

2011

CITY OF FLORENCE
PUBLIC SERVICES - WATER DIVISION

STANDARD SPECIFICATIONS & DRAWINGS FOR THE INSTALLATION OF WATER MAINS

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PART 1 - GENERAL

- 1.01 **INTRODUCTION** Unless modified, deleted, replaced, or otherwise changed, the latest published addition of the following documents shall be the accepted standard for materials and/or procedures for the construction of water mains and appurtenances:
- A. City of Florence Water Division's Standard Drawings
 - B. Natural Resources & Environmental Protection Cabinet, Division of Water
 - C. American Water Works Association's Standards (AWWA)
 - D. Recommended Standards for Water Works
- If a conflict exists between referenced sources, the more restrictive requirements shall prevail. The City shall provide interpretation as requested.
- 1.02 **DESCRIPTION** In general the following specifications are minimum requirement for water main design and installation. New design ideas and concepts are welcomed by the City, but subject to City's approval. Construction may be dictated by location, soil conditions, ground water, topography, etc. Additional provisions may be required by the City.
- 1.03 **DESIGN GUIDELINES** Plans are approved subject to the conditions of compliance with all applicable laws, rules, regulations and standards. Deviation from applicable laws, rules, regulations and standards will only be considered with appropriate justification submitted to the City's Engineering Dept. The proposed project may be constructed only in accordance with the approved plans. Plans submitted to the City for approval shall be on a 1" = 50' scale and plan sheets no larger than 24" X 36". It is strongly recommended that the design engineer meet with the City prior to plan submittals for review of overall project. Extensions from and connections to the public water system will be approved by the City where proper pressures and flows permit, provided there is a sufficient water supply developed and available for domestic use and fire protection to take on new or additional extension or service without detriment to those already served. The City will run a hydraulic analysis for every new line water main extension to ensure adequate water, as defined by the Ky. Division of Water, is available.

Water lines must be sized to meet the demands anticipated for the total development being designed. The design engineer and/or developer are responsible for properly sizing water mains to meet required demands of the development. Public water mains shall be installed in a public right of way with the exception of cross-country lines installed to eliminate dead ends and water mains installed on private property which are going to be maintained by the City. To allow for the future extension of the water system in an orderly manner, the water system shall be constructed to the developer's property limits which abut a proposed or existing public right-of-way or has a potential for future development and the termination shall be as described in the Standard Drawings and Specifications of the City or by for future development and the termination shall be as described in the Standard Drawings and connection to an existing main.

All improvement plans shall consist of street layout, lot or building layout and number, water main and appurtenance locations, and location of other utilities that may be in conflict. The Developer's Design Engineer is responsible to maintain an unobstructed area for the placement of the water main and appurtenances and allow no conflict with other utilities other than crossing of laterals. Utility laterals shall maintain a minimum of 6" outside diameter to outside diameter clearance except for storm and/or sanitary laterals, 18" clearance below the water main.

The four-(4) foot area over the water main, (3' from curbside) shall be a non-paved, strip totally unobstructed with the exception of:

- a) removable, post type mail boxes;
- b) utility laterals (gas, electric, telephone, and cable television) maintaining a minimum of 6 inch outside diameter to outside diameter clearance;
- c) no more than 30' of continuous pavement used as driveways or parking pads;
- d) street and sidewalk crossings;
- e) sidewalks (may not be over main, but could encroach on this four-(4) foot area on street radius, curves, and cul-de-sacs);

The ten-(10) foot area over the water main, centered (5' either side) shall be totally unobstructed with the exception of:

- a) items listed above;
- b) streets, curbs, and gutters;
- c) sidewalk pavement;
- d) storm drainage appurtenances

Additional requirements may be required for subdivision plans submittals that create double frontage lots (a lot other than a corner lot that has frontage on more than one public street) along public streets which currently do not have public water. The developer may be responsible for extending the water main along both sides of the double frontage lots if the property would benefit from the extension. If there is a future potential that a water main extension may be made by City's Extension Policy along the existing public street would be beneficial, as determined by the City, an agreement would need to be signed between the developer and the City.

