any of their activities under this contract. Wet tapping of water mains shall be required on all pipe. No service taps shall be installed on dry water mains.

10.3 Service Installation - Two Inches (2") and Smaller

During installation of corporation stops, the corporation stop shall not be turned using a pipe wrench. The corporation stop must be turned using a smooth jaw, adjustable crescent type wrench or open-end wrench. Special care shall be observed in handling the copper tubing so as not to kink, mash, or otherwise damage it. No such damaged tubing shall be installed. No bend shall be made in the tubing with a radius less than four inches (4").

All intermediate and terminal joints for 3/4" and 1" sizes of copper tubing shall be the compression type, using the proper tools for the sizes of tubing and types of fittings involved.

Service connections shall be installed so that the outlet is at an angle of 45° above the horizontal. A bend in the service line shall be provided to ensure flexibility and to accommodate the effects of loads.

The service line shall be flushed for two (2) minutes through the meter stop before connecting to the meter. Once the corporation stop has been turned on, and prior to backfilling, the corporation barrel set nut may need to be securely tightened to prevent leakage.

For Double Setter meters (where two meters are to be installed in one vault) the tail pipes of a service installation shall be installed parallel for their entire length and at least eight inches (8") apart, and in no event shall they touch or cross one another.

See Standard Drawings: 3002, 3003, 3004, 3400, 3401, 3403, 3404, 3420, 3430, 3200, and 3202 in Appendix of Drawings

10.3.1 Tapping Ductile or Cast Iron Pipe for Service Installation - Two Inches (2") and Smaller

In locations where Ductile Iron or Cast Iron Pipe will be tapped, the pipe shall be wrapped with three (3) layers of polyethylene compatible tape completely around the pipe to cover the area where the tapping machine and

chain is mounted. The tap shall install the corporation stop directly through the tape and polywrap.

After the tap is completed on mains with polyethylene wrap, the Contractor shall repair and replace the polyethylene wrap to completely cover the main and corporation stop in accordance with the details in the Appendix of Drawings.

The corporation stop and a minimum distance of three feet (3') of the copper service line shall be wrapped with polytape.

For ductile iron pipe Pressure Class 350 service outlets shall be made per the table below:

Service Installation Guide for Pressure Class 350 Ductile Iron Pipe					
Pipe Size	Tap Size				
	3/4"	1"	1-1/2"	2"	> 2"
4"	tap	saddle	saddle	saddle	requires tapping
6"	tap	tap	saddle	saddle	sleeve or fitting
8"	tap	tap	saddle	saddle	"
12"	tap	tap	saddle	saddle	"
16" & 20"	tap	tap	tap	tap	"

All direct taps require the installation of 2 to 3 layers of 3-mil thread sealant tape on the corporation stop. This guide is based on either a direct tap method or tapping saddle using an AWWA standard taper thread Corporation Stop.

See Standard Drawings: 3002, 3003, 3004, 3400, 3401, 3403, 3404, 3420, 3430, 3200, 3202 and 3804 in Appendix of Drawings

10.3.2 Tapping PVC Pipe for Service Installation - Two Inches (2") and Smaller

For PVC (polyvinyl chloride) pipe, service outlets of three-quarter inch (3/4") through two inches (2") shall be made with a tapping saddle.

Tapping saddle bolts shall be tightened with a torque wrench according to the saddle manufacturer's torque recommendations.

When installing a service to PVC, the Contractor shall use a shell cutter that is designed for DR14 (pressure class 200, AWWA C900) or DR18 (pressure class 150, AWWA C900) and one that will remove the material and retain the coupon. The cutting tool must be sharp and without damage. Drill

cutting tools are prohibited because they may increase the risk of causing the pipe to split longitudinally. The coupon must be delivered to the Company's Inspector.

When tapping the PVC pipe under pressure, the pipe temperature shall be between 32° and 90° F.

The taps shall be located a minimum of twenty-four inches (24") from the joint of the PVC pipe, and, if installing more than one tap in one length of PVC pipe, the taps shall be staggered and a minimum of eighteen inches (18") apart, measured longitudinally. Taps shall not be made in an area of PVC pipe that shows damage.

When a service tap is made on a PVC water main, a tracer wire shall be connected to the tracer wire on the main and then wrapped, with insulation and jacket removed, around the copper service line or affixed to the tapping saddle. When connecting the tracer wire to a tapping saddle, add two washers and a second nut to one of the bolts of the saddle. Strip a small section of the wire jacket and sandwich the bare portion of wire between the two washers and tighten the second bolt. Tracer wire must be rated for direct burial at 30 volts and be 12 AWG solid copper, copper clad steel (CCS), or high strength copper clad steel (CCS). Tracer wire shall be jacketed with blue HDPE or HMWPE insulation and designed for direct burial.

See Standard Drawings: 3002, 3003, 3004, 3400, 3401, 3403, 3404, 3420, 3430, 3200, 3202, and 3804 in Appendix of Drawings

10.4 Service Installation – Larger than Two Inches (2")

Service outlets larger than two inches (2") shall be made with a ductile iron tee or stainless steel or ductile iron tapping sleeve and gate as directed by the Company's Project Manager or Inspector on new ductile iron or PVC pipe.

When tapping a main, the Contractor shall make the tap only after a hydrostatic pressure test of 125 psi is applied for fifteen (15) minutes with no leakage to the tapping sleeve and gate valve assembly. Before cutting an existing main under pressure, the Contractor shall ensure the adjacent existing valve and fittings are sufficiently secure. The Contractor shall be responsible to provide the tapping coupon to the Company's Inspector.

The service line shall be flushed for two (2) minutes through the meter stop before connecting to the meter.

There shall be no tapping of same size on same size pipe with tapping sleeve

and gate, a tee must be installed.

10.4.1 Tapping Ductile or Cast Iron Pipe for Service Installation - Larger than Two Inches (2")

After the tap is completed on mains with polyethylene wrap, the Contractor shall repair and replace the polyethylene wrap to completely cover the main and fittings in accordance with the detail in the Appendix of Drawings.

See Standard Drawings: 3203A, 3203 and 3601 in Appendix of Drawings

10.4.2 Tapping PVC Pipe for Service Installation – Larger than Two Inches (2")

When installing a service on PVC water main, the Contractor shall use a shell cutter that is designed for DR14 (pressure class 200, AWWA C900) or DR18 (pressure class 150, AWWA C900) and one that will remove the material and retain the coupon. No twist drills will be allowed. The cutting tool must be sharp and without damage. The coupon must be delivered to the Company Inspector.

When tapping the PVC pipe under pressure, the pipe temperature shall be between 32° and 90° F. The taps shall be located a minimum of twenty-four inches (24") from the joint of the PVC pipe. Taps shall not be made in an area of PVC pipe that shows damage.

Tapping sleeves shall be assembled according to the manufacturers' instructions and must be supported independently of PVC pipe by precast concrete blocks during the tapping operation. The support shall be left in place, filling any voids such that the pad is bearing against undisturbed earth, and thrust blocks behind tapping sleeves shall be used as with other fittings.

When a service tap is made on a PVC water main, a tracer wire shall be connected to the tracer wire on the main and then wrapped, with insulation removed, around the service line gate valve and extend to the top of the key tube. Tracer wire must be rated for direct burial at 30 volts and be 12 AWG solid copper, copper clad steel (CCS), or high strength copper clad steel (CCS). Tracer wire shall be jacketed with blue HDPE or HMWPE insulation and designed for direct burial.

See Standard Drawings: 3203A, 3203 and 3601 in Appendix of Drawings

10.5 Meters

Contractor shall install or replace meters as stated on the Project Drawings or at the direction of the Company's Project Manager or Inspector. New meters shall be picked up by the Contractor at the Meter Shop located at 4801 Allmond Avenue. Old meters shall be returned in good condition to the Company's Inspector, including any lids or tags that may identify the meter number or attachment number.

10.6 Setting Meter Vaults

Meter vaults shall be set either to the existing grade, or as indicated on the service order or to the grade given by a stake card. Earth shall be firmly tamped by pneumatic, vibratory or other approved compaction device and backfilled per Section 7: "BACKFILLING PROCEDURES AND TAMPING" around the vault and cover, the lid locked in and the meter setting centered in the middle of the vault and at the proper depth below grade, as shown on the drawing in the Appendix of Drawings.

Meter vaults shall not be installed in areas subject to vehicular traffic whenever possible. When directed to be installed in areas subject to vehicular traffic, the meter vault shall be of the heavy-duty concrete type with heavy duty frame and cover.

See Standard Drawings: 3002, 3003, 3004, 3400, 3401, 3403, 3404, 3420, 3430, 3200, 3202, 3203, and 3601 in Appendix of Drawings

10.7 Pressure Regulators (Pressure Reducing Valves)

When directed by the Company's Project Manager, the Contractor shall install a pressure regulator (pressure reducing valve). The pressure regulator shall be installed on the front side (upstream) of the meter. When the pressure at the meter is 100 psi or greater, the Contractor shall install a pressure regulator as directed by the Company's Project Manager or Inspector. Pressure regulators shall be supplied by the Company unless otherwise stated in the Contract Documents. The Contractor shall perform an operability test and check for leaks after the pressure regulator has been installed.

See Standard Drawings: 3003, 3004, 3401, and 3202 in Appendix of Drawings

10.8 Leak Testing the Service

After the complete service has been installed and before any joints are covered, the corporation stop shall be opened and the entire length of the

service shall be subjected to system water pressure and each joint shall be inspected and sounded by the Contractor for leaks. The entire tailpiece shall be included in this leak check by temporarily capping the end of the tailpiece prior to connection to the customer

Any leaks so found shall be immediately repaired. After the service has been observed by the Company's Inspector to be watertight throughout its length, the meter stop shall be shut-off, and the backfilling started. The corporation barrel set nut may need to be securely tightened to prevent leakage.

The Contractor shall leave the corporation stop fully open and the meter angle stop fully closed upon completion of the testing.

10.9 Relocate Service

Relocating a service is defined to include installing a completely new service to an existing customer, including a new tail pipe, discontinuing the old service at the main (in the event the existing main is to remain active), abandoning the old meter vault, and returning the old meter, frame and lid/cover to the Company's Allmond Avenue Yard and backfilling.

Concrete meter vaults and heavy-duty frame and covers shall be used in driveways, parking lots, and other areas of vehicular traffic.

Service installation shall be done in accordance with "Service Installation – Two Inches (2") and Smaller, (Section 10.3) and Service Installation – Larger than two inches (2")", (Section 10.4). The Contractor shall discontinue the old service in accordance with "Discontinue Service" (Section 10.16). Excavation, backfilling, and restoring of surfaces shall be done in accordance with these specifications. Abandoning of the old meter vault shall be done in accordance with "Backfill Meter Vault" (Section 10.17).

When lead is encountered, refer to Section 10.11, "Lead and Galvanized Service Renewals."

Contractors shall be responsible to make at least two (2) attempts when connecting the tailpiece to a customer's galvanized service line. The second attempt shall be limited to a maximum of three feet (3') beyond the property line or to any property improvement which would require excessive restoration. If the second attempt is unsuccessful, the Contractor shall immediately contact the Company's Inspector, and provide a representative sample of the deteriorated line, at which time, the Company's Project Manager or Inspector shall arrange for a temporary service connection to the customer to be installed by others.

See Standard Drawing: 3440 in Appendix of Drawings

10.10 Renew Service

Renewing a service is defined to include installing a new copper service line from the existing main or new main to the meter stop, and a new copper tail pipe from the meter stop to the property line or the property service connection, and shall include, the following: excavation, boring or jacking of copper tubing or pipe, installing corporation stop, tapping saddle or tapping sleeve and gate valve at the main, if applicable, installing all tubing and/or pipe and all associated fittings, meter vault, frame and lid/cover, and backfilling and restoring of all surfaces.

Service installation shall be done in accordance with “Service Installation – Two Inches (2”) and Smaller, (Section 10.3) and Service Installation – Larger than two inches (2”), (Section 10.4). The Contractor shall discontinue the old service in accordance with “Discontinue Service” (Section 10.17). All lead service lines shall be renewed in accordance with “Cutting Lead Pipe” (Section 10.13) and “Flushing of Lead and Galvanized Services” (Section 10.14) unless otherwise instructed on the project drawings. Excavation, backfilling, and restoring of surfaces shall be done in accordance with these specifications.

When lead is encountered, refer to Section 10.11, “Lead and Galvanized Service Renewals.”

Contractors shall be responsible to make at least two (2) attempts when connecting the tailpiece to a customer’s galvanized service line. The second attempt shall be limited to a maximum of three feet (3’) beyond the property line or to any property improvement which would require excessive restoration. If the second attempt is unsuccessful, the Contractor shall immediately contact the Company’s Inspector, and provide a representative sample of the deteriorated line, at which time, the Company’s Project Manager or Inspector shall arrange for a temporary service connection to the customer to be installed by others.

See Standard Drawing: 3441 in Appendix of Drawings

10.11 Lead and Galvanized Service Renewals

Renewing a lead or galvanized service is defined to include installing a new copper service line from the existing main or new main to the meter stop, and a new copper tail pipe from the meter stop to the property service connection, and shall include, the following: excavation, boring or jacking of copper tubing or pipe, installing corporation stop, tapping saddle or tapping sleeve and gate valve at the main, if applicable, installing all tubing and/or pipe and all associated fittings, meter vault, frame and lid/cover, and backfilling and restoring of all surfaces.

The Contractor is required to identify the property line location and excavate the service line's tail piece to locate the property service connection. If the property service connection is not found, the Contractor shall seek permission from the property owner to excavate on private property. With permission, the Contractor shall continue to excavate up to ten feet (10') beyond the property line onto private property in an effort to locate the property service connection and determine the material of the customer's service line. The Company's Inspector shall verify the material of the customer's service line prior to cutting any pipe.

If the material of the customer's service line is not lead, the Contractor shall renew/relocate the entire service line from the main to the customer's connection.

If the material of the customer's service line is lead or galvanized pipe, the Company's Project Manager or Inspector will contact the customer to make them aware of the work to be completed by the Company and the existence of lead or galvanized pipe on the customer's side of the service line. The Company's Inspector shall also enquire if the customer is willing to replace their lead or galvanized service line.

- 1) If the customer is willing to replace their lead or galvanized service line, the Contractor shall coordinate the renewal/relocation of the Company's lead or galvanized service line with the customer's plumber.
- 2) If the customer is not willing to replace their lead or galvanized service line and the service is to be relocated or renewed, the Contractor shall replace the entire service line from the main to the customer's connection and shall install a dielectric between the end of the Company's tail piece and the customer's lead or galvanized service line. The dielectric will be composed of a 24" section of like diameter schedule 80 PVC pipe and a plastic universal transition coupling (supplied by the Company). If the customer's service line is less than 10 feet in length as measured from the customer's building to the dielectric connection, the Company's Project Manager shall be contacted prior to renewing/relocating the service to determine if a new grounding system is needed.

Service installation shall be done in accordance with "Service Installation – Two Inches (2") and Smaller, (Section 10.3) or Service Installation – Larger than two inches (2")", (Section 10.4). The Contractor shall discontinue the old service in accordance with "Discontinue Service" (Section 10.17). All lead service lines shall be renewed in accordance with "Cutting Lead Pipe" (Section 10.13) and "Flushing of Lead and Galvanized Services" (Section 10.14) unless otherwise instructed on the project drawings. Excavation, backfilling, and restoring of surfaces shall be done in accordance with these

specifications.

See Standard Drawing: 3441 in Appendix of Drawings

10.12 Lead Hazards and Safety Precautions

Pure lead (Pb) is a heavy metal that can damage the central nervous system, cardiovascular system, reproductive system, hematological system, and kidneys. Symptoms of chronic overexposure include loss of appetite, constipation, nausea, excessive tiredness, headache, fine tremors, metallic taste in the mouth, weakness, nervous irritability, hyperactivity, muscle and joint pain or soreness, anxiety, insomnia, numbness, or dizziness. Lead is most commonly absorbed into the body by inhalation. Workers can also absorb lead through the digestive system if it enters the mouth and is ingested. A significant portion of lead inhaled or ingested can enter the bloodstream. Once in the bloodstream, lead circulates through the body and is stored in various organs and body tissues. Some of this lead is filtered out of the body quickly and excreted, but some remains in the blood and tissues.

Personnel performing lead service line removal activities shall:

- Wear disposable gloves when handling lead.
- Dispose of gloves and other materials that contact lead as trash on a regular basis.
- Be careful to not touch eyes or face.
- Wash hands before eating or smoking.
- Wash work clothes regularly.
- Contact management if they feel that they have been affected by lead exposure.

Information taken from 'OSHA – Lead in Construction', OSHA 3142-12R 2004

10.13 Cutting Lead Pipe

When the cutting of pipe made of lead is required, the pipe shall be cut with a shear device, such as Reed Ratchet Shears or similar device, as approved by the Company's Project Manager. Sawing of lead pipe shall not be allowed. The Company encourages contractors to recycle any lead service pipe that is removed.

10.14 Flushing of Lead and Galvanized Services

Flushing of renewed lead services shall be conducted immediately after the renewed service is reconnected at maximum flow. Flushing shall be continued

for a minimum of sixty (60) minutes. Flushing of the service for sixty (60) minutes shall also be conducted if a copper service is renewed and it is connected to a dielectric and private lead service line. If a galvanized service that has not been previously connected to lead is renewed, it shall be flushed for a minimum of five (5) minutes. If any part of the galvanized service is connected to lead, then the service shall be flushed for a minimum of sixty (60) minutes.

The Contractor shall be responsible for supplying all hoses, fixtures, and couplings needed to perform the lead service flush.

The Contractor shall identify, on a daily basis, those services that will require renewal on the following workday. Residences requiring lead or galvanized service renewals shall be investigated to determine if an outside spigot is available and functioning properly. The Contractor shall notify the Company's Inspector when an outside spigot is not available or not properly functioning in order for the Company's Inspector to contact the customer.

Services that cannot be flushed externally by the Contractor or internally by the customer at the time of the renewal, may be renewed, but shall be left in the "off" position immediately after the renewal is completed. The Contractor shall immediately notify the Company's Inspector when any service is turned "off" in order for the Company's Inspector to leave appropriate notification with the customer and notify the Company's Radio Room.

10.15 Lead Service Renewal Notification

The Contractor shall assist the Company's Inspector with distributing customer information and notices to all properties in which a lead service is to be renewed or replaced, as directed by the Company's Inspector. Notices are supplied by the Company and typically composed of self-adhesive window hangers or door hangers.

10.16 Transfer Service

Transferring a service is defined to include installing a length of service line, as required, to reconnect an existing copper service to the existing main or new main, and shall include, the following: excavation; boring or jacking of copper tubing or pipe; installing corporation stop; tapping saddle or tapping sleeve and gate valve at the main; installing all tubing and/or pipe and all associated fittings; and backfilling and restoring of all surfaces.

Service installation shall be done in accordance with "Service Installation – Two Inches (2") and Smaller, (Section 10.3) or Service Installation – Larger than two inches (2")", (Section 10.4). The Contractor shall discontinue the old service in accordance with "Discontinue Service" (Section 10.17).

Excavation, backfilling, and restoring of surfaces shall be done in accordance with these specifications.

When lead is encountered, refer to Section 10.11, "Lead and Galvanized Service Renewals."

See Standard Drawing: 3442 in Appendix of Drawings

10.17 Discontinue Service

Discontinuing a service is defined to include excavating a service line at a water main that is to remain active, turning off the corporation stop or ferrule, disconnecting and plugging the service line, returning the old meter, frame and lid/cover to the Company's Allmond Avenue Yard, backfilling the meter vault, and restoring all surfaces.

Driven ferrules, which are not threaded onto the main, will require water main shutdown, removal, and installation of a wrap-around repair band. Driven ferrules can be expected on most lead services.

Excavating, backfilling, and restoring of surfaces shall be done in accordance with these specifications. Abandoning the old meter vaults shall be done in accordance with "Backfill Meter Vault" (Section 10.18).

See Standard Drawing: 3442 in Appendix of Drawings.

10.18 Backfill Meter Vault

Meter vaults on all discontinued or relocated services shall be abandoned by removing the old meter, frame and lid/cover, and any existing curb stop frame and lids, and filling the void to existing grade with backfill and surface material, appropriate to the type surface. Unpaved areas shall be backfilled to grade with topsoil and restored in accordance with "RESTORATION" (Section 11).

Sidewalks shall be backfilled with pit run sand or DGA and repaved in accordance with "RESTORATION" (Section 11). Parking lots, driveways, and other areas subject to vehicular traffic shall be backfilled using DGA and restored in accordance with "Twelve-Inch (12") Cutback Requirement" (Section 5.4.2), "BACKFILLING PROCEDURES AND TAMPING" (Section 7), and "RESTORATION" (Section 11) found in this specification.

All meters and frames and lids/covers shall be returned to the Allmond Avenue warehouse. The Contractor shall be responsible for all remedial work due to discontinuation of meter vaults as required in the section "WARRANTY" (Section 12).

10.19 Potential Shock Hazard

Due to electrical grounding of some electrical services to metal water service lines, the potential for electrically charged water service lines and/or water meters exists.

The Contractor shall check each service for electric potential before working on the service. Any electrically charged water service shall immediately be brought to the attention of the Company's Inspector and reported to the appropriate electric company.

11. RESTORATION

11.1 General

The Contractor shall be responsible for restoring all disturbed areas resulting from their construction or activity.

A maximum of 1,500 lineal feet may be disturbed at one time prior to final grade. Restoration of the area is required before the Contractor is permitted to proceed.

The Contractor shall work no more than two sites at a time. At least one site must be fully restored with the exception of milling and paving before the Contractor begins working on the next site. This work includes yard, sidewalk and curb restoration as well as the patching of all road cuts.

The Contractor is to take whatever measures are necessary to keep all traveled surfaces free of dirt, mud, or other material during all non-working hours. Unless otherwise approved by the Company's Project Manager, no excavated material shall be placed on the paved surface or any other areas near the trench; the excavated material shall be placed directly from the trench to the haul truck. The Contractor shall provide adequate dust control and follow all governing regulations applicable to the work.

Repaving over the completed trench shall be done by the Contractor, who shall furnish all materials required. Repaving shall match the original paving in type, shall be first class in all respects, and shall comply with specifications covering the type of paving to be restored as issued by the authority over the thoroughfare involved.

The restoration of parking lots and driveways serving commercial and/or public establishments shall comply with the specifications of the respective authority having jurisdiction over the abutting right-of-way.

Except for parking lots, driveways, and sidewalks, each individual pavement restoration shall have a Company-supplied pavement marker

installed by the Contractor.

All saw cuts shall be straight and perpendicular to the driveway / roadway. Restoration shall be made with the same type material and finish that is removed. Street restoration shall be as specified in the detail for Backfill and Pavement Restoration in accordance with the Appendix of Drawings, pending the jurisdiction of said street, included in these specifications. Permanent restoration of driveway, sidewalks, and street intersections shall be completed by the Contractor within ten working days after backfilling of trench is complete. If restorations are not completed, the Company may, at its option, have the repairs made by others and deduct those costs from the amount owed to the Contractor.

11.2 Asphalt Paved Surfaces

All Asphalt pavement cuts are to be restored in accordance with the permanent pavement restoration details as shown in the Appendix of Drawings.

Pavement cuts are to be uniform width and straight sawed edges. All asphalt pavement trench edges shall be saw cut regardless of paving restoration (full lane, complete roadway, etc.). Use of a hoe ram for cutting pavement trench edges is not allowed. An approved joint sealer is to be used to seal all joints between new and existing pavement. In the event asphalt plants have closed due to cold weather, the Contractor shall maintain all pavement cuts with recessed steel plates or temporary asphalt pavement, until it becomes possible to permanently restore the pavement. Asphalt pavement used for permanent pavement restoration shall have a minimum temperature of 225°F as measured when discharged from the truck.

Particular care is to be taken that existing pavement surfaces within the right-of-way are not scarred or otherwise damaged by equipment. Planking or other protective devices are to be used at all times to prevent damage to paved surfaces from tracked equipment.

In the event the asphalt paved surfaces are damaged or scarred by work on this project, resurfacing is to be required as follows:

- 1) If scarring or other damage is continuous, resurfacing is to be likewise continuous and is to consist of one and one-half inches (1 ½") Class A bituminous surfaces extending to the edge of damaged lane.

The edge of the damaged pavement shall be edge keyed, with the resurfaced section being flush with the undisturbed adjacent pavement surface, allowing roadway surface drainage not to be obstructed.

- 2) If scarring or other damage is determined to be intermittent, individual or paved patches may be permitted and are likewise to consist of Class A bituminous surface, extending to the edge of the damaged lane.
- 3) All damage to the edge of pavement shall require the removal of and base repair of a minimum of two feet (2') in addition to the maximum width of the damage. The longitudinal edge is to be a uniform width with straight sawed edges. The lane is then to be milled a minimum of five feet (5') in width with a two inch (2") minimum asphalt overlay.

There will be no skip milling allowed and the minimum length will be determined in the field by the Company's Inspector or Project Manager.

All joint sealant material shall be: hot-applied, non-water-based, and produced by a competent and reputable manufacturer. Sealant shall be in accordance with the permitting agency's specifications. Sand shall be placed over the joint sealant to prevent tracking.

11.3 Asphalt Paved Surface Materials and Construction Methods

The composition of the asphalt pavement and method of construction shall be in accordance with the Kentucky Transportation Cabinet Department of Highways (KYTC) Standard Specifications for Road and Bridge Construction (latest edition). A copy of these specifications is on file with the Company's Supervisor of Construction Inspection Services, 4801 Allmond Avenue.

11.4 Concrete Paved Surfaces

All concrete used for structural purposes (such as thrusts blocks, road subbase, sidewalks, etc.) shall be produced at a concrete plant, delivered by a ready-mix concrete truck or mobile mixer (metered) concrete truck. Only concrete used for miscellaneous purposes (such as vault floor pad, end plugs for mains to be abandoned-in-place, etc.) is allowed to be that of an on-site bag mix.

All cuts in concrete driveways and sidewalks are to be replaced from construction joint to construction joint, using minimum 3,500 psi concrete. When a section of sidewalk at a street intersection is to be replaced in the Louisville / Jefferson County Metro Government jurisdiction a wheel chair ramp is to be installed in accordance with the Appendix of Drawings.

For pipeline installation work, all concrete curbs or curb and gutter which are damaged are to be entirely removed and replaced in kind between existing joints. Stone base material shall be placed and compacted under any disturbed area with the curb replacement with the same type stone base

material and compaction as removed. Base material shall extend a minimum of eighteen (18) inches beyond the back of the curb. Install one-half inch (1/2"), pre-molded expansion joint material between new and existing concrete. Concrete shall be a minimum 3,500 psi concrete.

For service line installation work, concrete curbs or curb and gutter which are saw cut (typically four inch (4)" in width) are to be replaced in kind and have additional saw cutbacks one foot (1') to each side of the initial cut (4" cut). If either of the additional one foot (1') saw cutbacks fall within two feet (2') of an existing pavement joint, the entire section shall be removed and replaced to the existing joint. Stone base material shall be placed and compacted under any disturbed area with the curb replacement with the same type stone base material and compaction as removed.

Base material shall extend a minimum of eighteen (18) inches beyond the back of the curb. Install one-half inch (1/2"), pre-molded expansion joint material between new and existing concrete. Concrete shall be a minimum 3,500 psi concrete.

Particular care is to be taken that existing pavement surfaces within the right-of-way are not scarred or otherwise damaged by equipment. Planking or other protective devices are to be used at all times to prevent damage to paved surfaces from tracked equipment.

In the event the concrete paved surfaces are damaged or scarred by work on this project, repair is required as follows:

- 1) Concrete roadways shall be replaced per the permitting agency's standard specifications for the full width of the lane and to the nearest construction joint on each side of the damaged area.
- 2) All concrete driveways and aprons that are damaged by the Contractor's construction or activity, or that is specified for replacement on the plans shall be replaced in their entirety to the nearest construction joint. Concrete thickness and strength shall be per the Company's standard specifications. The style shall match the existing driveway or apron. The limits of repair, style of concrete and type of concrete for each driveway or apron shall be approved by the Company's Project Manager prior to installation. The Company's Project Manager may modify thickness, style, type and limits of repair based on field conditions and property owner consultation which shall be installed by the Contractor at no additional cost to the Company.

See Standard Drawing: 4410 in Appendix of Drawings

11.5 Concrete Paved Surface Materials and Construction Methods

All concrete used on this project and as shown on the project drawings shall have a 28-day minimum compression strength of 3,500 pounds per square inch (psi). The proportions and construction requirements for the concrete shall be as listed in the Kentucky Transportation Cabinet Department of Highways (KYTC) Standard Specifications for Road and Bridge Construction (latest edition).

See Standard Drawings: 4000, 4100 and 4400 in Appendix of Drawings

11.6 Unpaved Surfaces

All drainage structures (such as pipe, head or wing walls, channels, flumes, and culverts), fences, signs, etc., public or private, which are damaged or removed by this Contractor, shall be repaired or replaced in kind to the satisfaction of the owner. All open ditches shall be restored to their present cross sections, depths, and slopes, and dressed and graded to provide permanent adequate drainage to present connecting ditches or culverts equal to the original drainage systems except where specifically indicated on the project drawings.

The Contractor shall replace all surface material including landscaping, shrubbery, fences, or other disturbed surfaces, to a condition at least equal to that which existed before the work began, furnishing all labor and materials.

The grassed area disturbed by the work under this contract, whether by the Contractor or by any subcontractor, within or adjacent to the right-of-way of any state, county, city or other thoroughfare, public or private (except as required below), now in grass shall be shaped, seeded, and mulched in accordance with KYTC Standard Specifications for Road and Bridge Construction (latest edition).

Seed mixture shall be Mixture No. 1 as described in Seed Mixtures for Permanent Seeding. Acceptance of Seeding Section shall be amended to disallow compensations for any corrective seeding required by the Company's Project Manager.

All work fronting residential lots now in grass shall be shaped and seeded in accordance with KTCDOH Standard Specifications for Road and Bridge Construction (latest edition), but shall be amended to include removal of all rock from the sod bed. A minimum of six inches (6") of top soil being free of rock shall be placed prior to final restoration.

Reseeded areas that are located within ditches or on other sloped ground of 2:1 slopes or greater shall be covered with erosion control netting secured

with pins or stakes, or prefabricated matting containing mulch, seed and fertilizer. All ditch lines in residential lots shall be covered with erosion control netting secured with pins or stakes, or prefabricated matting containing mulch, seed and fertilizer.

A maximum of 1,500 lineal feet may be disturbed at one time prior to final grade. Restoration of the area is required before the Contractor is permitted to proceed.

Certain areas as approved by the Company's Project Manager or shown on the project drawings shall be sodded. Unless otherwise approved by the Company's Project Manager, no excavated material shall be placed on any paved roadway surface.

See Standard Drawing: 4300 in Appendix of Drawings.

11.7 Site Clean Up

Surplus pipeline materials, equipment, tools, and temporary structures shall be removed by the Contractor, and all dirt, rubbish and excess earth from excavations shall be hauled and disposed by the Contractor, all in a manner satisfactory to the Company.

The Contractor shall leave the site in presentable shape and in a condition at least equal to that which existed before the work began and in compliance with all restoration provisions of this specification.

12. WARRANTY

The provisions governing work covered by warranty are contained in **WARRANTIES** section in the **TERMS AND CONDITIONS**.

13. ADDITIONAL CONTRACT DEFINITIONS, ABBREVIATIONS, and TECHNICAL REFERENCES

13.1 Additional Contract Definitions

Right-of-Way – A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to a street, highway, or other public improvement.

Service Line – Any pipe, line, or conduit used or to be used to provide water service from a water main to the property line joint. A water service line shall be owned and maintained by the Company from the tap at the water main to the property line connection.

Non-storm sewers – Sanitary sewer, combined sewer, septic tank, or subsoil

treatment system.

Stone Classifications: Equivalencies:

Kentucky # 3 = Indiana # 2

Kentucky # 57 = Indiana # 8

Kentucky # 9 = Indiana # 3/8 pea

Kentucky D.G.A. = Indiana # 73

Structures – Bridges, culverts, catch basins, drop inlets, retaining walls, cribbing, manholes, end walls, sewers, service pipes, septic tanks, lateral fields, foundation drains, fences, swimming pools, and other features which may be encountered in the work and not classified herein.

Underground Facility – means any item which shall be buried or placed below ground for use in connection with the storage or conveyance of water, sewage, electronic, telephone or telegraph communications, electric energy, oil, gas or other substances, and shall include pipes, sewers, conduits, cables, valves, lines, wires, manholes, appurtenances, attachments and those portions of poles and their attachments below ground.

Utility – Pipe lines, conduits, ducts, transmission lines, overhead or underground wires, railroads, storm drains, sanitary sewers, irrigation facilities, street lighting, traffic signals, and fire alarm systems, and appurtenances of public utilities and those of private industry, businesses or individuals solely for their own use or use of their customers which are operated or maintained in, on, under, over or across public right-of-way or public or private easement.

13.2 Abbreviations:

AC – Asbestos Cement Pipe

ANSI – American National Standards Institute

ASTM – American Society of Testing Materials

AWWA – American Water Works Association

C – Temperature in degree Celsius

CFS – Cubic Feet Per Second

CI – Cast Iron Pipe

CL – Cement Lined Cast Iron Pipe

DEG - ° - Degree

DGA – Dense Graded Aggregate

DI – Ductile Iron Pipe

DIPS – Ductile Iron Pipe Size

DIW – Ductile Iron Pipe, Wrapped

DPW – Ductile Iron Pipe, Pressure Class 350, Wrapped

DR – Dimension Ratio

DVD – Digital Versatile Disc

SDR – Standard Dimension Ratio

F – Temperature in degree Fahrenheit
 FPS – Feet Per Second
 FT – ‘ – Feet
 HDPE – High Density Polyethylene Pipe
 HTH – Dry Chlorine (Calcium Hypochlorite)
 IN – “ – Inch
 IPS – Iron Pipe Size
 KAR – Kentucky Administrative Regulations
 KDOW – Kentucky Division of Water
 KOSHA – Kentucky Occupational Safety and Health Association
 KRS – Kentucky Revised Statutes
 KTC – Kentucky Transportation Cabinet
 KTCDOH - Kentucky Transportation Cabinet Department of Highways
 MJ – Mechanical Joint
 MSD – Louisville and Jefferson County Metropolitan Sewer District
 MUTCD – Manual on Uniform Traffic Control Devices for Streets and Highways
 NFPA – National Fire Protection Association
 OSHA – Occupational Safety and Health Administration
 PCB – Polychlorinated Biphenyls (toxic chemicals)
 PPM – Parts per Million
 PSF – Pounds per Square Foot
 PSI – Pounds per Square Inch
 PVC – Polyvinyl Chloride Pipe
 USGS – United States Geological Survey
 WQC – Water Quality Certification
 % - per cent
 @ - at
 / - per
 = - equals

13.3 Technical References

Section:

- 1.6.1 Federal Highway Administration, Part VI (6) of the Manual on Uniform Traffic Control Devices (MUTCD).
- 1.6.4 Louisville / Jefferson County Metro Government Ordinance: Title VII (7), Traffic Code: Chapter 72 Parking Regulations.
- 1.6.5 KRS-220, 224 Soil Erosion and Sediment Control
Jefferson County Ordinance, Chapter 159, Erosion Prevention and Sediment Control
- 1.6.6 Kentucky Division of Water- General Water Quality Certification, Permit #12.
- 2.2 KOSHA – 803 KAR 2:300 – 2:320; 803 KAR 2:240 – 2:423
- 3.2.4 Recommended Standards for Water Works (Ten States Standards)

- Latest Edition
- 5.3 Blasting Regulations: KRS 351 and KAR 805.
 - 6.2.2 PVC Pipe – Design and Installation AWWA Manual No. M-23
 - 6.2.3 AWWA Standard Specification C 600 – Installation of Ductile Iron Water Mains and Their Appurtenances.
 - 6.4.1 AWWA Standard Specification C 111 – Rubber–Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
AWWA Standard Specification C 900 – Polyvinyl Chloride (PVC) Pressure Pipe, 4”-12” for Water Distribution.
 - 6.7.1 AWWA Standard Specification C 105 – Polyethylene Encasement for Ductile-Iron Pipe Systems.
 - 7.1. ASTM D-1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.
 - 7.4 Kentucky Transportation Cabinet Department of Highways Standard Specification for Road and Bridge Construction.
 - 8.2.2 401 KAR 8:150 –sections 4 (1) and 4 (2) Disinfection and Filtration.
 - 8.4 Louisville Water Company Best Management Practice and Procedures on Chlorinated Water Disposal, December 2001.

14. TECHNICAL DESIGN AND CONSTRUCTION STANDARDS

1 GENERAL DESIGN REQUIREMENTS

- 1.1 The Utility shall establish and maintain Technical Design and Construction Standards for all water main projects reviewed and constructed under the KDOW Plans Review Agreed Order.
- 1.2 The Utility shall ensure that the plans and specifications for each project meet or exceed all Technical Design and Construction Standards.
- 1.3 The Professional Engineer of Record shall ensure the plans and specifications for each project meet or exceed these Technical Design and Construction Standards.
- 1.4 **Hydraulics**
 - 1.4.1 The utility shall define existing and potential customer peak demand in the hydraulic analysis.
 - 1.4.2 The hydraulics analysis shall demonstrate the proposed water main projects can be flushed at least two and one half (2.5) feet per second (fps), while keeping system pressure above twenty (20) pounds per square inch (psi) within the pressure zone of the proposed project.

- 1.4.3 The hydraulic analysis shall demonstrate the proposed water main project maintains thirty (30) psi under peak demand.
- 1.4.4 The hydraulic analysis shall demonstrate that the proposed water main project does not drop ground level pressure in any part of the pressure zone below twenty (20) psi under all conditions of flow.
- 1.4.5 Pressure greater than or equal to thirty (30) psi shall be available on the discharge side of all water meters.

1.5 Hydrants

- 1.5.1 Fire hydrants shall only be installed on new or existing water mains designed to carry fire flows. The water main supplying the hydrant must have a diameter greater than or equal to six (6) inches and provide sufficient capacity to meet the required fire flow. (Louisville Water Technical Specifications Section 9.1)
- 1.5.2 An auxiliary valve shall be installed in all hydrant supply pipes. (Louisville Water Technical Specifications Section 9.1)
- 1.5.3 Hydrant drains shall not be connected to any sanitary sewer, combined sewer, septic tank or subsoil treatment system (hereinafter “non-storm sewer”) or any storm sewer or storm drain, and shall be located at a distance greater than ten (10) feet from any non-storm sewer. (Louisville Water Technical Specifications Section 9.2)

1.6 Water Main Valves

- 1.6.1 Water mains shall have a sufficient quantity of valves so that customer inconvenience and sanitary hazards will be minimized during repairs.
- 1.6.2 Urban areas as determined by the Utility shall include a valve spacing distance of less than or equal to five hundred feet (500') for commercial service areas and less than or equal to one thousand feet (1,000') for residential service areas. Valves should be located at roadway intersections where practical.
- 1.6.3 Rural areas as determined by the Utility shall include a valve spacing distance of less than one (1) mile. Valves should be located at roadway intersections where practical.

1.7 Blow-Off or Flushing Connections

- 1.7.1 For water mains that dead end, a fire hydrant or blow-off shall be required at the end of each six (6) inch or larger diameter water main and a flush hydrant or blow-off shall be required at the end of each water main that is less than six (6) inches in diameter.
- 1.7.2 Each blow-off, fire hydrant, or flush hydrant shall be sized so that velocity of greater than or equal to two and one half (2.5) feet per second (fps) can be achieved in the water main served by the blow-off or hydrant during flushing.
- 1.7.3 Flushing devices, blow-offs, or air relief valve shall not be connected to any non-storm sewer or any storm sewer or storm drain, and shall be located at a distance greater than ten (10) feet from any non-storm sewer. Chambers, pits, or manholes containing valves, blow-offs, meters, or other such appurtenances shall not be directly connected to any non-storm sewer or any storm sewer or storm drain. Such chambers, pits, or manholes shall be drained to absorption pits underground or to the surface of the ground where they are not subject to flooding by surface water. (Louisville Water Technical Specifications Section 8.3.2)

1.8 Air Relief Valves

- 1.8.1 Air relief valves or hydrants shall be installed at high points in water mains, where air can accumulate. Automatic air relief valves shall not be used in situations where manhole or chamber flooding may occur. (Louisville Water Technical Specifications Section 8.7, 8.7.1 & 8.7.2)
- 1.8.2 The open end of an air relief pipe from automatic valves shall be extended a distance of greater than or equal to one (1) foot above grade and provided with a screened, downward facing elbow or shall be an equivalent standard as determined by the best professional judgment of the Utility. The pipe from a manually operated valve shall be extended to the top of the pit. (Louisville Water Technical Specifications Section 8.7.1 & 8.7.2)

1.9 Bedding and Backfill

A continuous and uniform bedding shall be provided in the trench for all buried pipe. Backfill material shall be tamped in layers

around the pipe and to a sufficient height above the pipe to adequately support and protect the pipe. Stones found in the trench shall be removed for a depth greater than or equal to six (6) inches below the bottom of the pipe. (Louisville Water Technical Specifications Section 7.1)

1.10 **Minimum Depth**

All water mains shall be covered to a depth equal to or greater than forty-two (42) inches to prevent freezing. (Louisville Water Technical Specifications Section 7.1)

1.11 **Thrust Blocks**

All valves, tees, bends, plugs, and hydrants shall be provided with reaction blocking, tie rods, or joints designed to prevent movement. (Louisville Water Technical Specifications Section 6.14 & 9.1)

1.12 **Disinfection and Coliform Monitoring**

1.12.1 New or relocated water mains shall be thoroughly disinfected in accordance with 401 KAR Chapter 8:150 Section 4 (1) upon completion of construction and before being placed into service. To disinfect the new or relocated water mains, the Utility shall use chlorine or chlorine compounds (disinfectants) in such amounts as to produce an initial disinfectant concentration of at least fifty (50) ppm and a residual disinfection of greater than or equal to twenty-five (25) ppm at the end of twenty-four (24) hours. Follow the water main disinfection with thorough flushing and place the water main into service if, and only if, coliform monitoring applicable to the water main does not show the presence of coliform. If coliform is detected, repeat flushing of the water main and coliform monitoring. If coliform is still detected, repeat disinfection and flushing as if the water main has never been disinfected. Continue the described process until monitoring does not show the presence of coliform. (Louisville Water Technical Specifications Section 8.2.2 & 8.6)

1.12.2 The presence or absence of total coliform monitored by sampling and analysis shall be determined for the new or relocated water main(s) as needed. Take samples at connection points to existing water mains at one (1) mile intervals and at dead ends, without omitting any branch of the new or relocated water main. Sample bottles shall be clearly

identified as “special” construction tests. (Louisville Water Technical Specifications Section 8.6)

1.12.3 For new construction projects, the distribution system, using the most expedient method, shall maintain coliform test results. (Louisville Water Technical Specifications Section 8.6)

1.12.4 Chlorinated water resulting from disinfection of project components shall be disposed in a manner which will not violate 401 KAR 5:031. (Louisville Water Technical Specifications Section 8.4)

1.13 **Pressure Testing and Leak Detection**

The presence or absence of leaks monitored by physical testing shall be determined in all types of installed pipe as needed. Pressure testing and leakage testing shall be in accordance with the latest edition of AWWA Standard C600. (Louisville Water Technical Specifications Section 8.5)

1.14 **Water Main Construction and Material Standards**

1.14.1 Installation of water mains and appurtenances shall meet or exceed AWWA standards or manufacturer recommendations.

1.14.2 Pipes, fittings, valves, fire hydrants, and appurtenances shall meet or exceed the latest standards issued by the AWWA, ASTM, or NSF (if such standards exist). PVC and Polyethylene piping used must be certified to ANSI/NSF Standard 61.

1.15 **Sewer Crossings and Separation**

1.15.1 For the purpose of this standard, “non-storm sewer” is defined as any of the following: sanitary sewer, combined sewer, septic tank, or subsoil treatment system. (Louisville Water Technical Specifications Section 3.1.4)

1.15.2 Water mains shall be laid a horizontal distance of greater than or equal to ten (10) feet horizontally from any existing or proposed non-storm sewer. The horizontal distance shall be measured from outside diameter of the water main to outside diameter of the non-storm sewer. (Louisville Water Technical Specifications Section 3.1.4)

1.15.3 In cases where the Utility determines it is not practical to maintain a ten (10) foot separation, water mains may be installed closer to a non-storm sewer provided that a variance is obtained from the Cabinet's Division of Water and maintained with the project records. (Louisville Water Technical Specifications Section 3.1.4)

1.15.4 No deviation from the ten (10) foot separation is allowed if the non-storm sewer is a force main (sewer under pressure). (Louisville Water Technical Specifications Section 3.1.4)

1.15.5 When water mains and non-storm sewers cross:

1.15.5.1 Water mains shall be laid such that there shall be a vertical distance of greater than or equal to eighteen (18) inches between the water main and non-storm sewer. The vertical distance shall be measured from the outside diameter of the water main to the outside diameter of the non-storm sewer line. (Louisville Water Technical Specifications Section 3.1.4)

1.15.5.2 One (1) full length of the water pipe shall be located so that both joints of the water pipe will be as far from the non-storm sewer as practical as determined by the Utility. (Louisville Water Technical Specifications Section 3.1.4)

1.15.5.3 Special structural support for the water and non-storm sewer may be required. (Louisville Water Technical Specifications Section 3.1.4)

1.15.6 No water pipe shall pass through or come in contact with any part of a non-storm sewer manhole. (Louisville Water Technical Specifications Section 3.1.4)

1.16 **Water Mains Near Areas with Organic Contamination**

If water mains are installed or replaced in areas of organic contamination or in areas within two hundred (200) feet of underground or petroleum storage tanks, ductile iron or other non-permeable materials shall be used in all portions of the water main installation or replacement. (Louisville Water Technical Specifications Section 5.5.6)

1.17 **Asbestos-Cement Pipe (Transite Pipe)**

If the existing water main to be tapped is asbestos-cement pipe, then

the contractor shall conform to OSHA regulations governing the handling of hazardous waste during the process of tapping the asbestos-cement pipe. Pieces of asbestos-cement pipe resulting from the tap shall be double bagged, placed in a rigid container, and disposed of in an approved landfill. (Louisville Water Technical Specifications Section 6.7)

1.18 Subfluvial Pipe Crossings

1.18.1 For subfluvial pipe crossings, a floodplain construction permit will not be required pursuant to KRS 151.250 if the following requirements of 401 KAR 4:050 Section 2 are met:

1.18.1.1 No material may be placed in the stream or in the flood plain of the stream to form construction pads, coffer dams, access roads, etc. during construction of pipe crossings.

1.18.1.2 Crossing trenches shall be backfilled as closely as possible to the original contour.

1.18.1.3 All excess material resulting from construction displacement in a crossing trench shall be disposed of outside the flood plain.

1.18.1.4 For erodible channels, there shall be at least thirty (30) inches of backfill on top of all pipe or conduit points in the crossing.

1.18.1.5 For nonerodible channels, pipes or conduits in the crossing shall be encased on all sides by at least six (6) inches of concrete with all pipe or conduit points in the crossing at least six (6) inches below the original contour of the channel.

(Louisville Water Technical Specifications Section 1.3.6)

1.18.2 For subfluvial pipe crossings greater than fifteen (15) feet in width:

1.18.2.1 The pipe shall be of special construction having flexible, restrained, or welded watertight joints, and

1.18.2.2 Valves shall be provided at both ends of water crossings so that the section can be isolated for testing or repair. Valves shall be easily accessible and not be subject to flooding.

1.18.2.3 Permanent taps or other provisions to allow insertion of a small meter to determine leakage and obtain water samples shall be made on each side of the valve closest to the supply source. (Louisville Water Technical Specifications Section 1.3.6)

1.19 Cross Connections

Cross connections shall not be allowed in accordance with 401 KAR 8:020. 401 KAR 8:020 (2) Cross-connections prohibited. All cross-connections shall be prohibited. The use of automatic devices, such as reduced pressure zone back flow preventers and vacuum breakers, may be approved by the cabinet in lieu of proper air gap separation. A combination of air gap separation and automatic devices shall be required if determined by the cabinet to be necessary due to the degree of hazard to public health. Every public water system shall determine if or where cross-connections exist and shall immediately eliminate them.

1.20 Project Approvals, Record Retention and Management requirements and stipulations under this Agreed Order are as follows:

- 1.20.1.1 All water main projects reviewed by the Utility require the preparation of plans and specifications stamped by a licensed Kentucky Professional Engineer (P.E.) who shall be the Engineer of Record for an individual project.
- 1.20.1.2 All water main projects submitted to the Utility for review shall be documented as reviewed and approved or denied by the Utility's Designated Plans Reviewer for the project.
- 1.20.1.3 All water main projects that the Utility designs internally or has designed by a contractor shall include plans and specifications stamped by a licensed Kentucky Professional Engineer (P.E.) who shall be the Engineer of Record for an individual project, and shall be reviewed and approved or denied by the Utility's Designated Plans Reviewer for the project.
- 1.20.1.4 All revisions to water main project plans previously approved by the Utility under the coverage of this Agreed Order shall be reviewed and approved or denied by the Utility's Designated Plans Reviewer for the project.

- 1.20.1.5 During construction, a set of Utility approved plans and specifications shall be available at the job site at all times. All work shall be performed in accordance with the Utility approved plans and specifications.
- 1.20.1.6 The Utility shall certify the water main projects has been constructed and tested in accordance with the approved plans and specifications. The Utility shall document and maintain a record of the certification of the project consistent with the recordkeeping requirements as stated in the Agreed Order.
- 1.20.1.7 The Utility shall define a project approval period not to exceed twelve (12) months, during which time the project construction shall begin.
- 1.20.1.8 Coverage under this Agreed Order does not relieve the Utility from the responsibility of obtaining any other approvals, permits, licenses required by the Cabinet and other state, federal and local agencies.
- 1.20.1.9 Project files and documentation, including water main project plans, location map, engineering calculations, and hydraulic information demonstrating regulatory compliance shall be retained for a period of not less than five (5) years from the completion of the project (in-service date).

2 Qualifications for Cabinet's Division of Water Agreed Order Projects

- 2.1 The Cabinet's Division of Water Agreed Order Projects will be limited to projects that meet the criteria identified in this section. Projects not meeting these qualifications shall be submitted to the Cabinet's Division of Water for review and approval.
 - 2.1.1 The water system shall have a valid Agreed Order.
 - 2.1.2 Projects with an overall length less than ten thousand (10,000) contiguous feet shall qualify. Two (2) or more adjoining projects shall be considered one (1) project for the purposes of this requirement.
 - 2.1.3 Projects consisting of water mains greater than or equal to three (3) inches in diameter or less than or equal to twelve (12) inches in diameter shall qualify. Additionally, circulating two (2) inch water main projects of less than five hundred (500) feet shall qualify if future extension from the line will

not occur and if the Utility determines that the two (2) inch line will benefit the overall system hydraulics and / or drinking water quality.

2.1.4 Projects qualifying for review and approval by the Utility may include water main projects with valves and / or hydrants as part of the design. However, projects, including those less than ten thousand (10,000) total linear feet, that include new construction or installation of treatment plants, storage tanks, chemical or pressure booster pumping stations, shall be reviewed by the Cabinet for final determination.

2.1.5 The water demand for the project shall not cause the Utility to exceed eighty-five (85) % of its rated or operational design capacity.

2.1.6 Projects funded in part or in full by the State Revolving Fund (SRF) or Congressional Special Appropriation Grants (SPAP) shall not qualify for review and approval by the Utility under the terms and conditions of this Agreed Order.

2.1.7 Projects under the jurisdiction of any regulating agency or funding agency other than the Kentucky Division of Water (external agencies), which in any way conflict with any regulatory process or funding process of these external agencies, shall not qualify for review and approval by the Utility under the terms and conditions of this Agreed Order.

2.1.8 The Utility is not authorized to approve any project that impacts any outstanding state resource water, outstanding national resource water, exceptional water, or cold water aquatic habitat as specified by 401 KAR Chapter 10.

2.1.9 Upon completion, projects shall meet all drinking water quality standards as set forth in 401 KAR Chapter 8.

2.1.10 The project meets all of the Technical Design and Construction Standards of the Cabinet's Division of Water Agreed Order and does not require any variances or deviations from the Technical Design and Construction Standards of the Cabinet's Division of Water Agreed Order.

APPENDIX OF STANDARD DRAWINGS FOR 4" – 20" PIPELINE CONSTRUCTION

Standard
Drawing
Number

Section 1: General Requirements

4501 Creek Crossings with Concrete Cap (Sect. 1.3.5)

Section 3: Site

1000 Typical Utility Location Profiles (Sect.3.1)

3600 Typical Temporary Service from Fire Hydrant (Sect. 3.4.4 & 3.4.4.1)

Section 6: Installation

1500 Steel Casing Pipe and Casing Runners (Sect. 6.3)

1400 Typical Cast-in-Place Thrust Anchors (Sect.6.8 & 6.15)

1200 A-C Methods for Installing and Restoring Polyethylene Wrap (Sect. 6.9)

Section 7: Backfilling Procedures and Tamping

4300 Common Backfill and Lawn Restoration (Sect. 7.1, 7.4, 7.5, 7.6 & 11.6)

Section 8: Placing Water Main In Service

1601 Typical 2" Blow-off and Flushing Connection (Sect. 8.3.2)

1602 Typical 1" Manual Air Valve (For mains up to 20") (Sect. 8.3.2, 8.7 & 8.7.2)

1603 Typical Combined 2" Automatic and Manual Air Valve
(For mains 16" and larger) (Sect. 8.3.2, 8.7 & 8.7.1)

1608 Leak Detection By-Pass Meter for Underwater Crossings (Sect. 1.3.6 & 8.8)

Section 9: Fire Hydrant

2000 Typical Fire Hydrant Installation (Sect. 9)

Section 10: Service Work

3804 Method for Tapping Polyethylene Encased Pipe (Sect. 10.3.1)

3002 Typical Copper Service 1" and Smaller (Sect.10.3, 10.3.1, 10.3.2 & 10.6)

3003 Typical 1" Copper Service with Pressure Reducing Valve (Sect.10.3, 10.3.1,
10.3.2, 10.5 & 10.7)

3004 Typical 3/4" Copper Service with Pressure Reducing Valve (Sect.10.3, 10.3.1,
10.3.2, 10.6 & 10.7)

3400 Typical Double 1" Domestic/Irrigation Copper Service (Sect. 10.3, 10.3.1,
10.3.2)

3401 Typical Double Domestic/Irrigation 1" Copper Service With Pressure
Reducing Valve (Sect. 10.3, 10.3.1, 10.3.2, 10.6 & 10.7)

3403 Typical ¾" Irrigation Retro Fit Copper Service (Sect. 10.3, 10.3.1, 10.3.2, &
10.6)

3404 Typical 1" Tandem 2-Way Domestic Copper Service (Sect. 10.3, 10.3.1,
10.3.2, & 10.6)

3420 Typical 1" 3-Way Domestic Copper Service (Sect. 10.3, 10.3.1, 10.3.2, &
10.6)

3430	Typical 1" 4-Way Domestic Copper Service (Sect. 10.3, 10.3.1, 10.3.2, & 10.6)
3200	Typical 1-1/2" or 2" Copper Service (Sect. 10.3, 10.3.1, 10.3.2, & 10.6)
3202	Typical 1-1/2" or 2" Copper Service with Pressure Reducing Valve (Sect. 10.3, 10.3.1, 10.3.2, 10.6 & 10.7)
3203A	Typical Ductile Iron Domestic Service 4"x3" (Sect. 10.4, 10.4.1, 10.4.2, & 10.6)
3203	Typical Ductile Iron Domestic Service 4" and Larger (Sect. 10.4, 10.4.1, 10.4.2, & 10.6)
3601	Typical Fire Protection Service 4" and Larger (Sect. 10.4, 10.4.1, 10.4.2, & 10.6)
3440	Relocate Service (Sect.10.9)
3441	Renew Service (Sect. 10.10, 10.11)
3442	Transfer Service (Sect.10.16) and Discontinue Service (Sect.10.17)
3805	Service Sleeve Installation Detail (Sect.10)

Section 11: Restoration

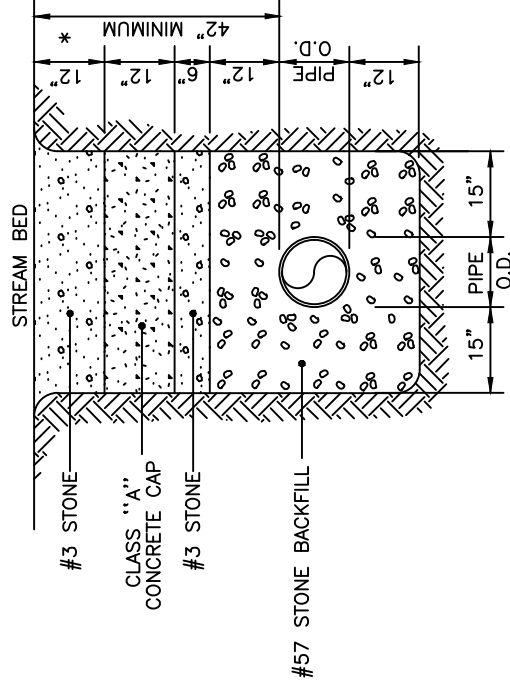
4000	State of Kentucky Backfill and Paving Restoration (Sect. 11)
4100	Metro Louisville/Jefferson County Backfill and Paving Restoration (Sect. 11)
4400	Sidewalk/Backfill Detail (Sect. 11)
4410	Concrete Curb and Gutter Restoration Detail (Sect. 11.4)

Other:

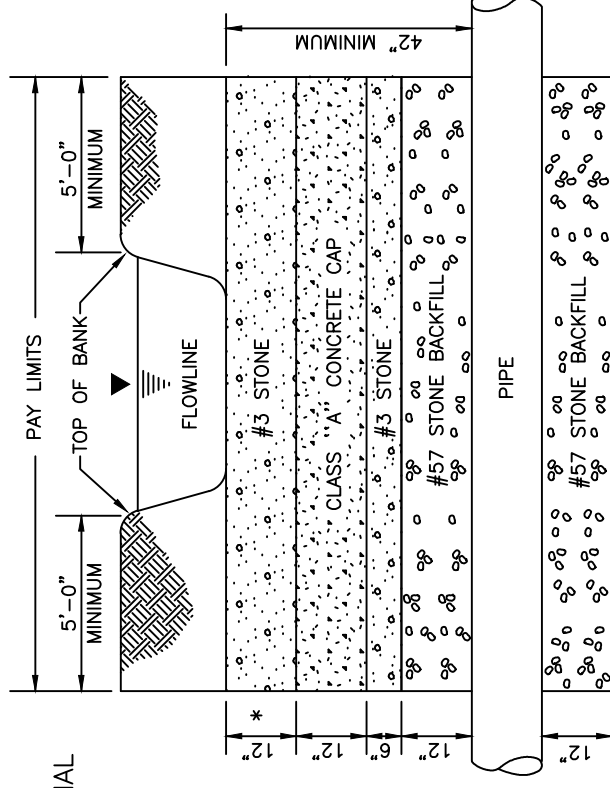
4600	Typical Master Meter Detail
5005	Valve Status Marker

*THE TOP 12" TO BE #3 STONE OR OTHER SELECT MATERIAL APPROVED BY THE KENTUCKY DIVISION OF WATER.

TYPICAL SECTION



TYPICAL PROFILE



STREAM CROSSING CONDITIONS

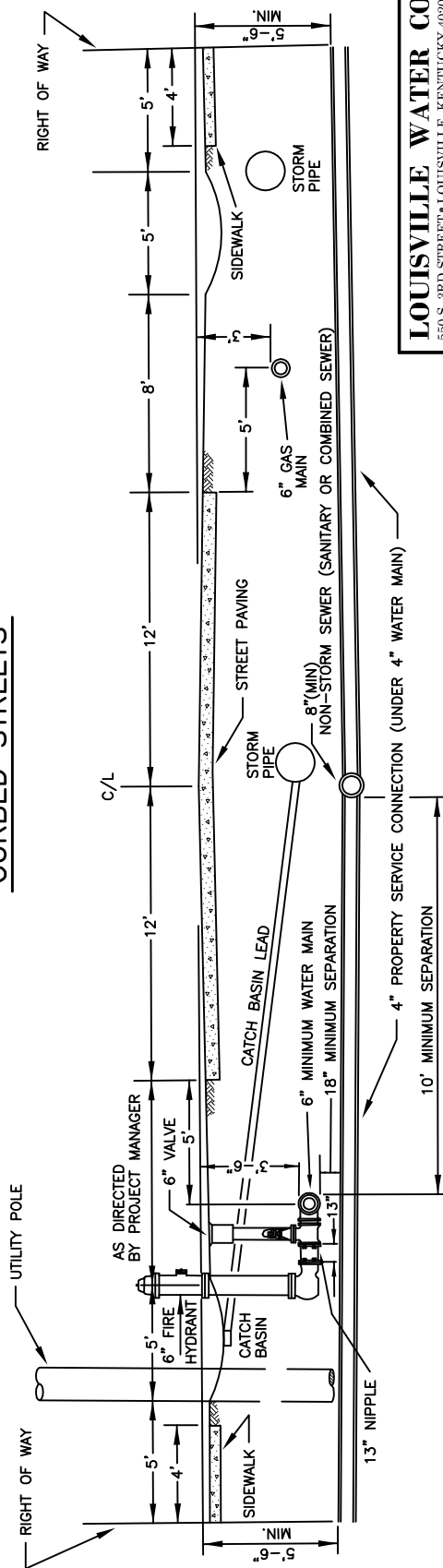
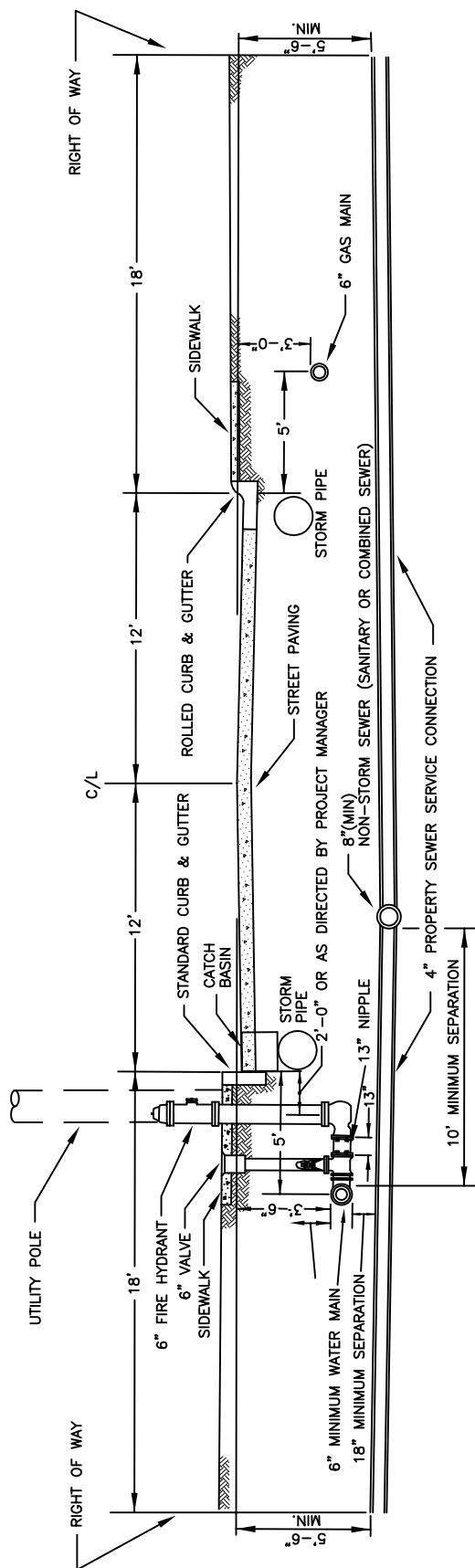
1. COMPLY WITH SECTION 1.3.5, SOIL EROSION AND SEDIMENT CONTROL.
2. THIS DETAIL APPLIES ONLY TO BLUE-LINE STREAMS, AS SHOWN ON THE PERTINENT USGS QUADRANGLE MAP.
3. BEST MANAGEMENT CONSTRUCTION PRACTICES MUST BE USED AT ALL TIMES DURING CONSTRUCTION. ADEQUATE SILT CONTROL MUST BE PLACED PRIOR TO THE START OF CONSTRUCTION AND MAINTAINED UNTIL VEGETATION IS ESTABLISHED.
4. REVEGETATE ALL DISTURBED GRASSY AREAS ON THE STREAM SLOPES. SOD STAKES MAY BE REQUIRED TO SECURE SOD ON THE STREAM BANKS.
5. MAINTAIN AT LEAST 3.5' OF BACKFILL AT THE STREAM CROSSING FROM THE TOP OF PIPE TO THE ORIGINAL STREAM BED ELEVATION.
6. OBTAIN APPROVAL FROM THE METROPOLITAN SEWER DISTRICT PRIOR TO THE START OF THE STREAM CROSSING WHEN CONSTRUCTION IS UNDER THEIR JURISDICTION.
7. THRUST BLOCKING SHALL BE CONSTRUCTED AT ALL BENDS.

LOUISVILLE WATER COMPANY
 550 S. 3RD STREET • LOUISVILLE, KENTUCKY 40202 • (502) 569-3600
 SPENCER W. BRUCE, P.E. - PRESIDENT
 TIMOTHY KRAUS, P.E. - VICE PRESIDENT / CHIEF ENGINEER

STANDARD DRAWING

CREEK CROSSING
 WITH CONCRETE CAP

DATE	MAY 2021	SCALE	NONE
DRAWING NO.	4501	SHEET	1 OF 1



LOUISVILLE WATER COMPANY
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SPENCER W. BRUCE, P.E. - PRESIDENT
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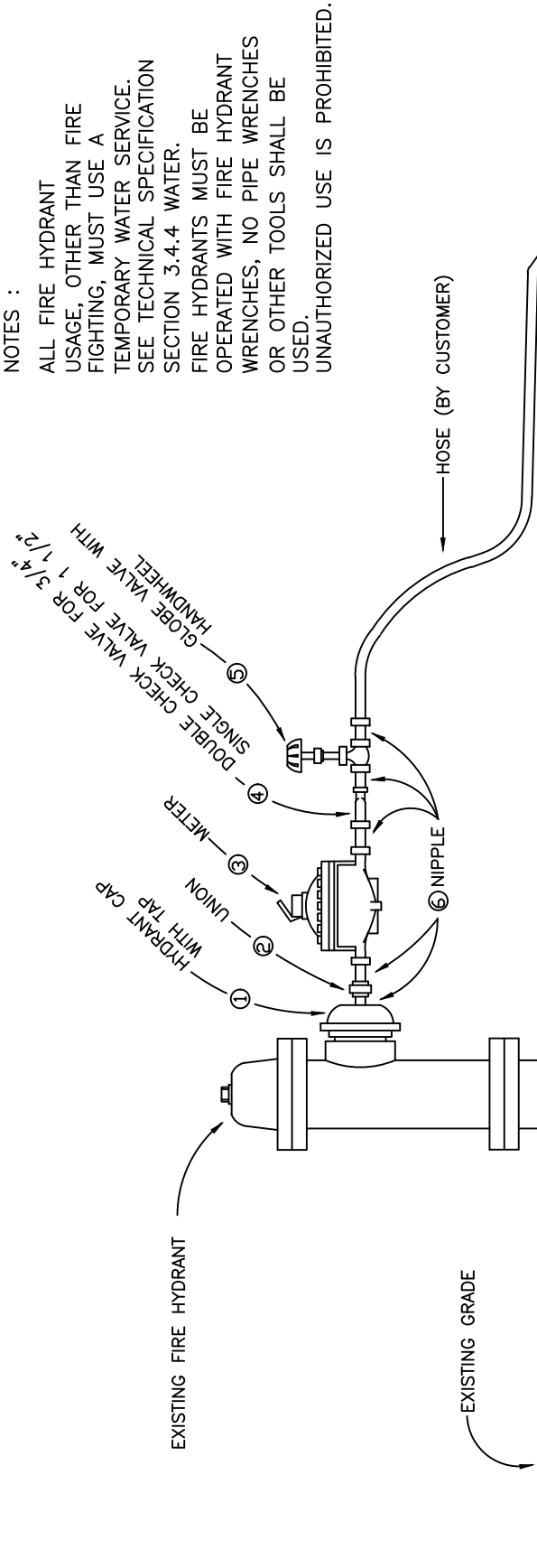
STANDARD DRAWING
TYPICAL
UTILITY LOCATION PROFILES

UTILITY LOCATIONS WITHOUT CURBED STREETS

DATE	AUGUST 2018	SCALE	NONE
DRAWING NO.	1000	SHEET	1 of 1

NOTES :

ALL FIRE HYDRANT
USAGE, OTHER THAN FIRE
FIGHTING, MUST USE A
TEMPORARY WATER SERVICE.
SEE TECHNICAL SPECIFICATION
SECTION 3.4.4 WATER.
FIRE HYDRANTS MUST BE
OPERATED WITH FIRE HYDRANT
WRENCHES, NO PIPE WRENCHES
OR OTHER TOOLS SHALL BE
USED.
UNAUTHORIZED USE IS PROHIBITED.



GASKETS MUST BE USED ON
ALL HYDRANT CAPS.

WHEN SERVICE IS USED,
THE FIRE HYDRANT IS
TO BE FULLY TURNED
ON. THE AMOUNT OF
SERVICE FLOW IS TO BE
CONTROLLED BY THE HANDWHEEL
ON THE GLOBE VALVE ⑤.

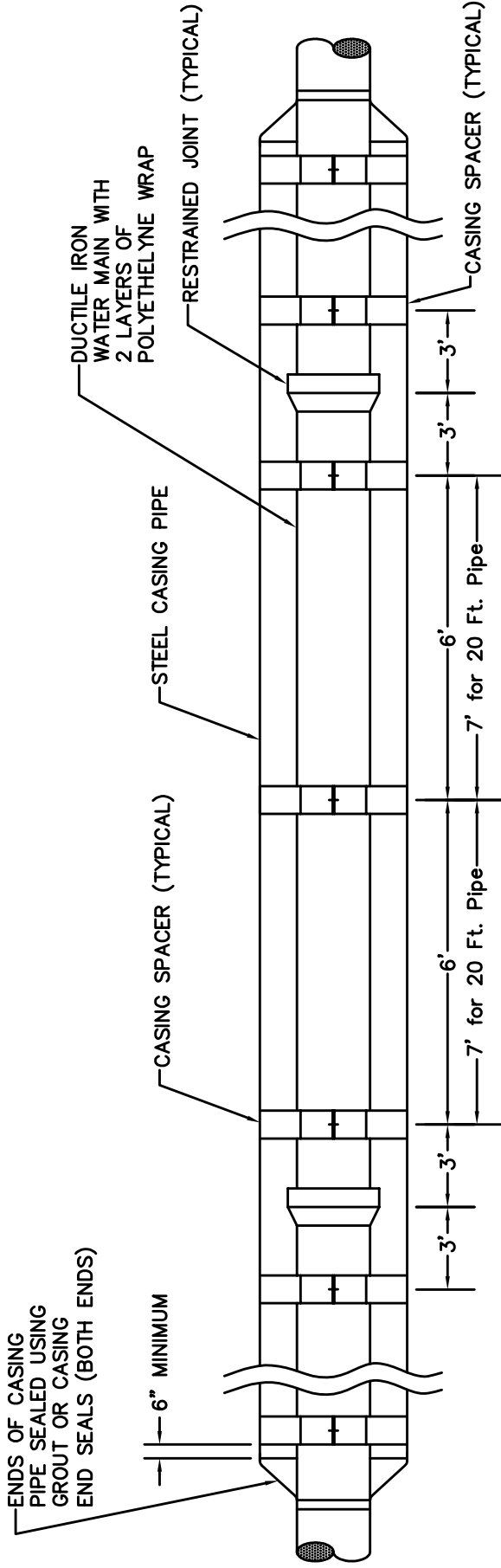
NO.	QUANTITY	FITTING	JOINT	SERVICE SIZES
①	1	Hydrant Cap w/Gasket	Female Threaded	3/4" 1-1/2"
②	1	& Tap	Female Threaded	4"x3/4" 4"x1-1/2"
③	1	Union	Female Threaded	3/4" 1-1/2"
④	1	Meter	Female Threaded	3/4" 1-1/2"
⑤	1	Check Valve	Flanged with Adapter	3/4" 1-1/2"
⑥	1	Globe Valve w/Handwheel	Female Threaded	3/4" 1-1/2"
⑦	5	Nipple	Inlet-Male Threaded Outlet-Male Threaded	3/4" 1-1/2"

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STANDARD DRAWING

TYPICAL TEMPORARY SERVICE
FROM FIRE HYDRANT
3/4" OR 1-1/2"

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3600	SHEET	1 OF 1



TYPICAL SPACER SPACING
(PER 18 FT. PIPE LENGTH)

- NOTES:
- 1) STEEL CASING TO EXTEND A MINIMUM OF FIVE (5) FEET BEYOND THE EDGE OF PAVEMENT.
 - 2) THREE (3) CASING SPACERS PER EACH PIPE LENGTH (MINIMUM). WITH ONE CASING SPACER WITHIN 3 FT. OF EACH PIPE END.
 - 3) WATER MAIN SHALL HAVE RESTRAINED JOINTS WITHIN CASING PIPE. (SEE SECT. 6.3)

CASING PIPE SIZES		
WATER MAIN PIPE SIZE (INCHES)	CASING PIPE SIZE (INCHES)	CASING THICKNESS (INCHES)
4	12	0.375
6	16	0.375
8	16	0.375
12	24	0.375
16	30	0.500
20	36	0.500

LOUISVILLE WATER COMPANY
 550 S. 3RD STREET • LOUISVILLE, KENTUCKY 40202 • (602) 568-3600
 SPENCER W. BRUCE, P.E. - PRESIDENT
 TIMOTHY KRAUS, P.E. - VICE PRESIDENT / CHIEF ENGINEER

STANDARD DRAWING
STEEL CASING PIPE
AND CASING SPACERS

DATE	AUGUST 2018	SCALE	NONE
DRAWING NO.	1500	SHEET	1 of 1

90° BEND		HORIZONTAL OFFSET																	
		<table border="1"> <thead> <tr> <th>SIZE</th><th>A</th><th>B</th><th>C</th></tr> </thead> <tbody> <tr> <td>4" 6" 8", & 12"</td><td>4'-6"</td><td>2'</td><td>2'</td></tr> <tr> <td>16"</td><td>5'-9"</td><td>2'-6"</td><td>2'-6"</td></tr> <tr> <td>20"</td><td>6'-6"</td><td>3'</td><td>3'</td></tr> </tbody> </table>		SIZE	A	B	C	4" 6" 8", & 12"	4'-6"	2'	2'	16"	5'-9"	2'-6"	2'-6"	20"	6'-6"	3'	3'
SIZE	A	B	C																
4" 6" 8", & 12"	4'-6"	2'	2'																
16"	5'-9"	2'-6"	2'-6"																
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45° BEND		VERTICAL OFFSET																	
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22-1/2° BEND		PLUG																	
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SIZE	A	B	C																
4" 6" 8", & 12"	4'-6"	2'	4'																
16"	5'-9"	2'-6"	4'																
20"	6'-6"	3'	4'-6"																

11-1/4° BEND		PLUG W/BLOWOFF																	
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4" 6" 8", & 12"	4'-6"	2'	4'																
16"	5'-9"	2'-6"	4'																
20"	6'-6"	3'	4'-6"																

NOTE:

- ALL DUCTILE AND GRAY IRON PIPE AND APPURTENANCES SHALL BE DOUBLE POLYWRAPPED.
- CARE SHALL BE TAKEN TO AVOID DAMAGING POLYWRAP. ANY DAMAGE OR TORN POLYETHYLENE WRAP MUST BE REPAIRED WITH POLYETHYLENE TAPE AND ADDITIONAL POLYETHYLENE WRAP IF NECESSARY TO PROVIDE TWO (2) LAYERS OF PROTECTION.
- CONCRETE THRUST BLOCKING MUST BE ALLOWED TO CURE OR PROTECTED AS APPROVED BY THE PROJECT MANAGER, BEFORE BACKFILLING.
- ALL CONCRETE SHALL BE 3,500psi FROM A COMMERCIAL PLANT; OR SHALL BE AN ON-SITE MIXTURE PREVIOUSLY APPROVED BY THE PROJECT MANAGER.
- ALL FITTINGS INVOLVED WITH PVC PIPE SHALL HAVE A CONCRETE SUPPORT BLOCK, IN ADDITION TO THE PERTINENT THRUST BLOCK.

45° VERTICAL BEND		TEE OR TAPPING SLEEVE																	
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- RODS USED FOR THRUST RESTRAINT ARE TO BE USED ONLY AS TEMPORARY THRUST RESTRAINT. THRUST ANCHORS MUST BE POURED FOR ALL FITTINGS AS DETAILED IN THIS DRAWING. MECHANICAL RESTRAINT MAY BE USED IN PLACE OF RODS AT THE DISCRETION OF THE COMPANY'S PROJECT MANAGER.
- REINFORCING STEEL ANCHORS USED IN THRUST BLOCKING SHALL BE GRADE 60 AND EPOXY COATED.
- CONCRETE FOR THRUST BLOCKING MUST EXTEND TO AND BE PLACED AGAINST UNDISTURBED EARTH UNLESS DIRECTED OTHERWISE BY THE COMPANY'S PROJECT MANAGER OR INSPECTOR.

HORIZONTAL THRUST BLOCKING FOR PIG REMOVAL		REDUCER																									
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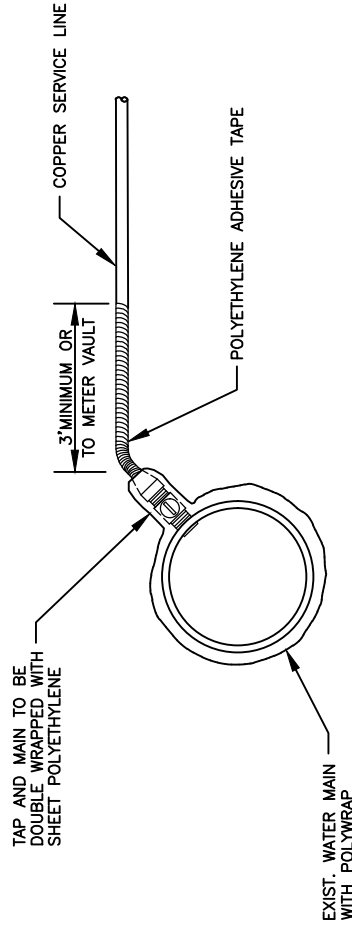
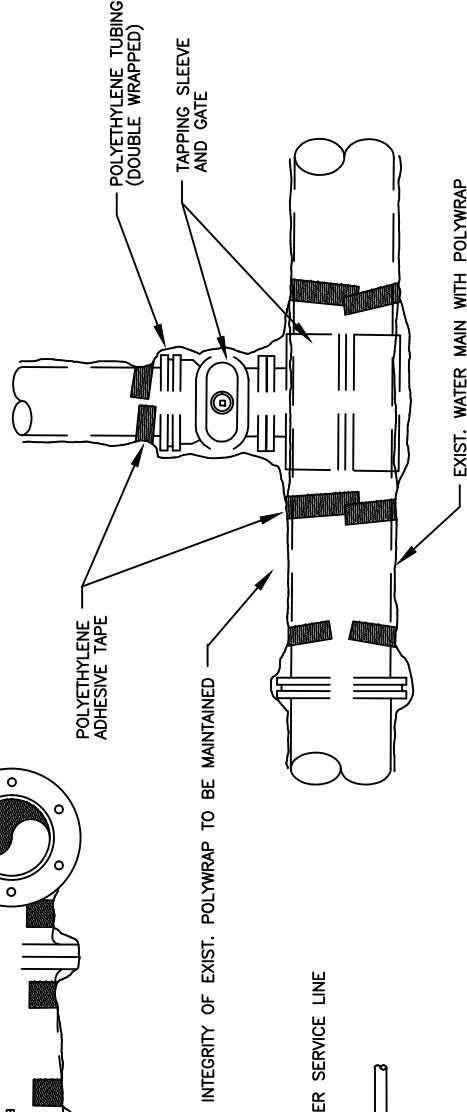
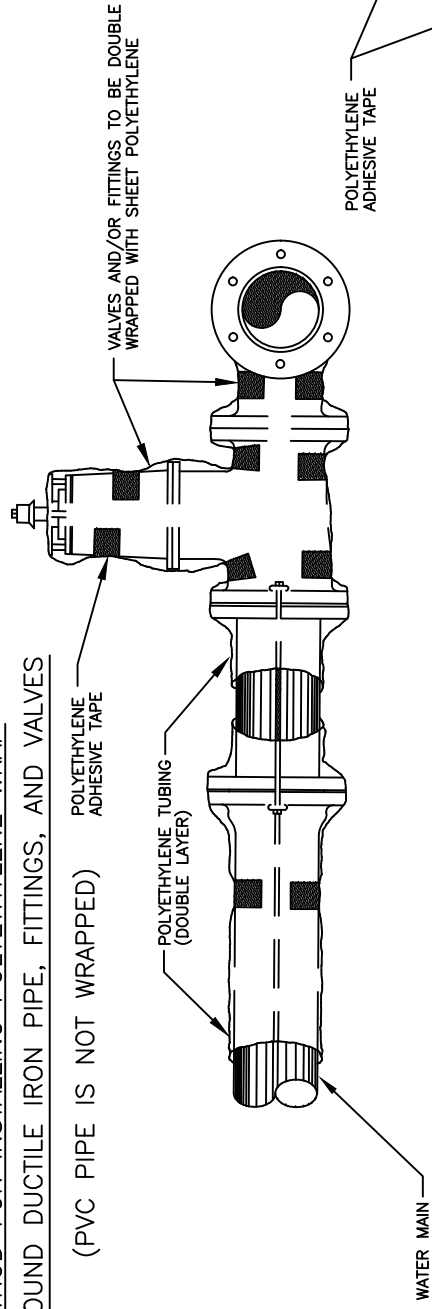
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TIMOTHY KRAUS, P.E. - VICE PRESIDENT / CHIEF ENGINEER
SPENCER W. BRUCE, P.E. - PRESIDENT

STANDARD DRAWING

TYPICAL CAST-IN-PLACE
CONCRETE THRUST BLOCKING

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	1400	SHEET	1 OF 1

METHOD FOR INSTALLING POLYETHYLENE WRAP AROUND DUCTILE IRON PIPE, FITTINGS, AND VALVES



METHOD FOR RESTORING POLYETHELENE WRAP WHEN TAPPING WATER MAINS

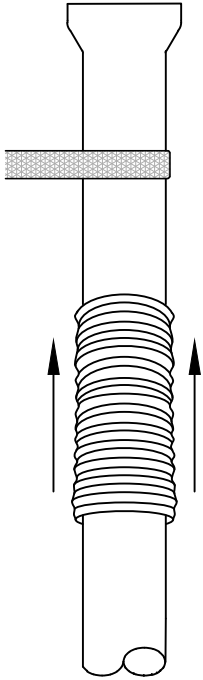
NOTES:

- 1) ANY DAMAGE OR TORN POLYETHYLENE WRAP MUST BE REPAIRED WITH POLYETHYLENE ADHESIVE TAPE AND ADDITIONAL POLYETHYLENE WRAP IF NECESSARY TO PROVIDE TWO (2) LAYERS OF PROTECTION.
- 2) PIPE SHALL NOT BE WRAPPED FOR MORE THAN FIVE (5) DAYS IN ADVANCE OF PLACEMENT INTO THE TRENCH.
- 3) ALL DUCTILE IRON TEES, VALVES AND FITTINGS ON PVC PIPE SHALL BE DOUBLE WRAPPED WITH POLYETHYLENE AND ENDS FASTENED SECURELY ON PVC PIPE.

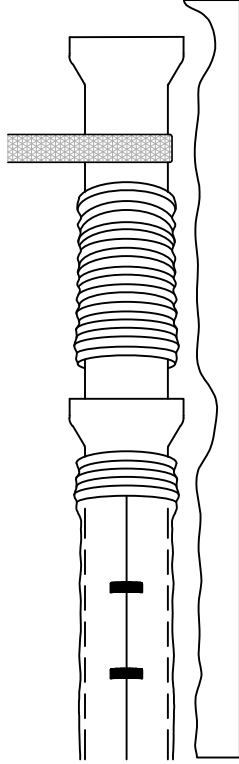
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STANDARD DRAWING METHODS FOR INSTALLING AND RESTORING POLYETHYLENE WRAP

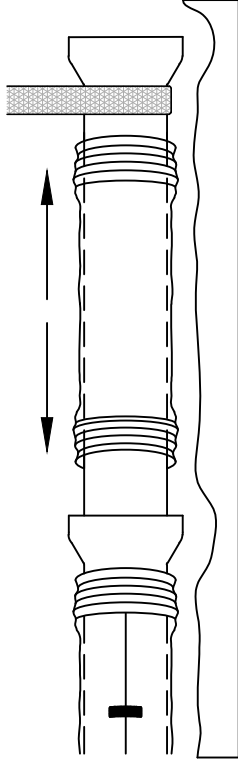
DATE	MAY 2021	SCALE	NONE
DRAWING NO.	1200-A	SHEET	1 OF 3



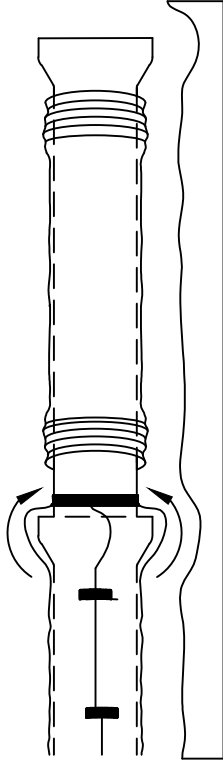
STEP 1.
CUT A SECTION OF POLYETHYLENE TUBE APPROXIMATELY TWO FEET LONGER THAN THE PIPE SECTION. REMOVE ALL LUMPS OF CLAY, MUD, CINDERS, OR OTHER MATERIAL THAT MIGHT HAVE ACCUMULATED ON THE PIPE SURFACE DURING STORAGE. SLIP THE POLYETHYLENE TUBE AROUND THE PIPE, STARTING AT THE SPIGOT END. BUNCH THE TUBE ACCORDIAN-FASHION ON THE END OF THE PIPE. PULL BACK THE OVERHANGING END OF THE TUBE UNTIL IT CLEARS THE PIPE END.



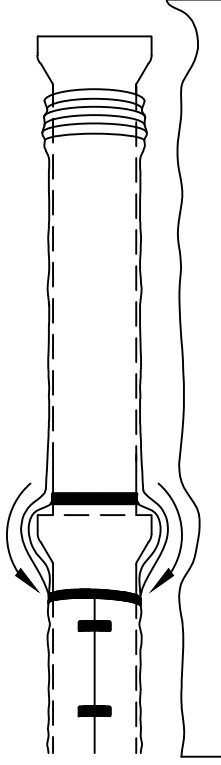
STEP 2.
DIG A SHALLOW BELL HOLE IN THE TRENCH BOTTOM AT THE JOINT LOCATION TO FACILITATE INSTALLATION OF THE POLYETHYLENE TUBE. LOWER THE PIPE INTO THE TRENCH AND MAKE UP THE PIPE JOINT WITH THE PRECEDING SECTION OF PIPE.



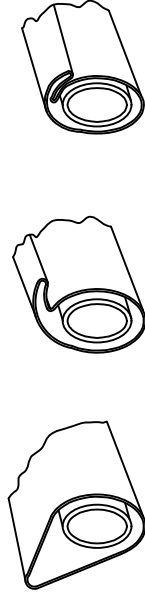
STEP 3.
MOVE THE CABLE TO THE BELL END OF THE PIPE AND LIFT THE PIPE SLIGHTLY TO PROVIDE ENOUGH CLEARANCE TO EASILY SLIDE THE TUBE. SPREAD THE TUBE OVER THE ENTIRE BARREL OF THE PIPE. NOTE: MAKE SURE THAT NO DIRT OR THE BEDDING MATERIAL BECOMES TRAPPED BETWEEN THE WRAP AND THE PIPE.



STEP 4.
MAKE THE OVERLAP OF THE POLYETHYLENE TUBE BY PULLING BACK THE BUNCHED POLYETHYLENE FROM THE PRECEDING LENGTH OF PIPE AND SECURING IT IN PLACE. NOTE: THE POLYETHYLENE MAY BE SECURED IN PLACE BY USING POLYTAPE.



STEP 5.
OVERLAP THE SECURED TUBE END WITH THE TUBE END OF THE NEW PIPE SECTION. SECURE THE NEW TUBE END IN PLACE WITH POLYTAPE.



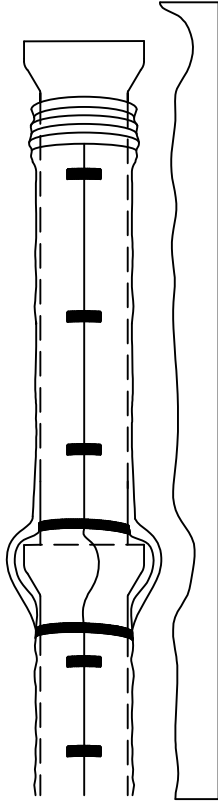
STEP 6.
TAKE UP THE SLACK IN THE TUBE ALONG THE BARREL OF THE PIPE TO MAKE A SNUG, BUT NOT TIGHT, FIT. FOLD EXCESS POLYETHYLENE BACK OVER THE TOP OF THE PIPE AND SECURE WITH POLYTAPE.

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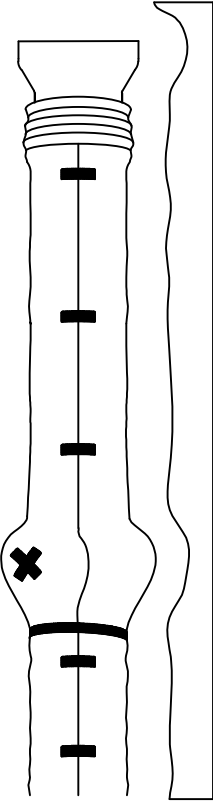
STANDARD DRAWING

METHODS FOR
INSTALLING AND RESTORING
POLYETHYLENE WRAP

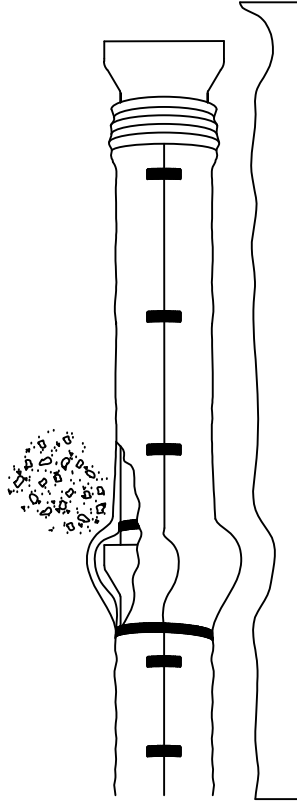
DATE	MAY 2021	SCALE	NONE
DRAWING NO.	1200-B	SHEET	2 OF 3



STEP 7.
SECURE THE FOLD AT SEVERAL LOCATIONS ALONG THE PIPE BARREL (APPROXIMATELY EVERY THREE FEET) WITH POLYTAPE.



STEP 8.
REPAIR ALL SMALL RIPS, TEARS, OR OTHER TUBE DAMAGE WITH ADHESIVE TAPE. IF THE POLYETHYLENE IS BADLY DAMAGED, REPAIR THE DAMAGED AREA WITH A SHEET OF POLYETHYLENE AND SEAL THE EDGES OF THE REPAIR WITH POLYTAPE.



STEP 9.
CAREFULLY BACKFILL THE PIPE ACCORDING TO LOUISVILLE WATER COMPANY'S TECHNICAL SPECIFICATIONS AND STANDARD DRAWINGS FOR 4-20" PIPELINE CONSTRUCTION, SECTION 7. BACKFILLING PROCEDURE AND TAMPING, TO PREVENT DAMAGE DURING BACKFILLING, ALLOW ADEQUATE SLACK IN THE TUBE AT THE JOINT. BACKFILL SHOULD BE FREE OF CINDERS, ROCKS, BOULDERS, NAILS, STICKS, OR OTHER MATERIALS THAT MIGHT DAMAGE THE POLYETHYLENE. AVOID DAMAGING THE POLYETHYLENE WHEN USING TAMPING DEVICES.

TABLE FOR MINIMUM FLATTENED
POLYETHYLENE TUBE WIDTHS

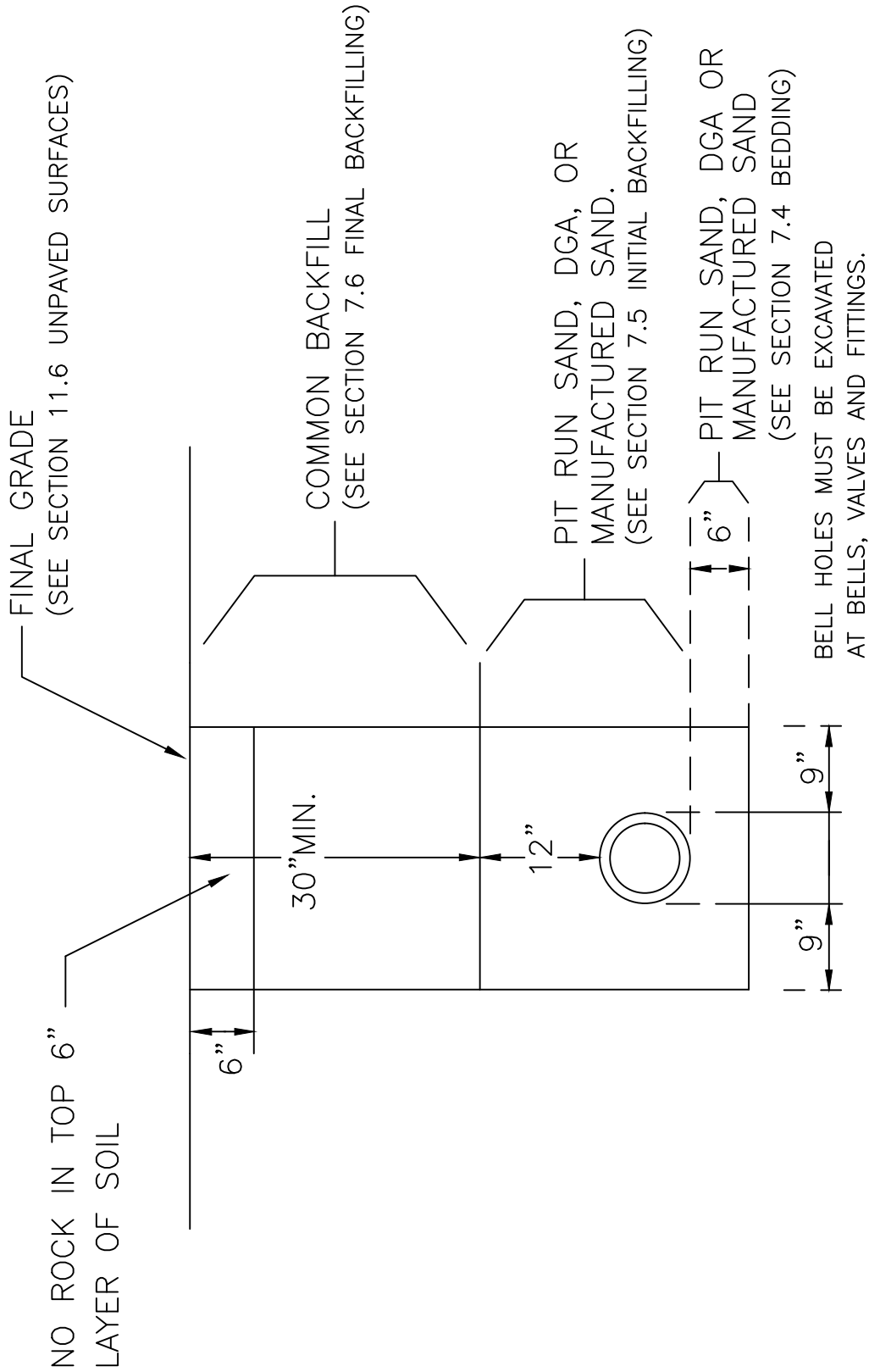
NOMINAL PIPE SIZE (INCHES)	RECOMMENDED POLYETHYLENE FLAT TUBE WIDTH (INCHES)
4	24
6	24
8	24
12	30
16	36
20	48

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STANDARD DRAWING

METHODS FOR
INSTALLING AND RESTORING
POLYETHYLENE WRAP

DATE	MAY 2021	SCALE	NONE
DRAWING NO.	1200-C	SHEET	3 OF 3

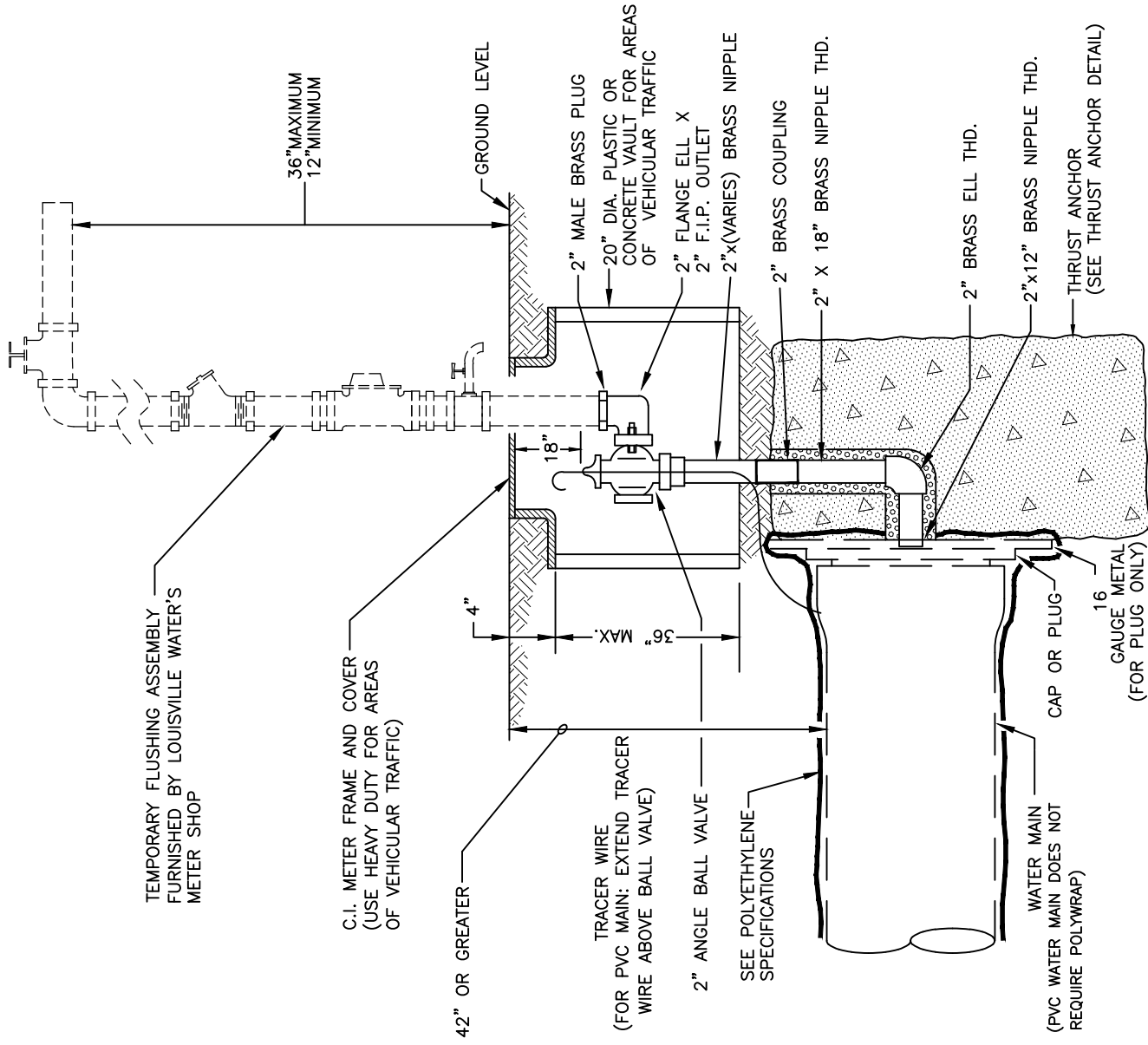


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STANDARD DRAWING

 COMMON BACKFILL AND
 LAWN RESTORATION

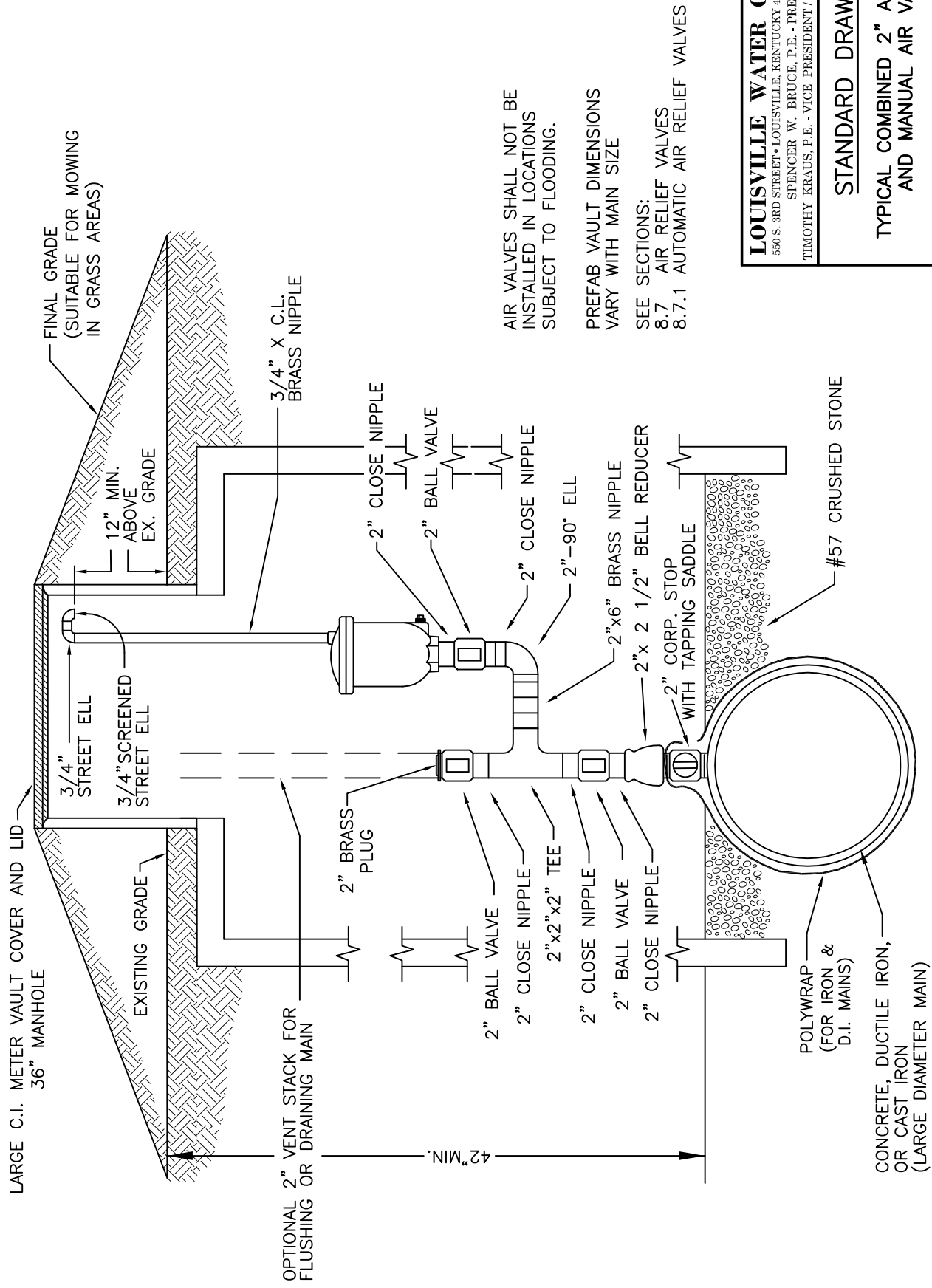
DATE	MAY 2021	SCALE	NONE
DRAWING NO.	4300	SHEET	1 OF 1



NOTES:

1. CAUTION: DO NOT CONNECT PRESSURE TEST EQUIPMENT TO TEMPORARY FLUSHING ASSEMBLY.
2. 1-1/2" TURBINE METER AND 2" DUAL CHECK VALVE ARE TO BE INSTALLED AFTER PIGGING OPERATIONS. A 2" HOSE IS TO BE USED DURING ALL FLUSHING OPERATIONS.
3. 8" AND LARGER WATER MAINS MAY REQUIRE LARGER THAN A 2" FLUSHING OUTLET TO MEET THE KDOV 2.5 F.P.S. FLUSHING REGULATION.
4. PERMANENT PLUGS SHALL NOT BE INSTALLED ON PVC MAINS; ONLY MECHANICAL JOINT CAPS WILL BE ALLOWED.

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STANDARD DRAWING TYPICAL 2" BLOW-OFF AND FLUSHING CONNECTION			
DATE	MAY 2021	SCALE	NONE
DRAWING NO.	1601	SHEET	1 OF 1



AIR VALVES SHALL NOT BE
INSTALLED IN LOCATIONS
SUBJECT TO FLOODING.

PREFAB VAULT DIMENSIONS
VARY WITH MAIN SIZE

SEE SECTIONS:

8.7 AIR RELIEF VALVES

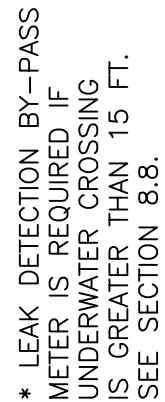
8.7.1 AUTOMATIC AIR RELIEF VALVES

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STANDARD DRAWING

TYPICAL COMBINED 2" AUTOMATIC
AND MANUAL AIR VALVE

DATE	AUGUST 2018	SCALE	NONE
DRAWING NO.	1603	SHEET	1 OF 1



LEAK DETECTION BY-PASS METER FOR UNDERWATER CROSSINGS

DATE	FEBRUARY 2020	SCALE	NONE
DRAWING NO.	1608	SHEET	1 OF 1

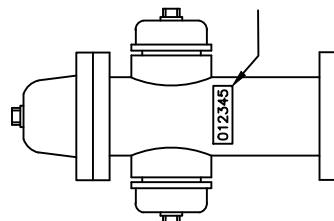
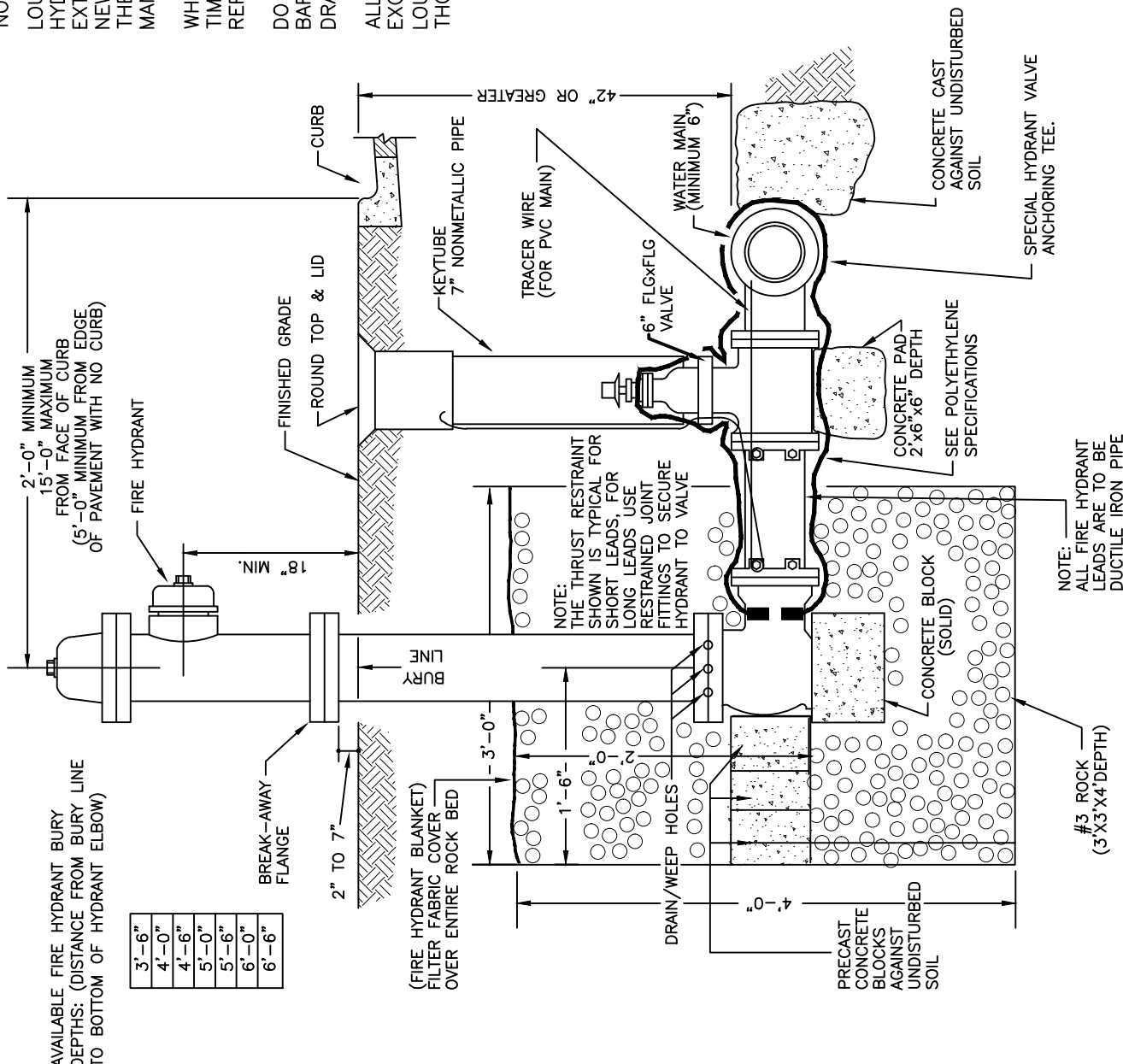
NOTE:

LOUISVILLE WATER COMPANY SUPPLIES HYDRANTS OF VARIOUS BURY DEPTHS. EXTENSION KITS SHALL NOT BE USED FOR NEW INSTALLATIONS. UNLESS APPROVED BY THE LOUISVILLE WATER COMPANY PROJECT MANAGER.

WHEN TURNING FIRE HYDRANT OFF, ALLOW TIME FOR FIRE HYDRANT TO DRAIN BEFORE REPLACING NOZZLE CAPS.

DO NOT INSTALL POLYWRAP ON HYDRANT BARREL. DO NOT COVER HYDRANT DRAIN/WEEP HOLES.

ALL HYDRANTS SHALL BE YELLOW WITH THE EXCEPTION OF WHEN INSTALLED WITHIN THE LOUISVILLE FIRE DEPARTMENT'S DISTRICT. THOSE HYDRANTS SHALL BE ORANGE.

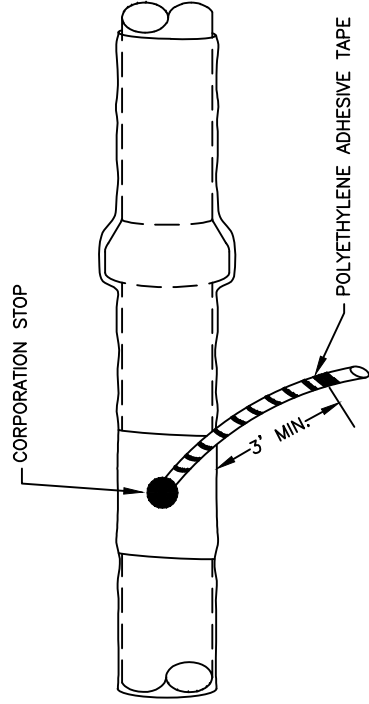
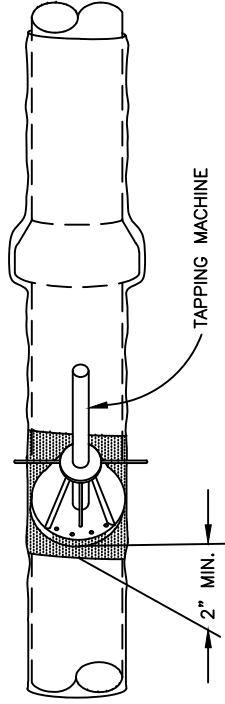
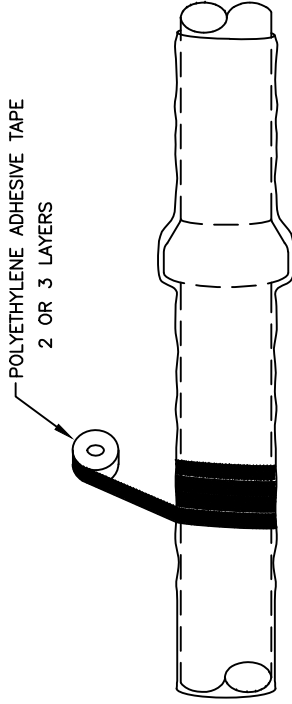


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STANDARD DRAWING

TYPICAL
 FIRE HYDRANT INSTALLATION

DATE	MAY 2021	SCALE	NONE
DRAWING NO.	2000	SHEET	1 OF 1



OPENINGS FOR BRANCHES, SERVICE TAPS, BLOW OFFS, AIR VALVES, AND SIMILAR APPURTENANCES SHALL BE MADE BY :

- 1.) WRAPPING 2 OR 3 LAYERS OF POLYETHYLENE ADHESIVE TAPE COMPLETELY AROUND THE PIPE TO COVER THE AREA WHERE THE TAPPING MACHINE AND CHAIN WILL BE MOUNTED, EXTENDING A MINIMUM OF 2" BEYOND THE MOUNTING SURFACE.
- 2.) MOUNT THE TAPPING MACHINE ON THE PIPE AREA COVERED BY THE TAPE. MAKE THE TAP AND INSTALL THE CORPORATION STOP DIRECTLY THROUGH THE TAPE AND POLYETHYLENE.
- 3.) INSPECT THE ENTIRE CIRCUMFERENTIAL AREA FOR DAMAGE AND MAKE ANY NECESSARY REPAIRS WITH TAPE.
- 4.) ON HOUSE SERVICES, TO MINIMIZE THE POSSIBILITY OF DISSIMILAR METAL CORROSION AT SERVICE CONNECTIONS, WRAP THE CORPORATION STOP AND A MINIMUM CLEAR DISTANCE OF THREE (3) FEET OF THE COPPER SERVICE WITH POLYETHYLENE ADHESIVE TAPE.
- 5.) SEE SECTION 10.3.1 & 10.4.1

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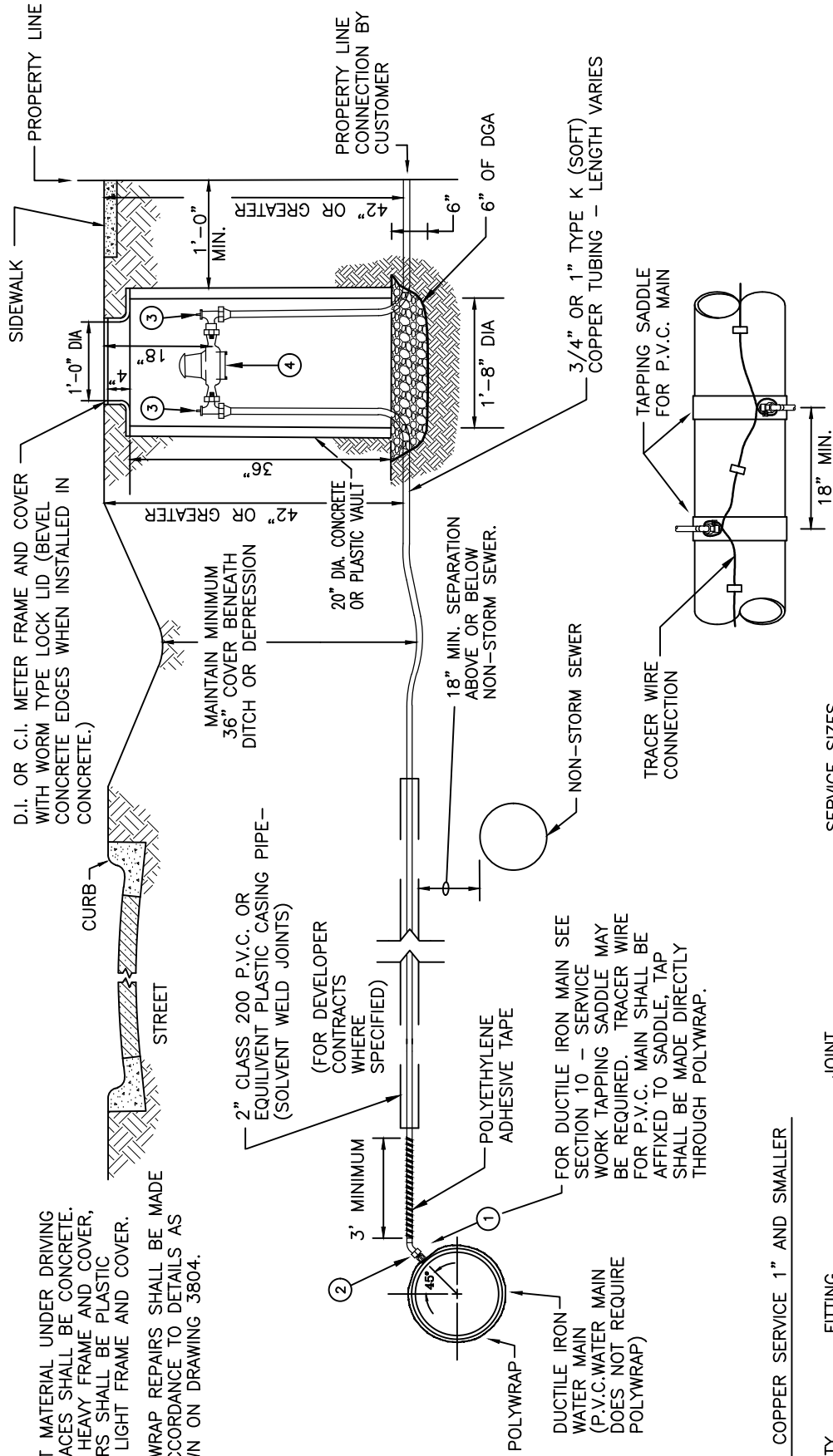
STANDARD DRAWING

METHOD FOR
 TAPPING POLYETHYLENE
 ENCASED PIPE

DATE	MAY 2021	SCALE	NONE
DRAWING NO.	3804	SHEET	1 OF 1

NOTE:

- 1) VAULT MATERIAL UNDER DRIVING SURFACES SHALL BE CONCRETE. WITH HEAVY FRAME AND COVER, OTHERS SHALL BE PLASTIC WITH LIGHT FRAME AND COVER.
- 2) POLYWRAP REPAIRS SHALL BE MADE IN ACCORDANCE TO DETAILS AS SHOWN ON DRAWING 3804.



TYPICAL COPPER SERVICE 1" AND SMALLER

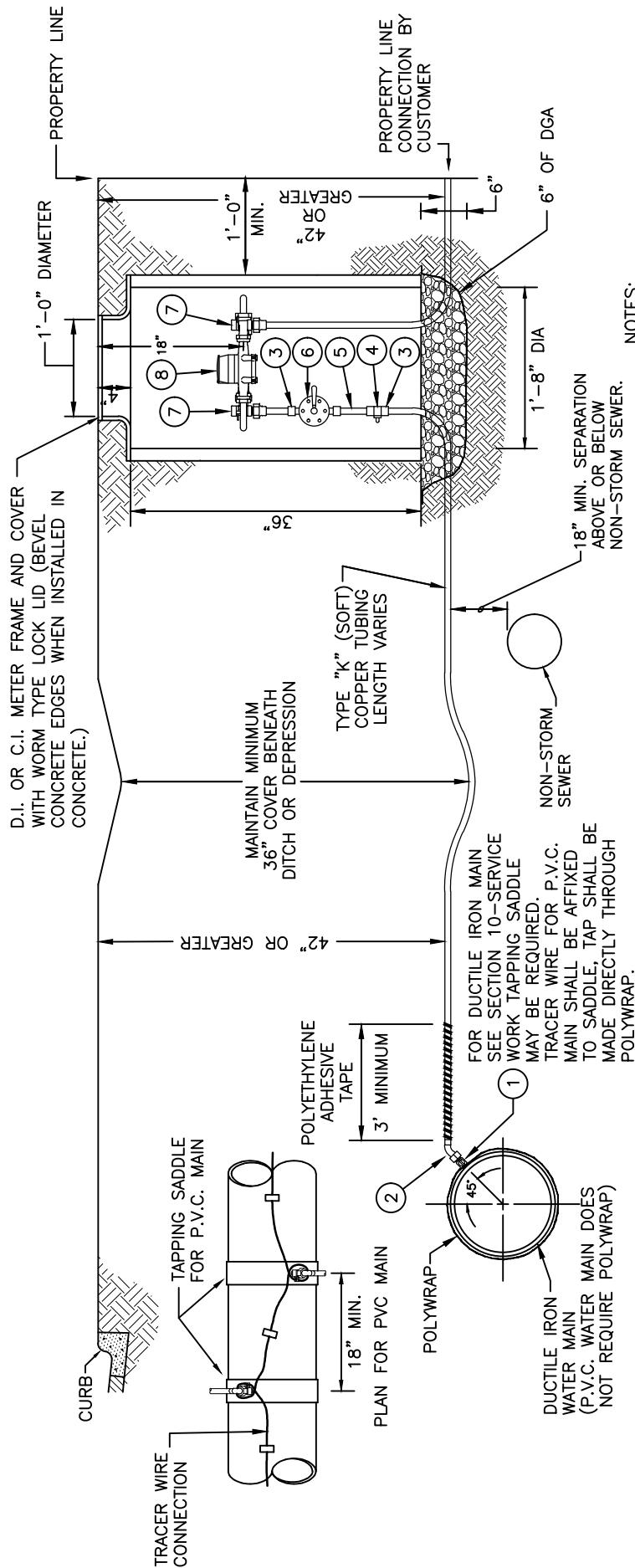
NO.	QTY	FITTING	JOINT	SERVICE SIZES
①	1	CORPORATION STOP	INLET-MALE THREAD (TAPERED) OUTLET-MALE THREAD	3/4" 1" 3/4" 1"
②	1	ADAPTER BEND (45° OR 90°)	INLET-FEMALE THREAD OUTLET-FEMALE COMPRESSION	3/4" 1" 3/4" 1"
③	2	ANGLE METER STOP	FEMALE COMPRESSION FEMALE THREAD	3/4" 1" 3/4" 1"
④	1	METER	MALE THREAD	3/4" 1"

PLAN FOR
PVC MAIN

LOUISVILLE WATER COMPANY
550 S. 3RD STREET • LOUISVILLE, KENTUCKY 40202 • (502) 569-3600
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TIMOTHY KRAUS, P.E. - VICE PRESIDENT / CHIEF ENGINEER

STANDARD DRAWING
TYPICAL COPPER SERVICE
1" AND SMALLER

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3002	SHEET	1 OF 1

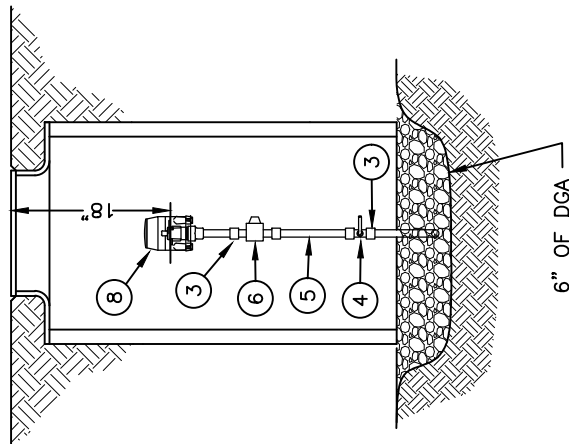


NOTES:

- 1) VAULT MATERIAL UNDER DRIVING SURFACES SHALL BE CONCRETE WITH HEAVY FRAME AND COVER, OTHERS SHALL BE PLASTIC WITH LIGHT FRAME AND COVER.
- 2) POLYWRAP REPAIRS SHALL BE MADE IN ACCORDANCE TO DETAILS AS SHOWN ON DRAWING 3804.

TYPICAL 1" COPPER SERVICE WITH PRESSURE REDUCING VALVE

NO.	QTY	FITTING	JOINT	SIZE
1	1	CORPORATION STOP	INLET-MALE THREAD (TAPERED)	1"
2	1	ADAPTER BEND (45° OR 90°)	OUTLET-MALE THREAD	1"
3	2	ADAPTER	INLET-FEMALE THREAD	1"
4	1	BALL VALVE W/HANDLE	OUTLET-FEMALE COMPRESSION	1"
5	1	BRASS NIPPLE	FEMALE COMPRESSION	1"
6	1	PRESSURE REDUCING VALVE	MALE THREAD	1"
7	2	ANGLE METER STOP	FEMALE THREAD	1"
8	1	METER	FEMALE COMPRESSION	1"
			MALE THREAD	1"

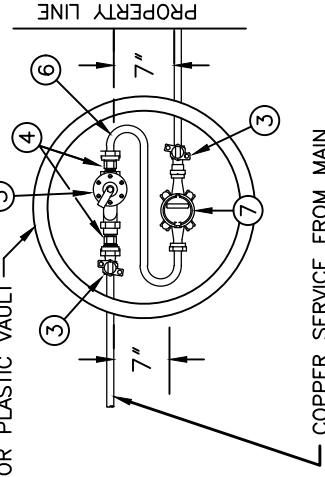
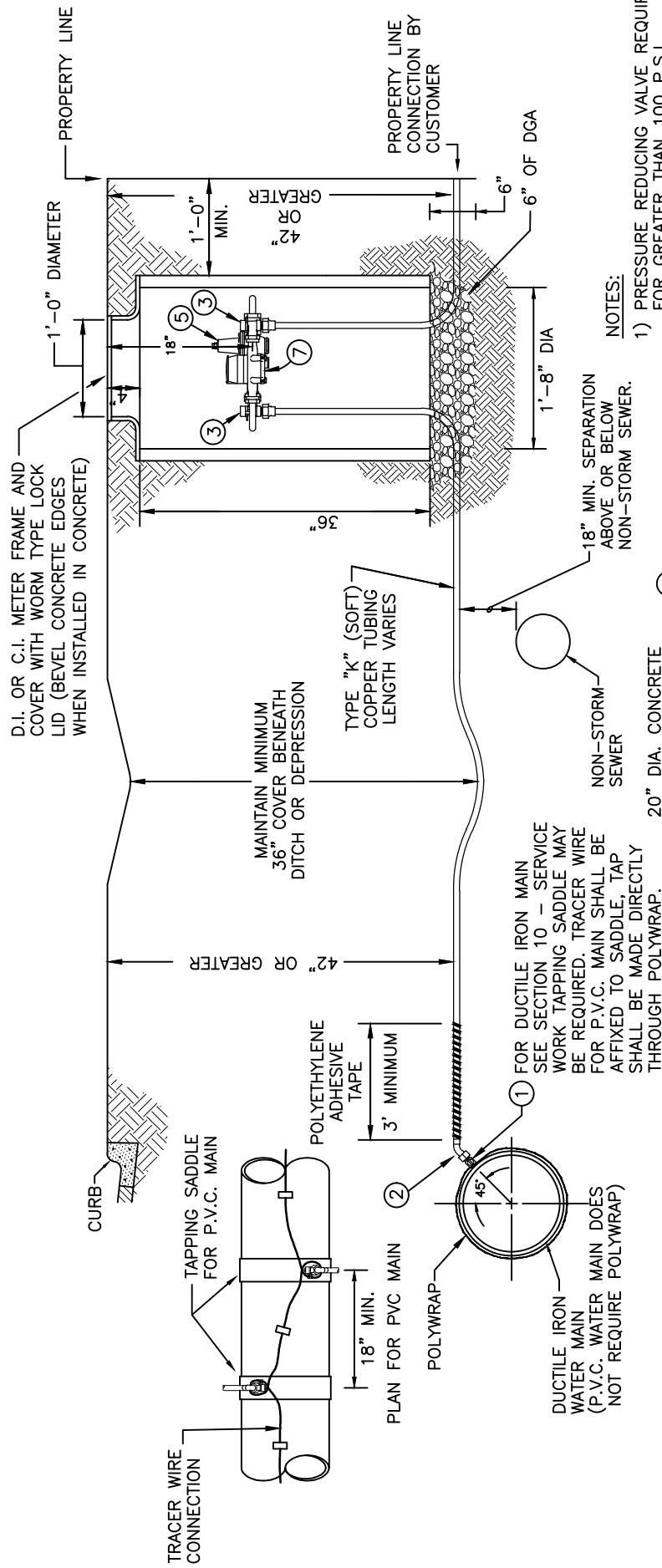


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STANDARD DRAWING

TYPICAL 1" COPPER SERVICE
WITH PRESSURE REDUCING VALVE

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3003	SHEET	1 OF 1



TYPICAL 3/4" COPPER SERVICE WITH PRESSURE REDUCING VALVE

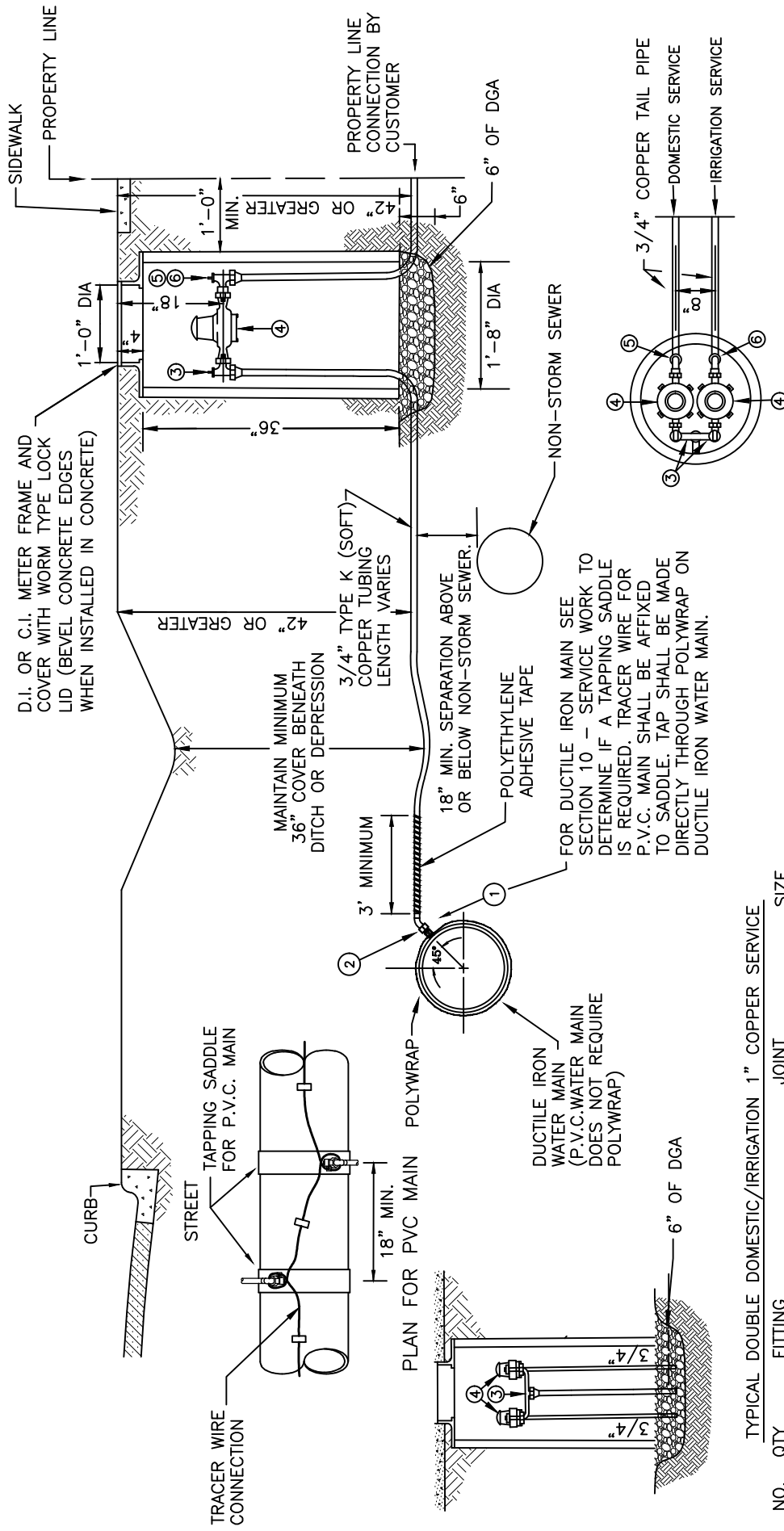
NO.	QTY	FITTING	JOINT	SIZE
①	1	CORPORATION STOP	INLET—MALE THREAD (TAPERED) OUTLET—MALE THREAD	3/4" 3/4"
②	1	ADAPTER BEND (45° OR 90°)	INLET—FEMALE THREAD OUTLET—FEMALE COMPRESSION	3/4" 3/4"
③	2	ANGLE METER STOP	FEMALE COMPRESSION FEMALE THREAD	3/4" 3/4"
④	2	ADAPTER FOR PRESSURE REGULATOR	MALE THREAD	3/4"
⑤	1	PRESSURE REGULATOR	FEMALE THREAD	3/4"
⑥	1	S—TUBE	FEMALE THREAD	3/4"
⑦	1	METER	MALE THREAD	5/8" x 3/4" (or 3/4")

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STANDARD DRAWING

TYPICAL 3/4" COPPER SERVICE
WITH PRESSURE REDUCING VALVE

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3004	SHEET	1 OF 1



NOTE:

1) VAULT MATERIAL UNDER DRIVING SURFACES SHALL BE CONCRETE WITH HEAVY FRAME AND COVER, OTHERS SHALL BE PLASTIC WITH LIGHT FRAME AND COVER.

2) POLYWRAP REPAIRS SHALL BE MADE IN ACCORDANCE TO DETAILS AS SHOWN ON DRAWING 3804.

TYPICAL DOUBLE DOMESTIC/IRRIGATION 1" COPPER SERVICE

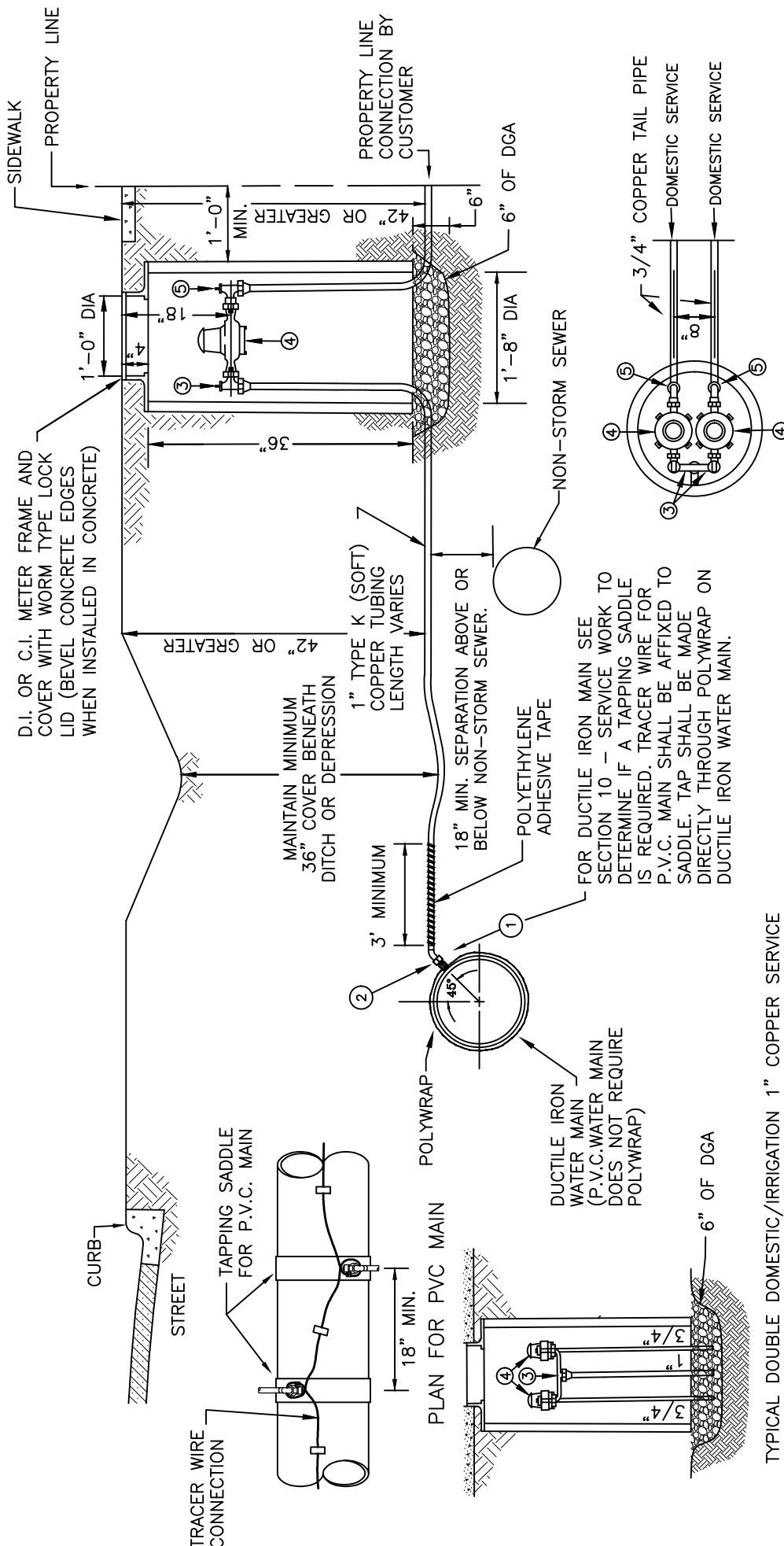
NO.	QTY	FITTING	JOINT	SIZE
①	1	Corporation Stop	Inlet-Male Thread (Tapered) Outlet-Male Thread	3/4" 3/4"
②	1	Adapter Bend (45° OR 90°)	Inlet-Female Thread Outlet-Female Compression	3/4" 3/4"
③	1	Branch Piece, with 2 Angle Meter Stops	Inlet-Female Compression Outlet-Female Compression	3/4" x 3/4" 3/4"
④	2	Meter	Male Thread	3/4"
⑤	1	Angle Meter Stop (Domestic Service Only)	Female Thread Female Compression	3/4" 3/4"
⑥	1	Angle Check Valve (Irrigation Service Only)	Female Thread Female Compression	3/4" 3/4"

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STANDARD DRAWING

TYPICAL 3/4" IRRIGATION
 RETRO FIT
 COPPER SERVICE

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3403	SHEET	1 OF 1



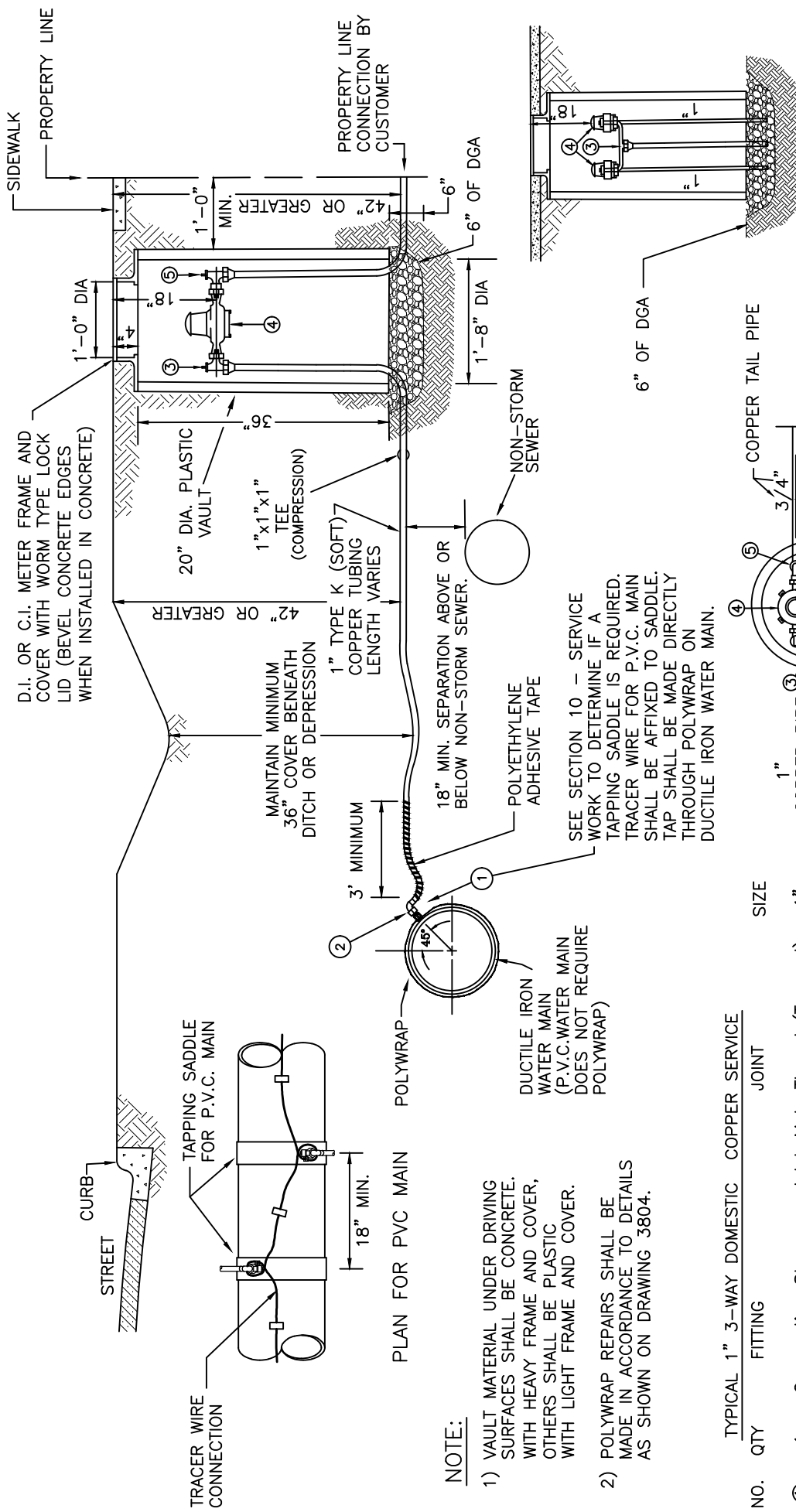
TYPICAL DOUBLE DOMESTIC/IRRIGATION 1" COPPER SERVICE

NO.	QTY	FITTING	JOINT	SIZE
①	1	Corporation Stop	Inlet-Male Thread (Tapered) Outlet-Male Thread	1" 1"
②	1	Adapter Bend (45° OR 90°)	Inlet-Female Thread Outlet-Female Compression	1" 1"
③	1	Branch Piece, with 2 Angle Meter Stops	Inlet-Female Compression Outlet-Female Thread	1" x 3/4" 3/4"
④	2	Meter	Male Thread	3/4"
⑤	2	Angle Meter Stop	Female Thread Female Compression	3/4" 3/4"

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STANDARD DRAWING
 TYPICAL 1" TANDEM
 2-WAY DOMESTIC
 COPPER SERVICE

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3404	SHEET	1 OF 1



TYPICAL 1" 3-WAY DOMESTIC COPPER SERVICE

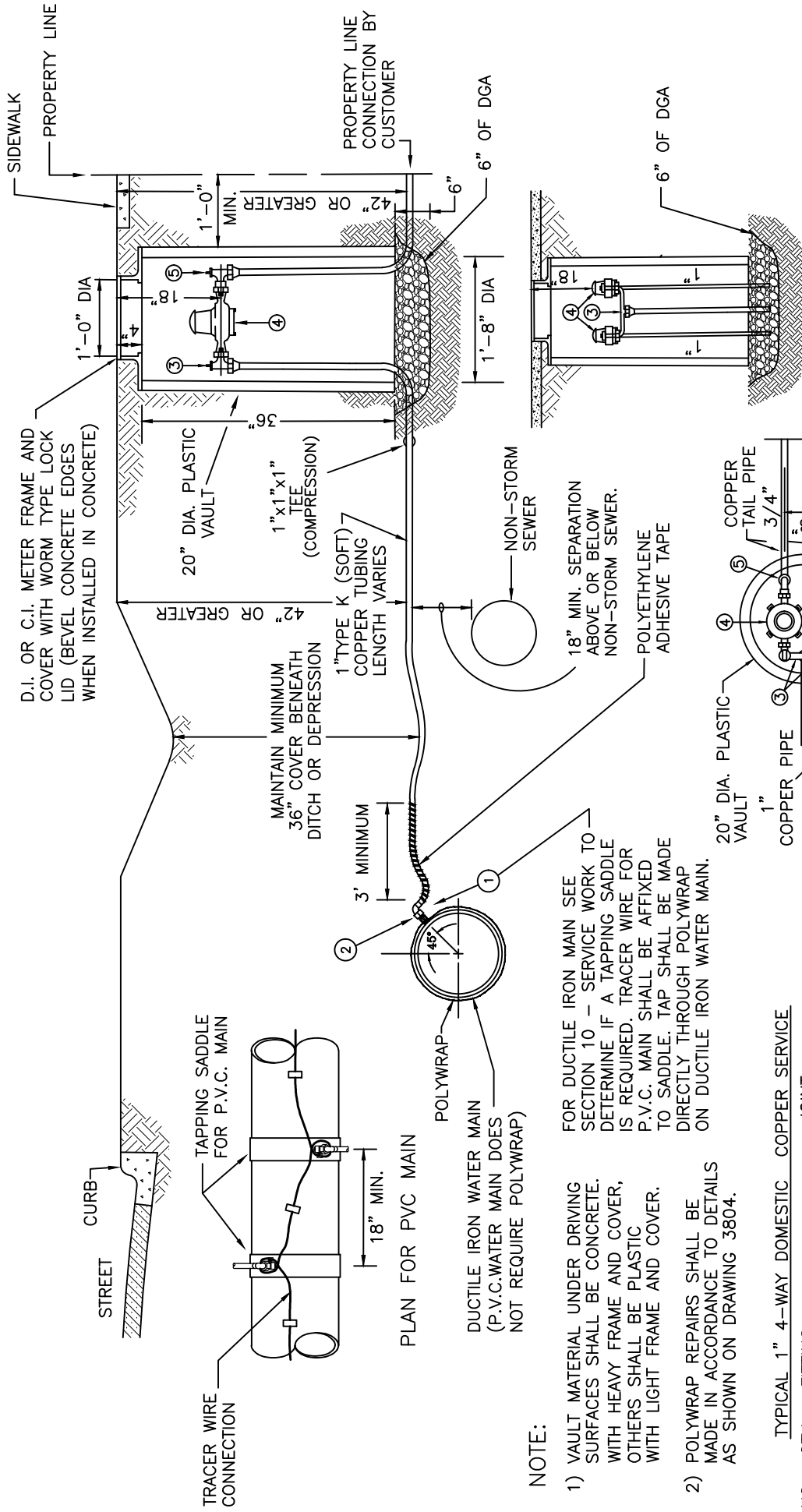
NO.	QTY	FITTING	JOINT	SIZE
①	1	Corporation Stop	Inlet-Male Thread (Tapered) Outlet-Male Thread	1" 1"
②	1	Adapter Bend (45° OR 90°)	Inlet-Female Thread Outlet-Female Compression	1" 1"
③	1	Branch Piece, with 2 Angle Meter Stops	Inlet-Female Compression Outlet-Female Thread	1"x3/4" 3/4"
④	3	Meter	Male Thread	3/4"
⑤	3	Angle Meter Stop	Female Thread	3/4"
⑥	1	Angle Meter Stop	Female Compression Female Thread Female Compression	3/4" 1"

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STANDARD DRAWING

TYPICAL 1" 3-WAY
 DOMESTIC COPPER SERVICE

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3420	SHEET	1 OF 1



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STANDARD DRAWING

TYPICAL 1" 4-WAY
 DOMESTIC COPPER SERVICE

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3430	SHEET	1 OF 1

TYPICAL 1" 4-WAY DOMESTIC COPPER SERVICE

NO.	QTY	FITTING	JOINT	SIZE
①	1	Corporation Stop	Inlet-Male Thread (Tapered) Outlet-Male Thread	1" 1"
②	1	Adapter Bend (45° OR 90°)	Inlet-Female Thread Outlet-Female Compression	1" 1"
③	2	Branch Piece, with 2 Angle Meter Stops	Inlet-Female Compression Outlet-Female Thread	1"x3/4" 3/4"
④	4	Meter	Male Thread	3/4"
⑤	4	Angle Meter Stop	Female Thread Female Compression	3/4" 3/4"

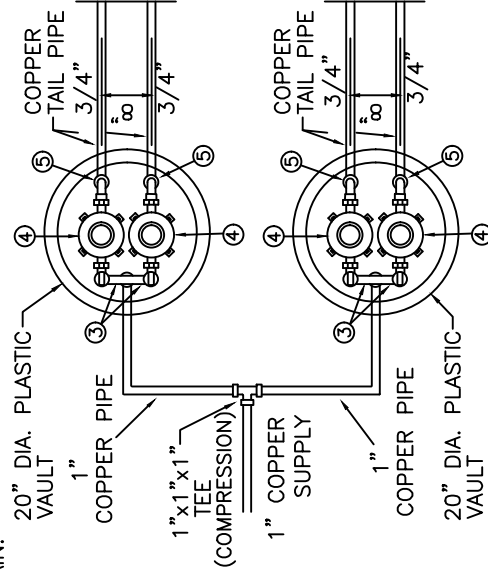
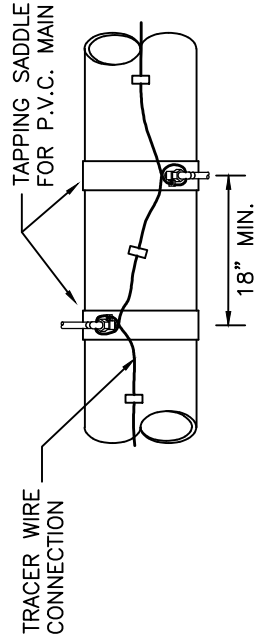
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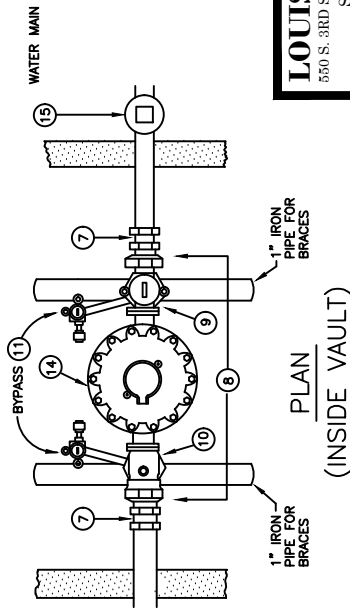
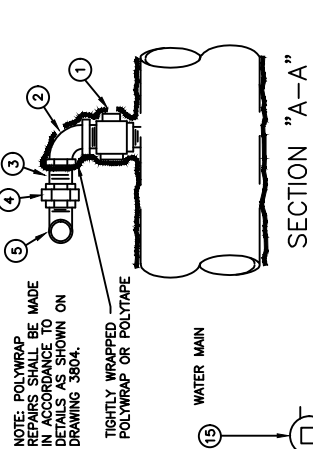
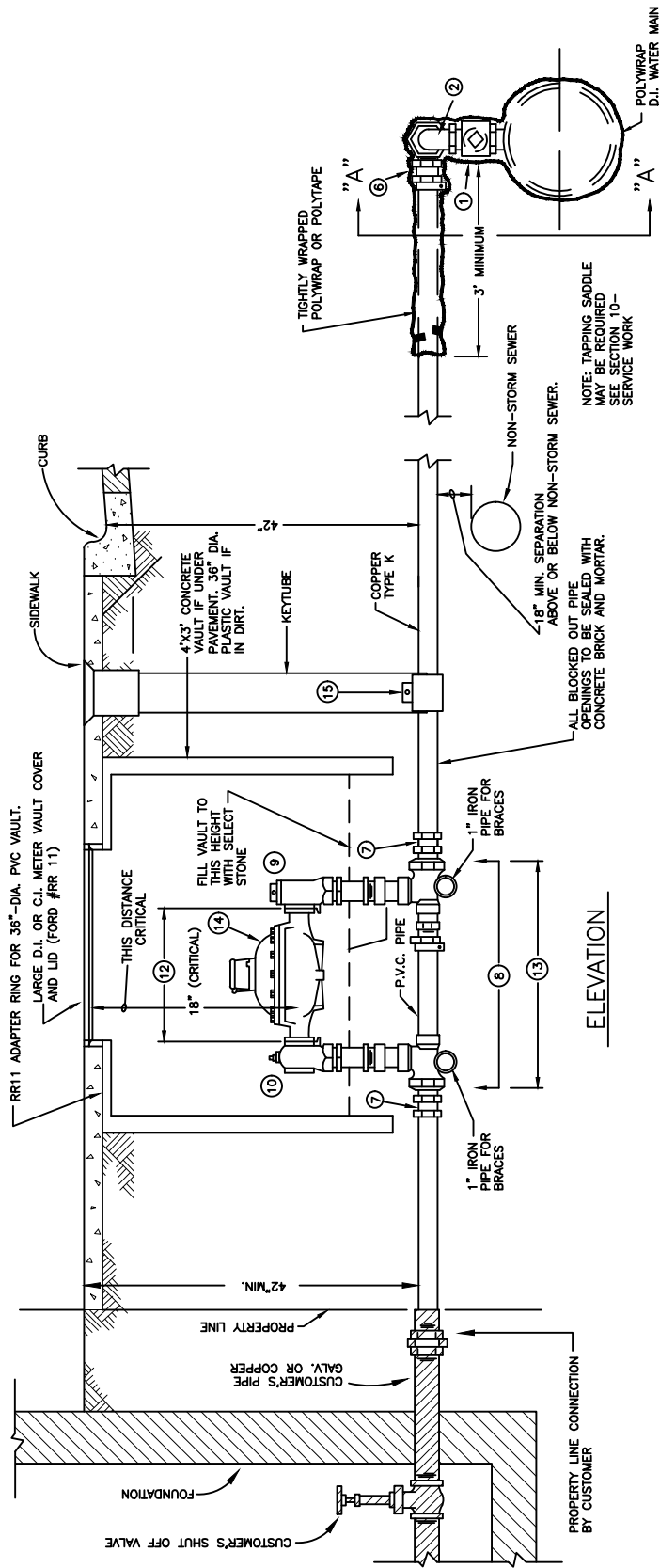
- 1) VAULT MATERIAL UNDER DRIVING SURFACES SHALL BE CONCRETE. WITH HEAVY FRAME AND COVER, OTHERS SHALL BE PLASTIC WITH LIGHT FRAME AND COVER.
- 2) POLYWRAP REPAIRS SHALL BE MADE IN ACCORDANCE TO DETAILS AS SHOWN ON DRAWING 3804.

FOR DUCTILE IRON MAIN SEE SECTION 10 - SERVICE WORK TO DETERMINE IF A TAPPING SADDLE IS REQUIRED. TRACER WIRE FOR P.V.C. MAIN SHALL BE AFFIXED TO SADDLE. TAP SHALL BE MADE DIRECTLY THROUGH POLYWRAP ON DUCTILE IRON WATER MAIN.

DUCTILE IRON WATER MAIN (P.V.C. WATER MAIN DOES NOT REQUIRE POLYWRAP)

PLAN FOR PVC MAIN





TYPICAL 1 1/2" or 2" COPPER SERVICE

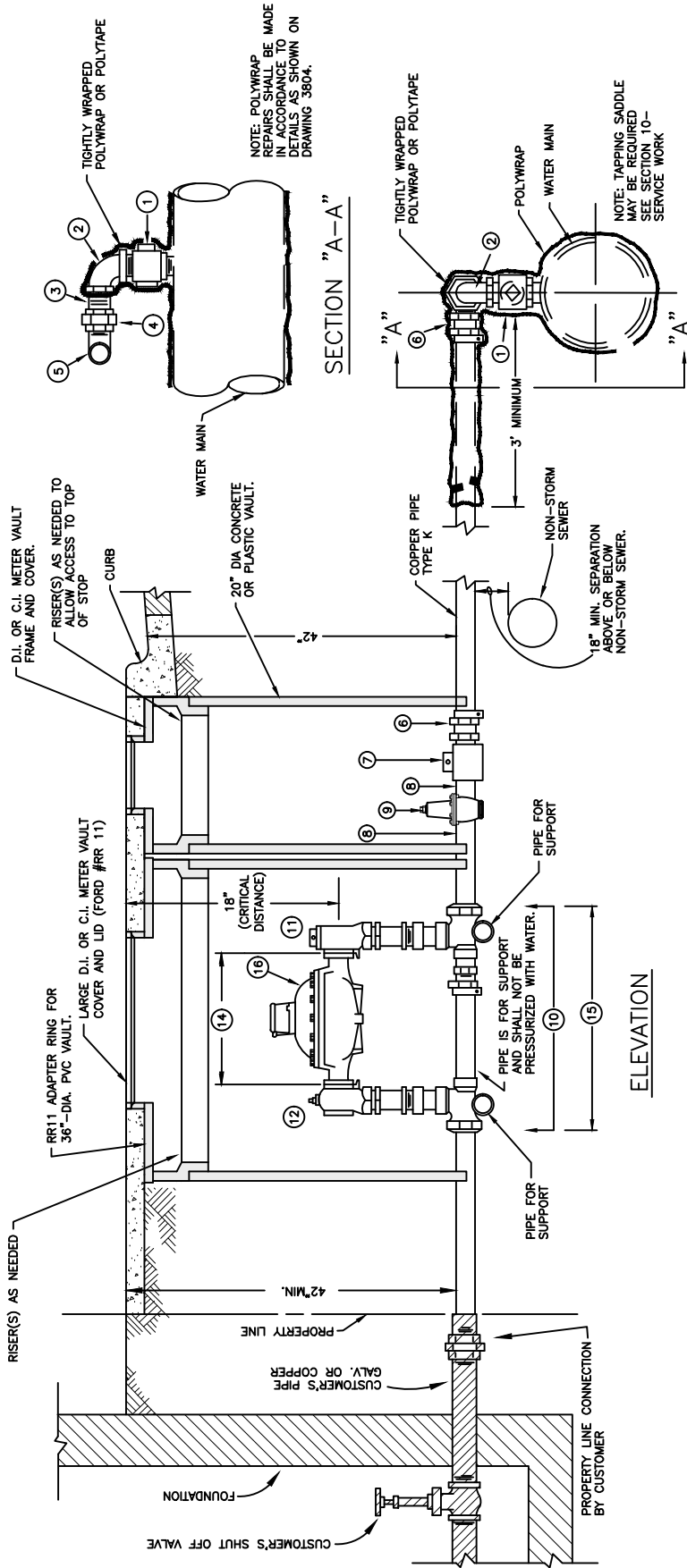
NO.	QTY	FITTING	JOINT	1.5" SERVICE'S FITTING SIZES	2" SERVICE'S FITTING SIZES
1	1	CORPORATION STOP	INLET-MALE THREAD (TAPERED)	1-1/2"	2"
2	1	BRASS REDUCING ELL	OUTLET-MALE THREAD	2"	2"
3	1	BRASS NIPPLE (CLOSE)	INLET-FEMALE THREAD	2"	2-1/2"
4	1	BRASS UNION	OUTLET-FEMALE THREAD	2"	2-1/2"
5	1	BRASS STREET ELL	MALE THREAD	1-1/2"	2"
6	1	COMPRESSION COUPLING	FEMALE THREAD	1-1/2"	2"
7	2	ADAPTER	FEMALE COMPRESSION	1-1/2"	2"
8	1	METER SETTER	MALE THREAD	1-1/2"	2"
9	1	ANGLE METER STOP	FEMALE THREAD	1-1/2"	2"
10	1	ANGLE CHECK VALVE	---	---	---
11	1	BY-PASS 1	---	---	---
12	1	---	---	---	---
13	1	---	---	13-3/8"	17-3/8"
14	1	METER	MALE THREAD	22"	27-1/8"
15	1	STOP	FEMALE THREAD	1-1/2"	2"

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STANDARD DRAWING

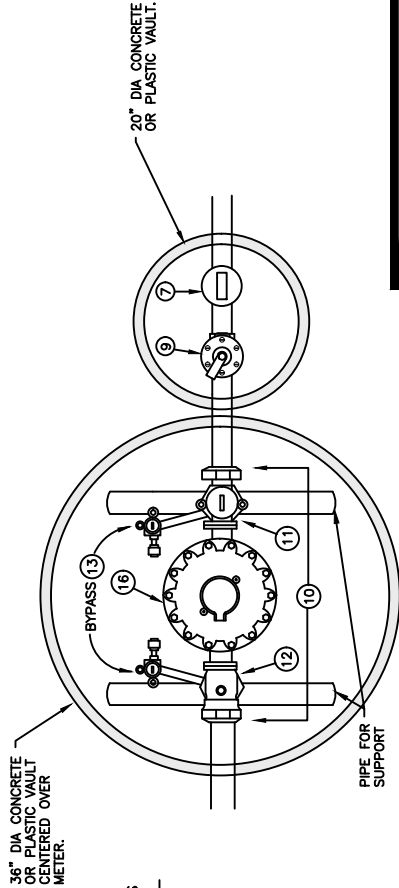
TYPICAL 1-1/2" OR 2"
 COPPER SERVICE

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3200	SHEET	1 OF 1



TYPICAL 1 1/2" or 2" COPPER SERVICE

NO.	QTY	FITTING	JOINT	1.5" SERVICE'S FITTING SIZE	2" SERVICE'S FITTING SIZE
1	1	CORPORATION STOP	INLET-MALE THREAD (TAPERED) OUTLET-MALE THREAD	1-1/2" 2"	2" 2-1/2"
2	1	BRASS REDUCING ELL	INLET-FEMALE THREAD OUTLET-FEMALE COMPRESSION	2" 1-1/2"	2-1/2" 2"
3	1	BRASS NIPPLE (CLOSE)	MALE THREAD	1-1/2"	2"
4	1	BRASS UNION	FEMALE THREAD	1-1/2"	2"
5	1	BRASS STREET ELL	MALE THREAD	1-1/2"	2"
6	1	COMPRESSION COUPLING	FEMALE THREAD FEMALE COMPRESSION	1-1/2" 1-1/2"	2" 2"
7	1	STOP	FEMALE THREAD	1-1/2"	2"
8	2	BRASS NIPPLE (X6)	MALE THREAD	1-1/2"	2"
9	1	PRESSURE REDUCING VALVE	FEMALE THREAD	1-1/2"	2"
10	1	METER SETTER	FEMALE THREAD	1-1/2"	2"
11	1	ANGLE METER STOP	-----	-----	-----
12	1	ANGLE CHECK VALVE	-----	-----	-----
13	1	BYPASS 1"	-----	-----	-----
14	1	-----	-----	-----	-----
15	1	-----	-----	-----	-----
16	1	METER	MALE THREAD	1-1/2"	2"



- NOTES:**
- VAULTS SHALL NOT REST DIRECTLY ON PIPE. A CLEAN CUT ARCH SHALL BE CUT IN VAULT TO ALLOW 3" SEPARATION BETWEEN VAULT AND PIPE.
 - VAULTS SHALL BE PLACED ON A 6" BEDDING OF DGA THAT EXTENDS 6" BEYOND VAULT EXTERIOR.

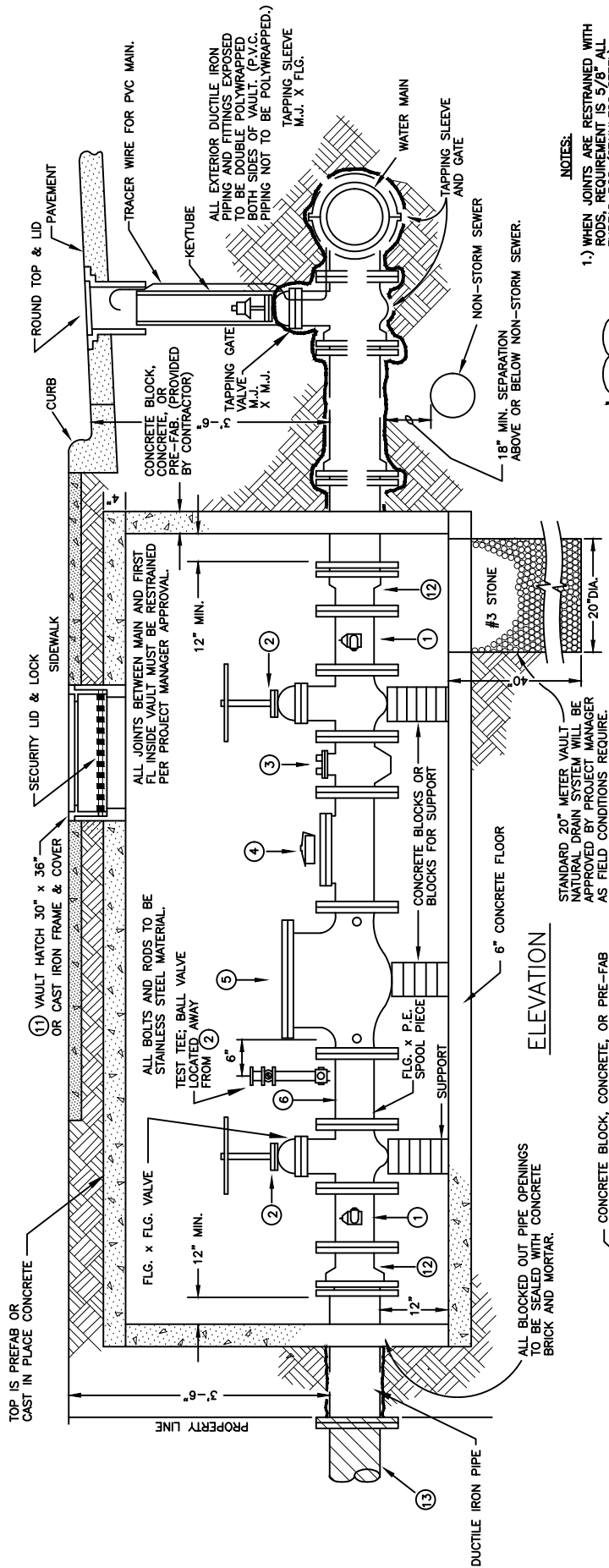
PLAN VIEW
(INSIDE VAULTS)

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STANDARD DRAWING

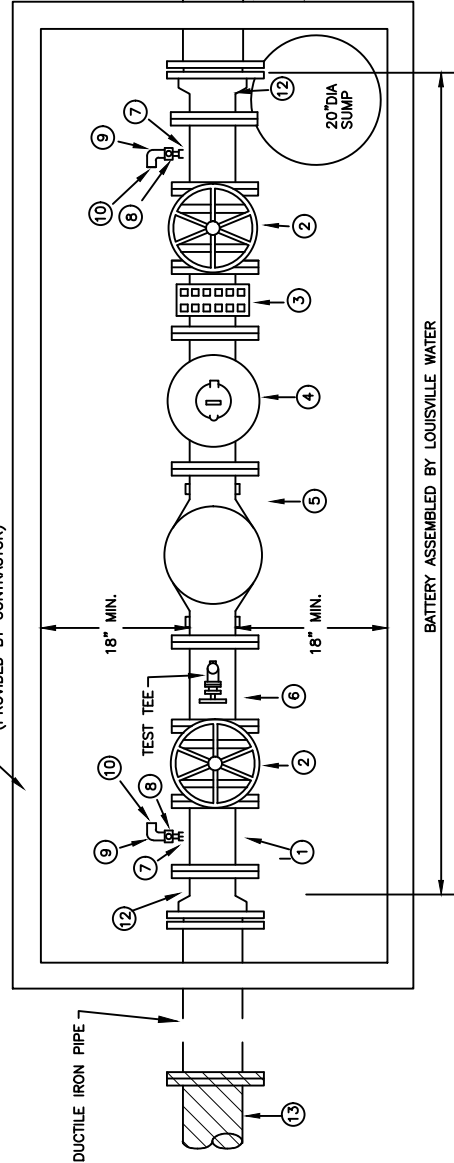
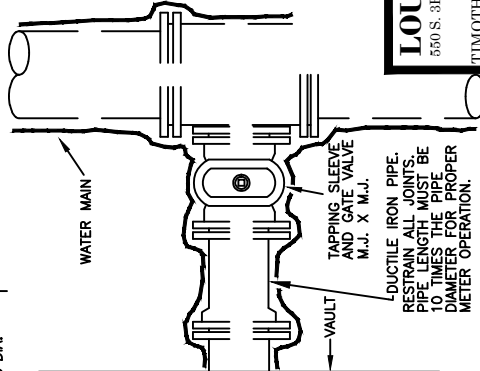
TYPICAL 1-1/2" OR 2"
 COPPER SERVICE
 WITH PRESSURE REDUCING VALVE

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3202	SHEET	1 OF 1



NOTES:

- 1.) WHEN JOINTS ARE RESTRAINED WITH RODS, REQUIREMENT IS 5/8" ALL THREAD ROD (STAINLESS STEEL) WITH A MINIMUM OF TWO RODS PER JOINT.
- 2.) RESTRAIN ALL JOINTS BETWEEN THE MAIN AND THE ADAPTER FLANGE JOINT THAT'S INSIDE THE VAULT.
- 3.) IF ANY PORTION OF THE SERVICE PIPING IS ENCASED, THEN THE ENTIRE LENGTH OF SERVICE PIPING SHALL BE DUCTILE IRON WITH RESTRAINED JOINTS.
- 4.) ACCESS HATCH AND VAULT MUST MEET OR EXCEED H-20 TRAFFIC LOADING DESIGN CRITERIA. CAST IRON FRAME & COVER REQUIRED IN AREAS OF VEHICULAR TRAFFIC.
- 5.) COMPOUND METER INSTALLATIONS SAME AS TURBINE METERS.



- | | | | |
|---|--|----|---|
| 1 | TWO (2) 4"x3" SPOOL PIECES WITH TWO (2) 2" OUTLETS, FLG x FLG | 9 | TWO (2) STREET ELLS, MALE THREAD |
| 2 | TWO (2) GATE VALVES, WHEEL FLG x FLG | 10 | TWO (2) PLUGS, MALE THREAD |
| 3 | ONE (1) STRAINER, FLG x FLG | 11 | ONE (1) VAULT HATCH-30" x 36" |
| 4 | ONE (1) METER, FLG x FLG | 12 | TWO (2) 4"x3" ADAPTERS-FLG. x MJ WITH GRIPPER GLAND |
| | | 13 | CUSTOMER PIPING |
| 5 | ONE (1) CHECK VALVE, FLG x FLG | | |
| 6 | ONE (1) SPOOL PIECE, FLG x FLG WITH ONE (1) 2" OUTLET, 2" BALL VALVE ASSEMBLY FOR TEST TEE | | |
| 7 | TWO (2) NIPPLES, MALE THREAD | | |
| 8 | TWO (2) STOP OR VALVES, MALE THREAD | | |

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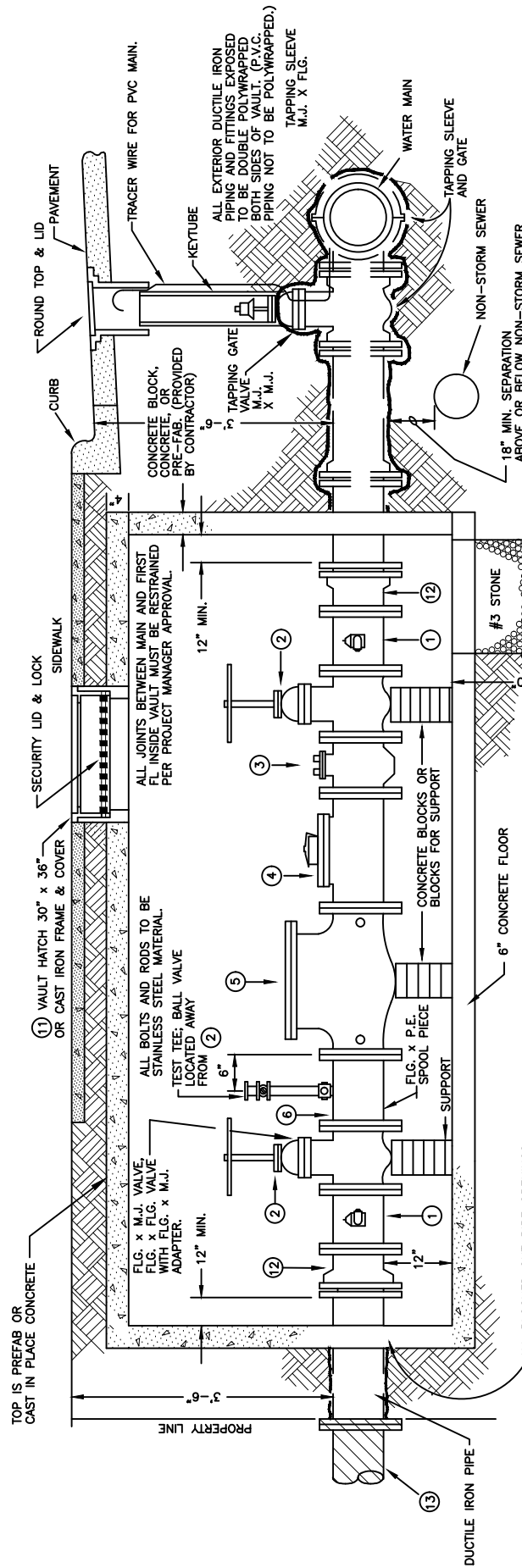
STANDARD DRAWING

TYPICAL DUCTILE IRON
 DOMESTIC SERVICE 4" x 3"

DATE	OCT. 2021	SCALE	NONE
DRAWING NO.	3203A	SHEET	1 OF 1

STANDARD DRAWING
TYPICAL DUCTILE IRON
DOMESTIC SERVICE
4" AND LARGER

DATE	OCT. 2021	SCALE	NONE
DRAWING NO.	3203	SHEET	1 OF 1



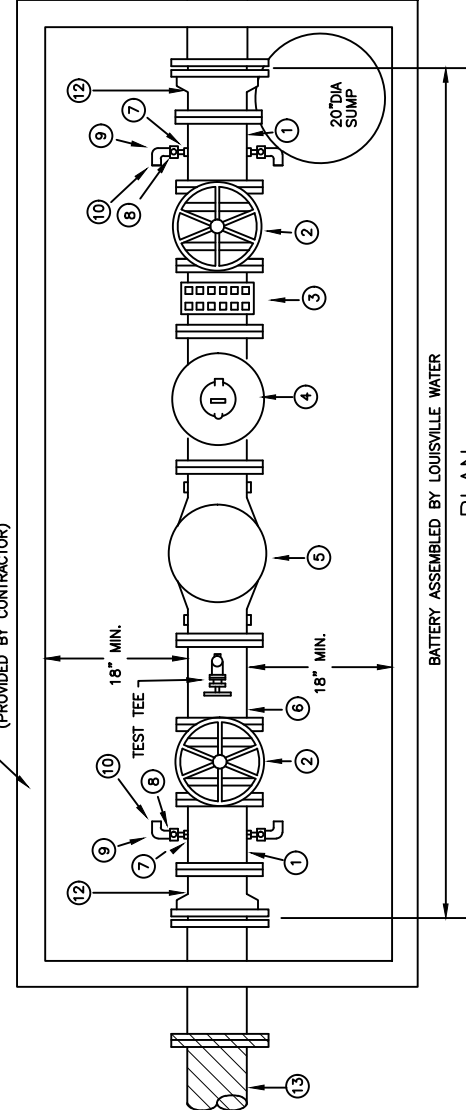
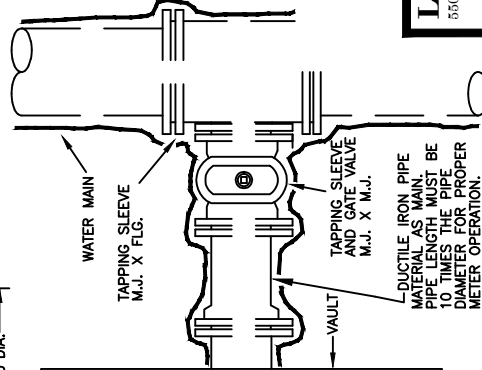
ELEVATION

ALL BLOCKED OUT PIPE OPENINGS TO BE SEALED WITH CONCRETE BRICK AND MORTAR.

STANDARD 20" METER VAULT WILL BE APPROVED BY PROJECT MANAGER AS FIELD CONDITIONS REQUIRE.

18" MIN. SEPARATION ABOVE OR BELOW NON-STORM SEWER.

NOTES:
 1.) WHEN JOINTS ARE RESTRAINED WITH RODS, REQUIREMENT IS 5/8" ALL THREAD ROD (STAINLESS STEEL) WITH A MINIMUM OF TWO RODS PER JOINT.
 2.) RESTRAIN ALL JOINTS BETWEEN THE MAIN AND THE ADAPTER FLANGE JOINT THAT'S INSIDE THE VAULT.
 3.) IF ANY PORTION OF THE SERVICE PIPING IS ENCASED THEN THE ENTIRE LENGTH OF SERVICE PIPING SHALL BE DUCTILE IRON WITH RESTRAINED JOINTS.
 4.) ACCESS HATCH AND VAULT MUST MEET OR EXCEED H-20 TRAFFIC LOADING DESIGN CRITERIA. CAST IRON FRAME & COVER REQUIRED IN AREAS OF VEHICULAR TRAFFIC.
 5.) COMPOUND METER INSTALLATIONS SAME AS TURBINE METERS.



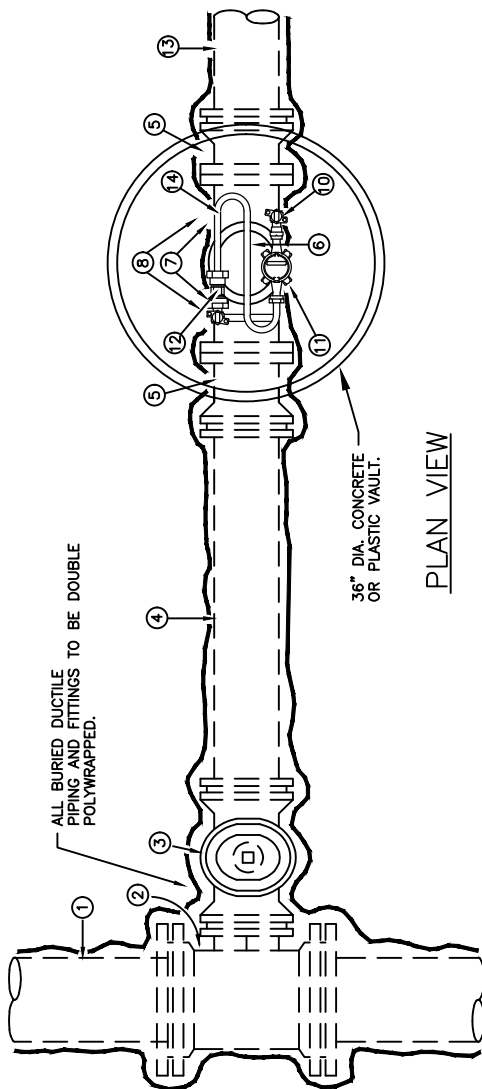
PLAN

BATTERY ASSEMBLED BY LOUISVILLE WATER

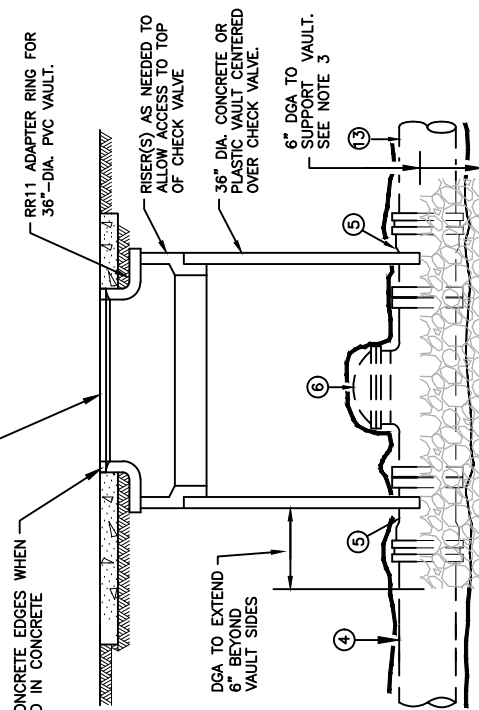
- 1 TWO (2) 4"x4" SPOOL PIECES WITH TWO (2) OUTLETS, FLG. x FLG.
- 2 TWO (2) GATE VALVES, WHEEL FLG x FLG
- 3 ONE (1) STRAINER, FLG x FLG
- 4 ONE (1) METER, FLG x FLG
- 5 ONE (1) CHECK VALVE, FLG x FLG
- 6 ONE (1) SPOOL PIECE, FLG x FLG, WITH ONE (1) 2" OUTLET, 2" BALL VALVE ASSEMBLY FOR TEST TEE
- 7 FOUR (4) NIPPLES, MALE THREAD
- 8 FOUR (4) STOP OR VALVES, MALE THREAD
- 9 FOUR (4) STREET ELLS, MALE THREAD
- 10 FOUR (4) PLUGS, MALE THREAD
- 11 ONE (1) VAULT HATCH-30" x 36"
- 12 TWO (2) 4"x3" ADAPTERS-FLG. x MJ WITH GRIPPER GLAND
- 13 CUSTOMER PIPING

TYPICAL FIRE PROTECTION SERVICE 4" OR LARGER

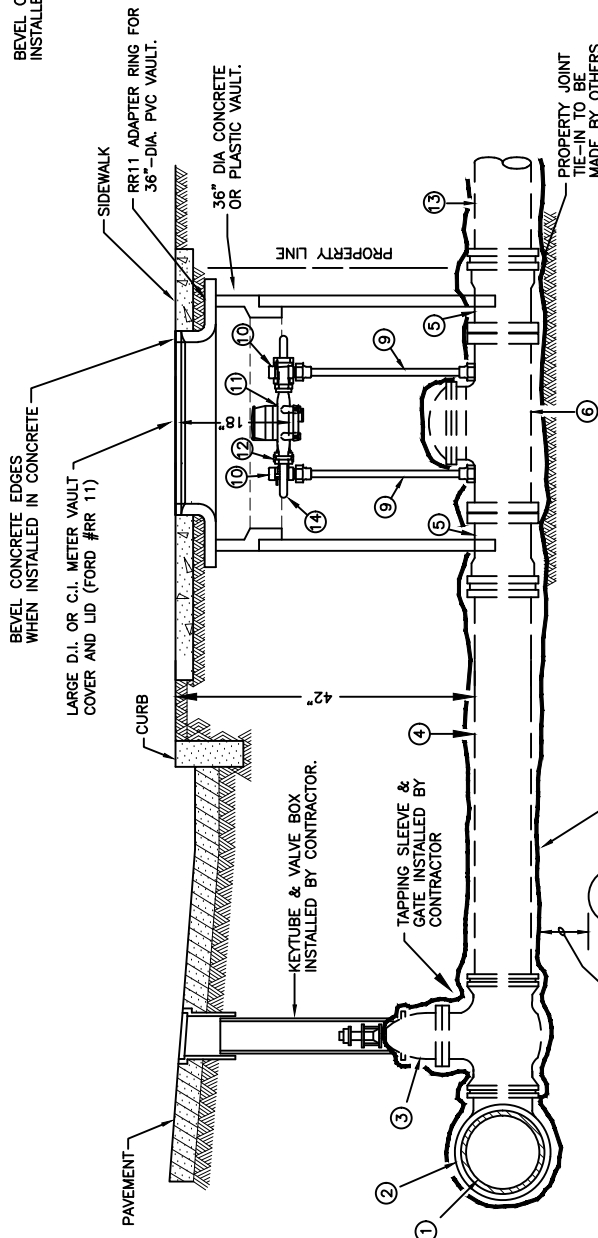
FIRE SERVICE SIZES		
	4"	6"
NO. QTY	FITTING	JOINT
1	Main in Street	Varies
2	Tapping Sleeve	MJ
3	Tapping Gate Valve	MJ x MJ (restrained)
4	D.I. Service Piping	MJ / Bell & Spig (restrain all joints up to check valve)
5	Adapter	Flange X MJ or PE
6	Detector Check Valve	Flange X Flange
7	Bushing	Male Thread
8	Adapter	Female Thread
9	Copper Tubing	Female Compression
10	Angle Meter Stop	Female Compression
11	Meter	Female Thread
12	Swing Check Valve	Male Thread X Male Thread
13	Customer Piping	Female Thread
14	S-Tube	Female Thread



PLAN VIEW



ELEVATION OF CHECK VALVE VAULT



PROFILE VIEW

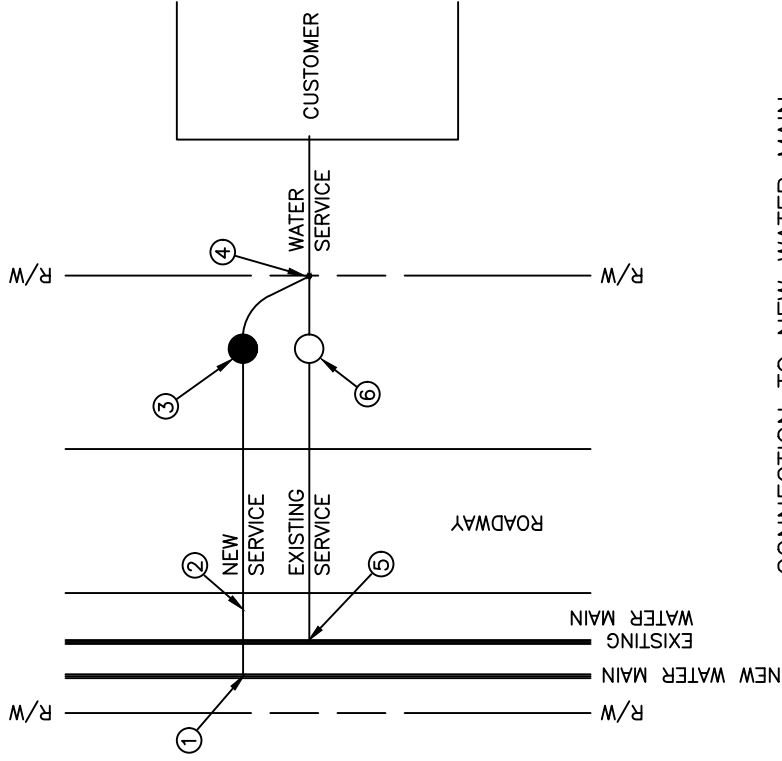
- NOTES:
1. ALL DAMAGED POLYWRAP SHALL BE REPAIRED IN ACCORDANCE TO DETAILS AS SHOWN ON DRAWING APPENDIX.
 2. RESTRAIN ALL JOINTS BETWEEN THE MAIN AND THE DETECTOR CHECK VALVE.
 3. 36" DIA. VAULT SHALL NOT REST DIRECTLY ON PIPE. A CLEAN CUT ARCH SHALL BE CUT IN VAULT TO ALLOW 3" SEPARATION. VAULT SHALL REST ON A 6" BEDDING OF DGA.
 4. ALL BOLTS ON TOP OF CHECK VALVE SHALL BE MADE ACCESSIBLE FROM INSIDE OF VAULT.
 5. CAST CONCRETE THRUST ANCHOR ON TAPPING SLEEVE AS PER DRAWING 1400.

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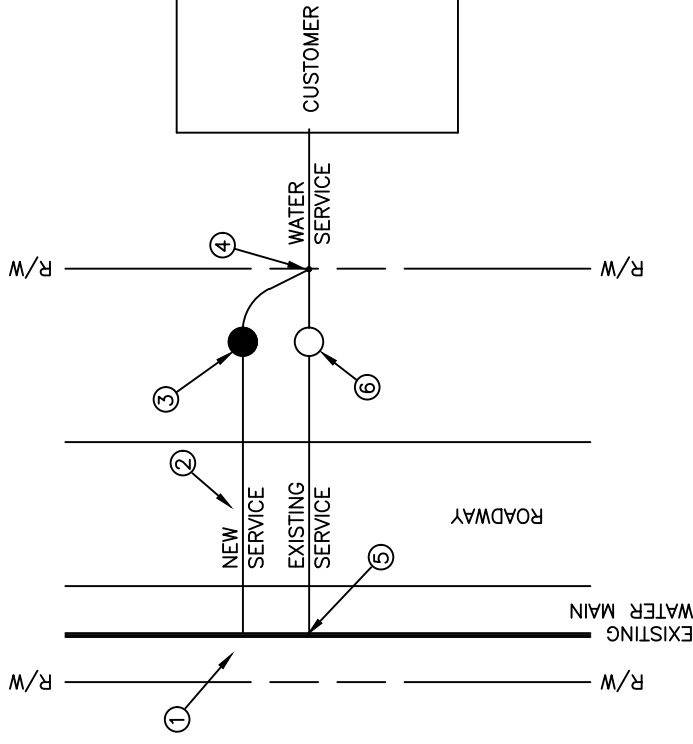
STANDARD DRAWING

TYPICAL
 FIRE PROTECTION SERVICE
 4" AND LARGER

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3601	SHEET	1 OF 1



CONNECTION TO NEW WATER MAIN



CONNECTION TO EXISTING WATER MAIN

NOTES:

- ① INSTALL NEW CORPORATION STOP ON MAIN.
- ② INSTALL NEW SERVICE LINE.
- ③ INSTALL METER, VAULT, FRAME AND LID. CONCRETE METER VAULTS WITH HEAVY FRAME AND COVER SHALL BE INSTALLED IN AREAS OF VEHICULAR TRAFFIC.
- ④ INSTALL TAIL PIECE AND TIE-IN TO CUSTOMER SERVICE LINE. IF EXISTING TAIL PIECE OR CUSTOMER SERVICE LINE IS LEAD OR GALVANIZED IRON THEN FOLLOW CURRENT INSTALLATION PROCEDURES PER THE LOUISVILLE WATER PROJECT MANAGER.

- ⑤ DISCONTINUE OLD SERVICE AT EXISTING WATER MAIN. DRIVEN FERRULES MUST BE REMOVED AND A TAPPING SADDLE INSTALLED AT TAP IF MAIN WILL REMAIN ACTIVE. (SEE SECT. 10.17)
- ⑥ ABANDON OLD METER VAULT, RETURN METER AND CAST IRON FRAME & COVER TO ALLMOND AVENUE, BACKFILL METER VAULT (SEE SECT.10.18)

* CONNECTION AS SHOWN IS A "LONG SERVICE" TO MAIN ON OPPOSITE SIDE OF ROAD. "SHORT SERVICE" IS DEFINED AS METER AND MAIN ON THE SAME SIDE OF ROADWAY.

LEGEND

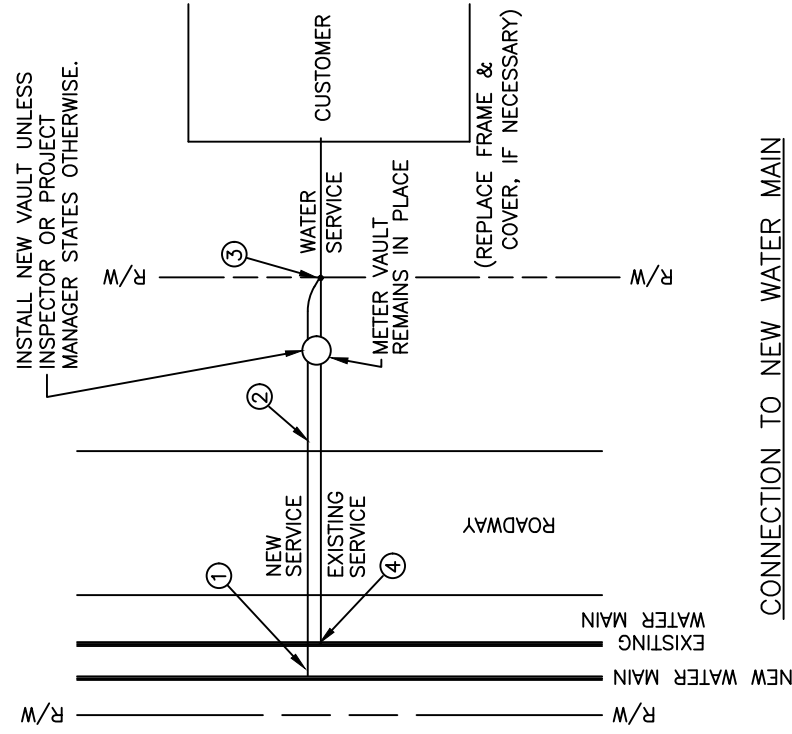
- = EXISTING METER VAULT
● = NEW METER VAULT

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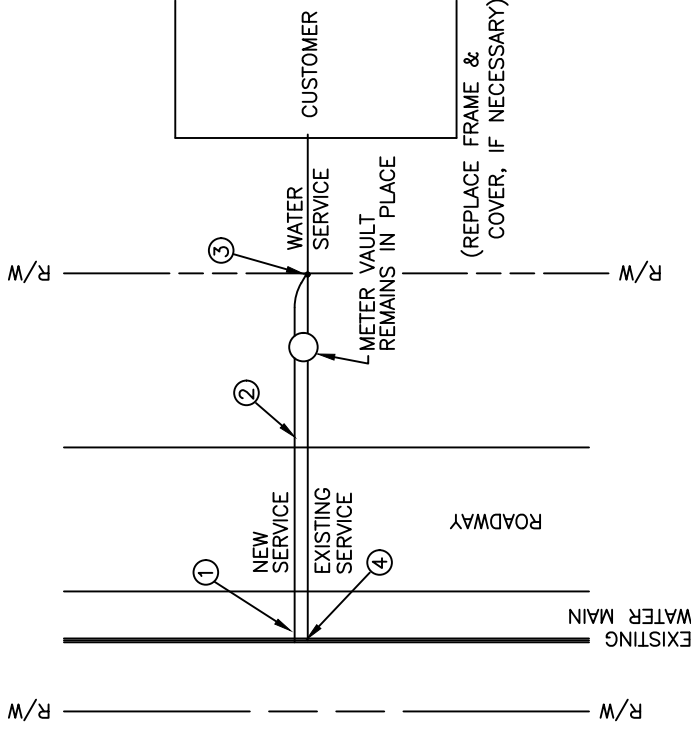
STANDARD DRAWING

RELOCATE SERVICE

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3440	SHEET	1 OF 1



CONNECTION TO NEW WATER MAIN



CONNECTION TO EXISTING WATER MAIN

LEGEND

○ = EXISTING METER VAULT

NOTES:

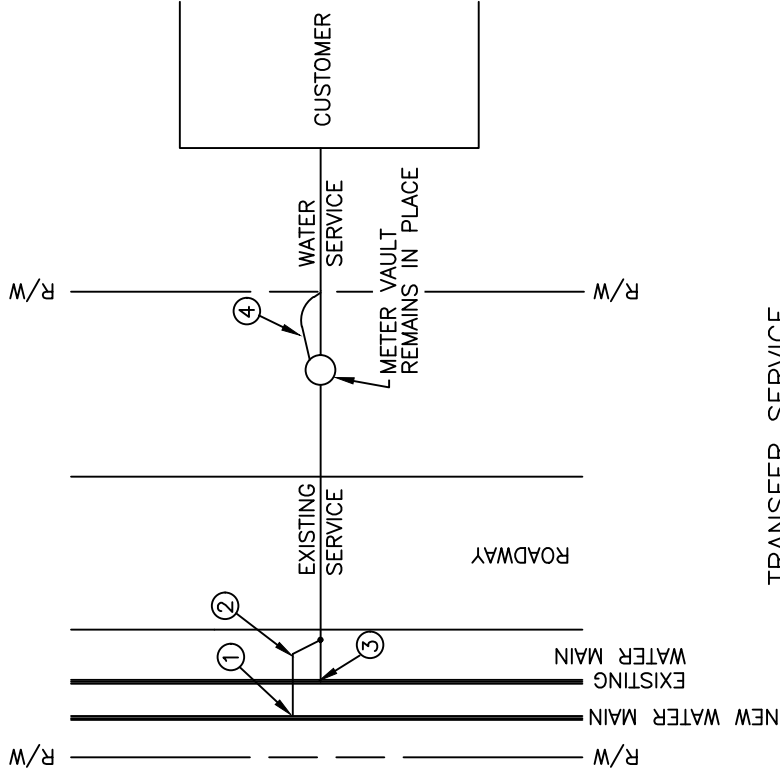
- ① INSTALL NEW CORPORATION STOP ON MAIN.
 - ② INSTALL NEW SERVICE LINE TO EXISTING METER STOP.
 - ③ INSTALL TAIL PIECE AND TIE-IN TO CUSTOMER SERVICE LINE. IF EXISTING TAIL PIECE OR CUSTOMER SERVICE LINE IS LEAD OR GALVANIZED IRON THEN INSTALL TAIL PIECE AND TIE-IN TO CUSTOMER SERVICE LINE. IF CUSTOMER SERVICE LINE IS LEAD THEN FOLLOW CURRENT INSTALLATION PROCEDURES PER THE LOUISVILLE WATER PROJECT MANAGER.
 - ⑤ DISCONTINUE OLD SERVICE AT EXISTING WATER MAIN. DRIVEN FERRULES MUST BE REMOVED AND REPAIR BAND INSTALLED AT TAP IF MAIN WILL REMAIN ACTIVE. (SEE SECT. 10.17)
 - ⑥ REPLACE EXISTING VAULT, FRAME, AND COVER IN SAME LOCATION AS OLD METER VAULT UNLESS THE LOUISVILLE WATER PROJECT MANAGER OR INSPECTOR APPROVES OF LEAVING THE EXISTING VAULT IN PLACE.
- * CONNECTION AS SHOWN IS A "LONG SERVICE" TO MAIN ON OPPOSITE SIDE OF ROAD. "SHORT SERVICE" IS DEFINED AS METER AND MAIN ON THE SAME SIDE OF ROADWAY.

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STANDARD DRAWING

RENEW SERVICE

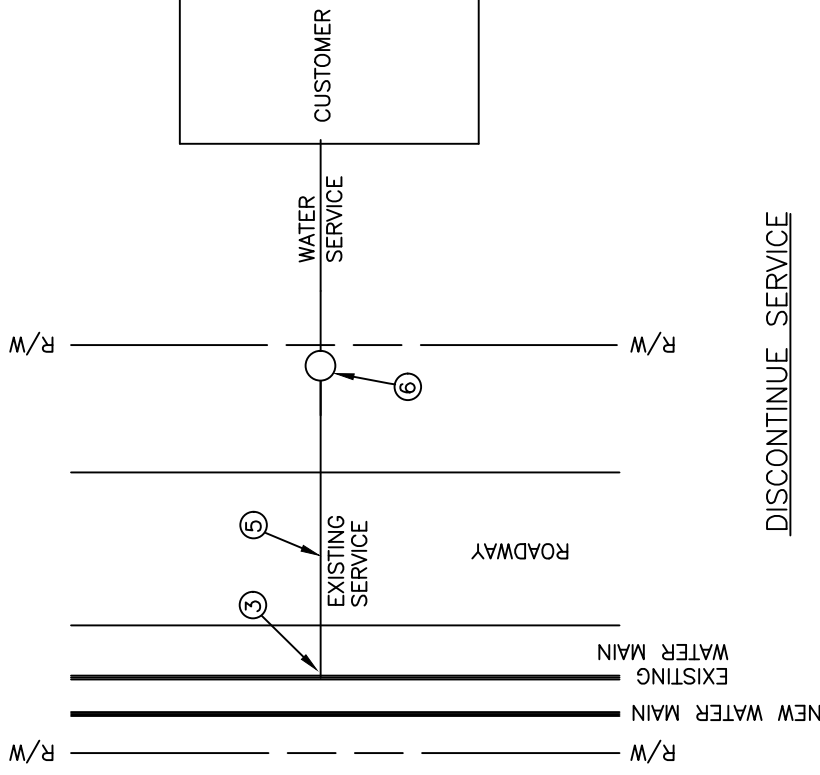
DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3441	SHEET	1 OF 1



TRANSFER SERVICE

NOTES:

- ① INSTALL NEW CORPORATION STOP ON MAIN.
- ② INSTALL NEW SERVICE LINE FROM NEW MAIN AND TIE-IN TO EXISTING SERVICE LINE. (AS REQUIRED)
- ③ DISCONTINUE OLD SERVICE AT EXISTING WATER MAIN. DRIVEN FERRULES MUST BE REMOVED AND REPAIR BAND INSTALLED AT TAP IF MAIN WILL REMAIN ACTIVE. (SEE SECT. 10.17)
- ④ INSTALL TAIL PIECE AND TIE-IN TO CUSTOMER SERVICE LINE. IF EXISTING TAIL PIECE OR CUSTOMER SERVICE LINE IS LEAD OR GALVANIZED IRON THEN INSTALL TAIL PIECE AND TIE-IN TO CUSTOMER SERVICE LINE. IF CUSTOMER SERVICE LINE IS LEAD THEN FOLLOW CURRENT INSTALLATION PROCEDURES PER THE LOUISVILLE WATER PROJECT MANAGER.



DISCONTINUE SERVICE

- ⑤ DISCONNECT AND PLUG SERVICE LINE.
- ⑥ ABANDON OLD METER VAULT, RETURN METER AND CAST IRON FRAME & COVER TO ALLMOND AVENUE, BACKFILL METER VAULT (SEE SECT.10.18)

LEGEND

○ = EXISTING METER VAULT

* CONNECTION AS SHOWN IS A "LONG SERVICE" TO MAIN ON OPPOSITE SIDE OF ROAD. "SHORT SERVICE" IS DEFINED AS METER AND MAIN ON THE SAME SIDE OF ROADWAY.

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STANDARD DRAWING

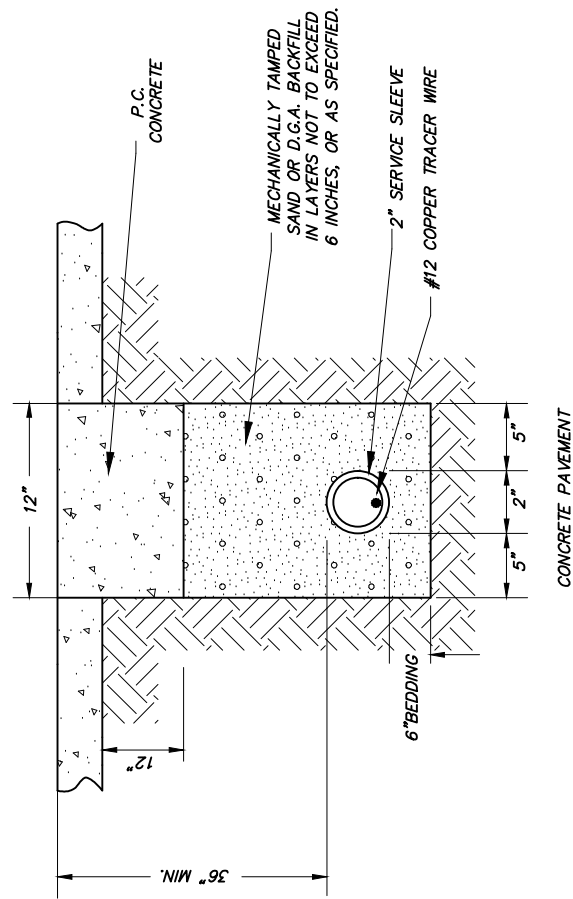
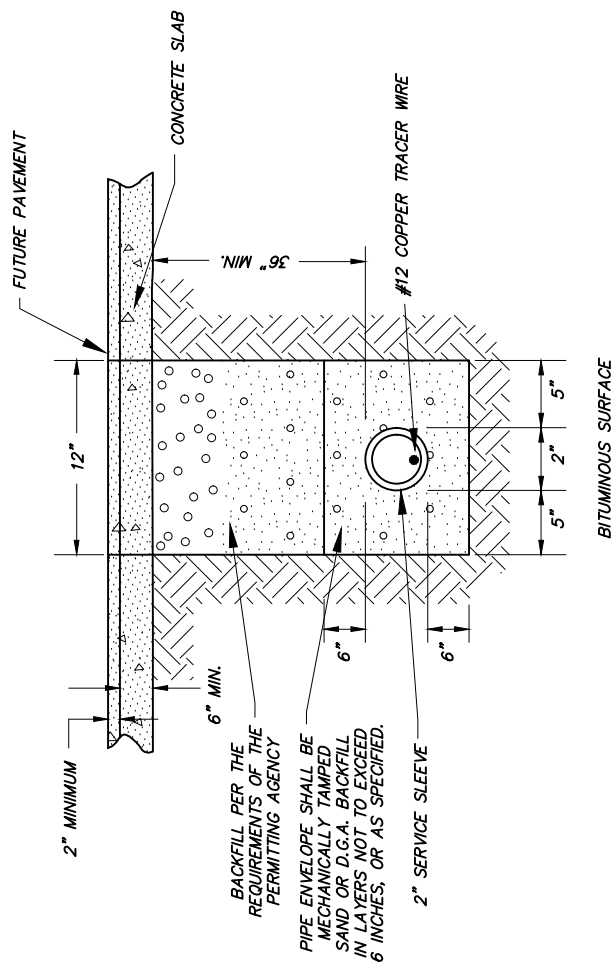
TRANSFER SERVICE
 DISCONTINUE SERVICE

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3442	SHEET	1 OF 1

FUTURE PAVEMENT

IN ORDER TO AVOID CURB AND PAVEMENT CUTS DURING SERVICE INSTALLATIONS, THE FOLLOWING PROCEDURES HAVE BEEN ESTABLISHED FOR NEW DEVELOPMENT PROJECTS:

- SERVICE SLEEVES ARE TO BE INSTALLED BY THE DEVELOPER'S WATER MAIN INSTALLATION CONTRACTOR AS SHOWN ON THE PLANS. LOCATIONS SHOWN ON THE PLANS ARE APPROXIMATE; THE CONTRACTOR SHALL COORDINATE EXACT SERVICE SLEEVE LOCATIONS WITH THE DEVELOPER OR THEIR REPRESENTATIVE.
- WHEN THE SERVICE SLEEVES ARE SUPPLIED BY THE DEVELOPER, THE COMPANY WILL ADJUST THE DEVELOPER'S PROJECT MATERIAL COSTS TO REFLECT DEVELOPER-DOCUMENTED SLEEVE MATERIAL COST.
- SLEEVES MUST BE INSTALLED AT 36" COVER, AND ALIGNED SO THAT FUTURE INSTALLATION OF SERVICE PIPING CAN BE ACCOMPLISHED WITHOUT PAVEMENT, OR CURB CUTS. SLEEVES MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY BENDS OR OBSTRUCTIONS.
- ALL SERVICE SLEEVES MUST EXTEND AT LEAST 2 FEET BEYOND THE BACK OF CURBS; WITH SEALED END CAPS AND MARKED BY ABOVE-GRADE P.V.C. PIPE THAT SHALL BE PAINTED BLUE ON THE EXPOSED END EXTENDING A MIN. OF 6" ABOVE FINISH GRADE TO EACH END OF THE SERVICE SLEEVE OR OTHER MARKER ACCEPTABLE TO LOUISVILLE WATER.
- ALL SLEEVES MUST HAVE #12 COPPER TRACER WIRE INSTALLED THROUGH EACH SLEEVE AND THE TRACER WIRE MUST BE MADE ACCESSIBLE FOR THE COMPANY'S SERVICE INSTALLER FOR THE PURPOSE OF LOCATING THE SERVICE SLEEVE.



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STANDARD DRAWING

SERVICE SLEEVE INSTALLATION DETAIL

DATE	JULY 2021	SCALE	NONE
DRAWING NO.	3805	SHEET	1 OF 1

Technical drawing showing two cross-sections of a trench for pipe installation.

Left Section:

- Top layer: CONCRETE SLAB (12" thick)
- Below slab: CRUSHED STONE BACKFILL (MATCH EXISTING DEPTH)
- Below backfill: MECHANICALLY TAMPED PIT RUN SAND, D.G.A., MANUFACTURED SAND, OR FLOWABLE FILL
- Bottom layer: PIPE (12" diameter)
- Bedding: 6" BEDDING
- Dimensions: 12" (slab), 12" (backfill), 42" MIN. (total depth), 9" (width)

Right Section:

- Top layer: CONCRETE SLAB (12" thick)
- Below slab: CRUSHED STONE BACKFILL (MATCH EXISTING DEPTH)
- Below backfill: MECHANICALLY TAMPED PIT RUN SAND, D.G.A., MANUFACTURED SAND, OR FLOWABLE FILL
- Bottom layer: PIPE (12" diameter)
- Bedding: 6" BEDDING
- Dimensions: 12" (slab), 12" (backfill), 42" MIN. (total depth), 9" (width)

Notes:

- CONCRETE BACKFILL (MATCH EXISTING DEPTH)
- MECHANICALLY TAMPED PIT RUN SAND, D.G.A., MANUFACTURED SAND, OR FLOWABLE FILL
- MECHANICALLY TAMPED PIT RUN SAND, D.G.A. OR MANUFACTURED SAND
- PIPE ENCASED IN PIPE OF LARGER DIAMETER, IF SPECIFIED ON JOB DRAWING.

BITUMINOUS SURFACE 2" +

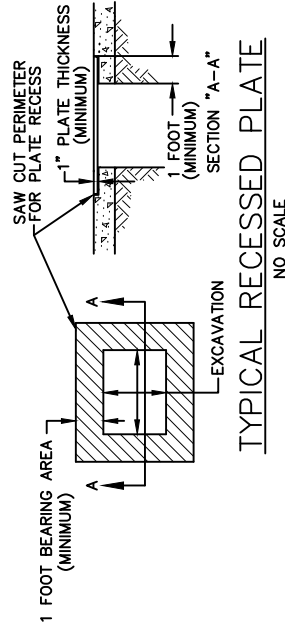
(12" CUTBACK IS NOT REQUIRED WHEN FLOWABLE FILL IS USED)

BITUMINOUS SURFACE LESS THAN
2" AND TRAFFIC BOUND MACADAM

(12" CUTBACK IS NOT REQUIRED
WHEN FLOWABLE FILL IS USED)

STATE OF KENTUCKY SPECIFICATIONS

1. BEDDING SHALL BE PIT RUN SAND, DENSE-GRADE AGGREGATE, MANUFACTURED SAND MECHANICALLY COMPACTED PER SPECIFICATION SECTION 7.4 AND 7.5.
2. SELECT GRANULAR BACKFILL SHALL COMPLY WITH SPECIFICATION 7.6
3. ANY USE OF NO. 57 STONE FOR BEDDING OR BACKFILL MUST BE APPROVED BY THE DIRECTOR OF ENGINEERING.
4. CONTRACTOR WILL BE HELD RESPONSIBLE DURING THE ENSUING 5 YEARS FOR PROPER BACKFILLING AND REPLACEMENT OF SURFACE DURING THE 5 YEAR PERIOD AFTER THE DATE OF THE FINAL CONTRACT PAYMENT. ANY PAVEMENT SETTLEMENT SHALL BE IMMEDIATELY REPAIRED IN AN APPROVED MANNER AT THE EXPENSE OF THE CONTRACTOR.
5. BACKFILLING UP TO BOTTOM OF SUBBASE ELEVATION SHALL BE COMPLETED PRIOR TO SECOND PAIR OF SAWCUTS AND EXCAVATION FOR THE ADDITIONAL 12" OF CONCRETE ON EACH SIDE OF THE TRENCH.
6. DILUTE SS1H (OR OTHER APPROVED TACK COAT MATERIAL) SHALL BE APPLIED AT THE RATE OF 0.1 GAL. PER SQUARE YARD OVER THE CONCRETE BASE. ALLOW SUFFICIENT TIME FOR IT TO "BREAK" BEFORE THE FINISHED BITUMINOUS CONCRETE IS PLACED, AND SEAL ALL JOINTS SECURELY AFTER PAVING.



NO SCALE

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STANDARD DRAWING

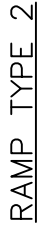
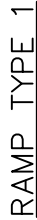
STATE OF KENTUCKY
BACKFILL AND PAVING
RESTORATION

DATE	AUG. 2021	SCALE	NONE
DRAWING NO.	4000	SHEET	1 OF 1

9. CONTRACTOR WILL BE HELD RESPONSIBLE DURING THE ENSUING 5 YEARS FOR PROPER BACKFILLING AND REPLACEMENT OF SURFACE. DURING THE 5 YEAR PERIOD AFTER THE DATE OF THE FINAL CONTRACT PAYMENT, ANY PAYMENT SETTLEMENT SHALL BE IMMEDIATELY REPAIRED IN AN APPROVED MANNER AT THE EXPENSE OF THE CONTRACTOR.



DATE	JULY 2021	SCALE	NONE
DRAWING NO.	4100	SHEET	1 OF 1



ALL SIDEWALKS SHALL BE 5" THICK. ALL DRIVEWAYS SHALL BE 6" THICK. ALL CONCRETE SHALL BE CLASS "A" (3500 lb. CONCRETE). WOOD FLOAT FINISH FOR ALL WORK. AN APPROVED TYPE OF LIQUID CURING COMPOUND WILL BE PERMITTED. EXPANSION JOINTS ACROSS THE LINE OF THE WALK SHALL BE SPACED NOT MORE THAN 50' APART. EXPANSION JOINTS PARALLEL TO THE LINE OF WALK WILL BE REQUIRED AT THE BACK OF CURB FOR FULL WIDTH WALKS. AT DRIVEWAYS, EXPANSION JOINTS SHALL BE USED ON BOTH SIDES AGAINST THE SIDEWALK. OTHER JOINTS DETERMINED BY THIS LOCATION. AT DRIVEWAYS AND ENTRANCE WALKS ACROSS GRASS PLOTS, AN EXPANSION JOINT SHALL BE USED AT BACK OF CURB. ALL EXPANSION MATERIAL SHALL BE APPROVED NON-EXTRUDING PREFORMED STRIPS 1/2" THICK. BLOCKS SHALL BE MARKED OR SCORED IN SUITABLE SIZED BLOCKS, BUT NOT LESS THAN 4' OR MORE THAN 6' ON A SIDE. CONTRACTION JOINTS (PLANES OF WEAKNESS) SHALL BE AT EVERY THIRD BLOCK AND SHALL BE CUT AT LEAST 1 1/2" IN DEPTH (IN LIEU OF A SCORE). AT BACK OF WALK, TERRACE SHALL BE HAND TRIMMED OR FINISHED TO A 1 TO 1 SLOPE OR FLATTER.

ALL SIDEWALK AND DRIVEWAY CONSTRUCTION IN THE PUBLIC WAYS OF THE CITY OF LOUISVILLE SHALL CONFORM WITH THE REQUIREMENTS ON THIS SHEET UNLESS OTHERWISE APPROVED IN WRITING BY THE CHIEF ENGINEER. MINIMUM WIDTH OF SIDEWALK SHALL BE 5' EXCEPT WITH PERMISSION OF CHIEF ENGINEER.



Diagram illustrating the cross-section of a trench. The trench width is 42". The bedding is 6" thick. The backfill is D.G.A. BACKFILL PLACED & COMPACTED PER SPECIFICATION SECTION 7.6. The bedding is shown as a hatched area, and the backfill is shown as a stippled area. A circular pipe is shown within the bedding, with a diameter of 9" and a depth of 9" below the bedding surface.

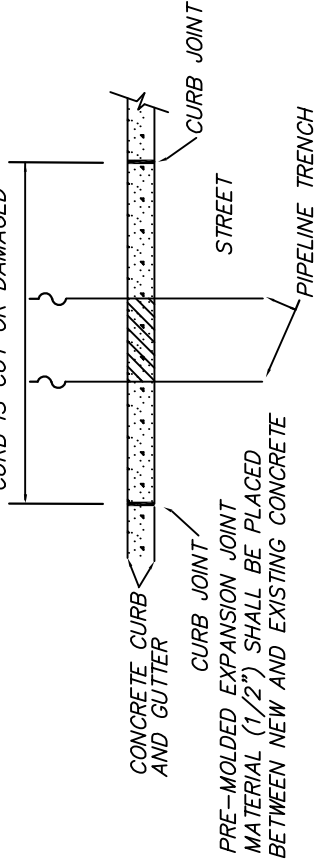
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STANDARD DRAWING

BACKFILL UNDER
SIDEWALK

DATE	MAY 2021	SCALE	NONE
DRAWING NO.	4400	SHEET	1 OF 1

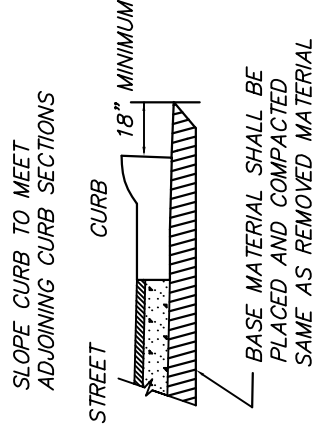
REMOVE AND REPLACE ENTIRE CURB
BETWEEN CONCRETE JOINTS WHEN
CURB IS CUT OR DAMAGED



PLAN VIEW

CURB RESTORATION FOR PIPELINE INSTALLATION

SECTION



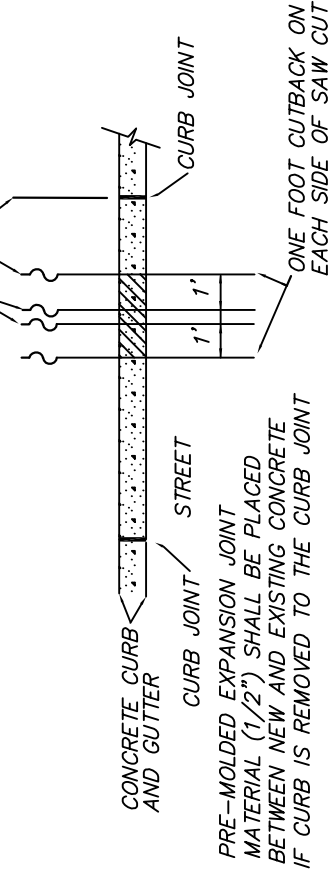
NOTES:

ALL CONCRETE SHALL BE A MINIMUM
CLASS "A" (3500 lb. CONCRETE).

AN APPROVED TYPE OF LIQUID CURING
COMPOUND WILL BE REQUIRED ON CONCRETE.
EXPANSION JOINT MATERIAL SHALL BE USED
BETWEEN CURB JOINTS AND CURBS AND
ADJOINING SIDEWALKS.

ALL EXPANSION MATERIAL SHALL BE
APPROVED NON-EXTRUDING PREFORMED
STRIPS (1/2" THICK).

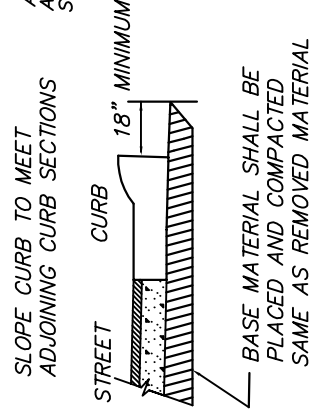
REMOVE AND REPLACE ENTIRE CURB
BETWEEN CUT BACK AND CONCRETE JOINTS
WHEN CUT BACK IS WITHIN 2 FEET OF CURB JOINT.



PLAN VIEW

CURB RESTORATION FOR SERVICE LINE INSTALLATION

SECTION

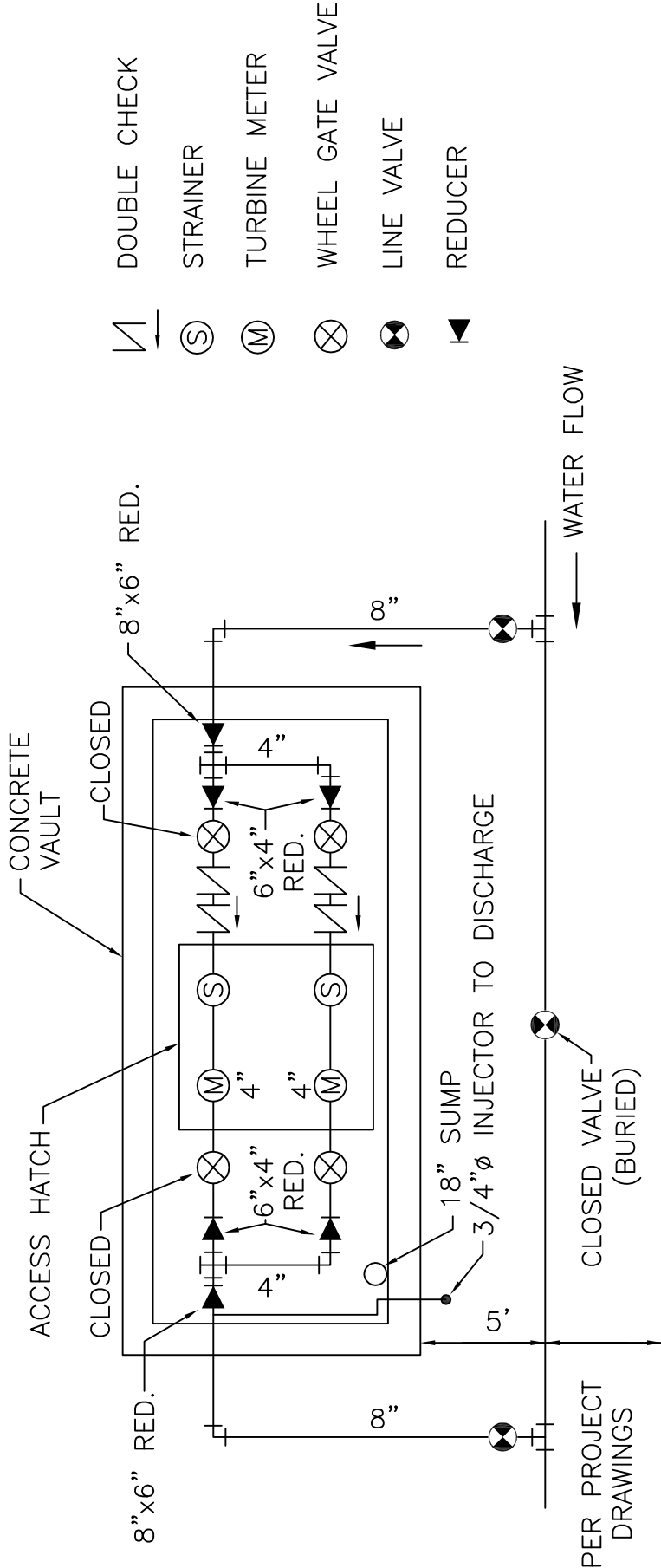


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STANDARD DRAWING

CONCRETE CURB AND GUTTER RESTORATION DETAIL

DATE	AUGUST 2018	SCALE	NONE
DRAWING NO.	4410	SHEET	1 OF 1



EDGE OF PAVEMENT

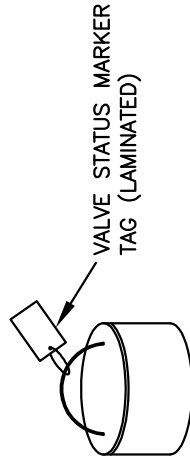
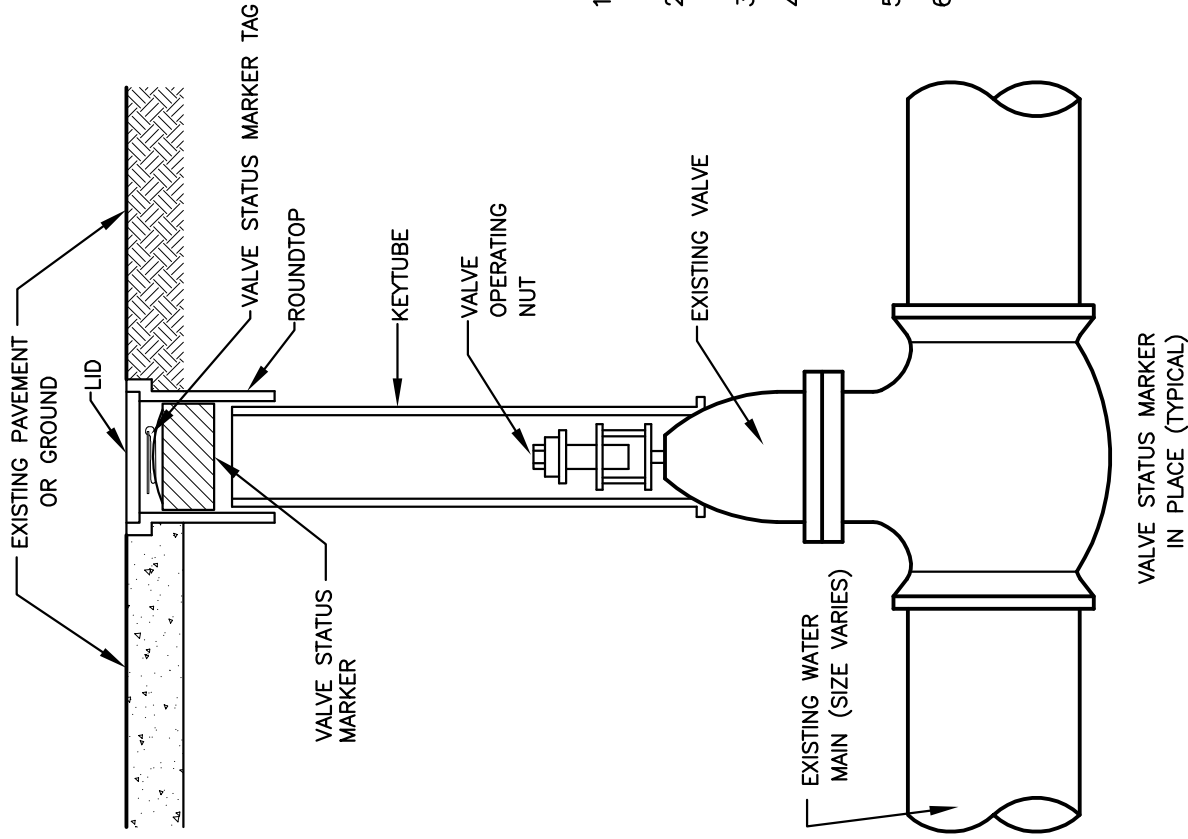
MASTER METER LAYOUT

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STANDARD DRAWING

TYPICAL MASTER
 METER DETAIL

DATE	AUGUST 2018	SCALE	NONE
DRAWING NO.	4600	SHEET	1 of 1



VALVE STATUS MARKER

TYPICAL MARKER TAG NOTES:

1. PRESSURE PLANE BOUNDARY VALVE – DO NOT OPEN
2. CLOSED VALVE – DO NOT OPEN
3. LEFT HAND OPEN
4. TEMPORARY CONSTRUCTION
–CLOSED VALVE: CONTACT LWC RADIO ROOM OR INSPECTION
5. VALVE PARTIAL OPEN # TURNS
6. NAME/DATE/CELL# (MORE DETAIL).

NOTES:

1. CONTACT PROJECT MANAGER OR COMPANY INSPECTOR FOR APPROVAL BEFORE OPERATING ANY VALVE.
2. NOTES ON PLUGS SHALL BE MADE USING A LAMINATED TAG ZIP TIED TO THE STRAP OR BY WRITING DIRECTLY ON TOP OF THE PLUG WITH A PERMANENT INK MARKER.

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STANDARD DRAWING

VALVE STATUS MARKER

DATE	FEBRUARY 2020	SCALE	NONE
DRAWING NO.	5005	SHEET	1 OF 1