- 1.04 **PLAN SUBMITTALS** All plans submitted must be dated and bear the stamp and signature of a Professional Engineer licensed in the State of Kentucky. Improvement plans shall be submitted in duplicate for preliminary review by the City. One copy of the improvement plan will be returned to the Engineer for corrections to meet the City's Standards. The Engineer will need to revise and resubmit six (6) sets of improvement plans. Also at this time a set of plans in digital format showing curb lines, a north arrow on a 1"= 50' scale will also be submitted for the City's GIS system. The City will not submit a project to the Ky. Division of Water until these digital format plans have been received. The Engineer will also need a check for a \$150.00 submittal fee made payable to the Ky. State Treasurer for final review by the City and Ky. Division of Water. The name of the project should be on the check. Ky. Division of Water's review fee for projects over 10,000 feet of water main will be \$325.00.

WATER SPECIFICATIONS

REVISION	BY	DATE	 <div>CITY OF FLORENCE 8100 EWING BLVD. FLORENCE, KENTUCKY 41042 Ph: (859) 647-5416 Fax: (859) 647-5438</div>		DATE:
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Distribution of approved plans will be made by City as follows: Two (2) copies retained by the City; four (4) copies submitted to the Ky. Division of Water. In accordance with Ky. Regulation 401 KAR 8:100 construction of the submitted project cannot begin until written approval has been received from the Ky. Division of Water.

- 1.05 **WATER MAINS ON PRIVATE PROPERTY** Water mains installed on private property which are going to be maintained by the City, shall have a twenty-(20) foot wide easement with the water main centered in the easement area and shall have a justifiable benefit to the City (serving more than one property owner, hydraulic more than one property owner, hydraulic benefits, etc.) A four-(4) foot area over the water main shall be a non-paved, strip totally unobstructed with the exceptions as outlined in DESIGN GUIDELINES. With appropriate justification, paving may be approved within the four-(4) foot area over cross-country water mains. Outside the ten-(10) foot area over the water main, 5' either side but within the overall easement area, other utilities may be placed in this area. Proper documentation shall be provided for all easement areas. For areas that are on recorded subdivision plats, the following statement may be used in lieu of the grant of easement forms:

WATER MAIN EASEMENTS (S)

The Water Main Easement(s) as shown on this plat are subject to the DECLARATION OF MASTER WATER FACILITY EASEMENT AGREEMENT as set forth in _____ of the _____ County Clerk's records at _____, Ky.
(Document Location) (County Name) (Court House)

Document Location at Various Court Houses:

Court House	Document Location	County
Alexandria	Easement Book 129, Page 145	Campbell
Boone County	Easement Book 54, Page 195	Boone
Covington	Miscellaneous Book 504, Page 311	Kenton
Independence	Miscellaneous Book 228, Page 73	Kenton
Newport	Easement Book 304, Page 466	Campbell

For other areas, the Design Engineer shall prepare an easement document suitable for recording with the County Clerk. Documents shall consist of a sketch (8 1/2" by 14"), a legal description of the twenty (20) foot easement with back references to Deed Book and Page number, and a signed Grant of Easement Form (Restoration agreement) provided by the City prior to filling the main for sterilization.

- 1.06 **WATER MAIN SIZE** Minimum public water main size shall be 8", unless it is determined by the City that a dead-end main has no potential for future development, the City may allow the last 600 feet of water main to be constructed as 6" water main. Conduits will need to be installed on the opposite lot lines of the electric service and at the proper depth with a tracing wire. Additional requirements may be required for the installation of conduits subject to the approval of the City. All water mains 12" and larger shall be min. class 50 D.I.P as determined by the City. The City does not allow water mains 10", 14" & 18" in size.

- 1.07 **DEAD ENDS OF WATER MAINS** Dead ends to water mains shall be prohibited unless approved by the City. Dead ends may be approved if one or more of the following conditions exists:

- A. The distance between the dead end and the other tie-in point is greater than 600 feet.
- B. Physical features exist between the dead end and the other tie- in point that in the opinion of the City make it impractical to tie them together.
- C. Slopes between the dead end and the other tie-in point is greater than 3 to 1.
- D. Slopes/terrain between the dead end and the other tie-in point is certified as geotechnically unstable by a qualified professional geotechnical engineer.
- E. It is necessary to purchase easements to run a water line through existing developed lots.

The City reserves the right to require certain dead ends to be connected even though they meet the above conditions. No services shall be permitted to be tapped on cross-country water mains. All dead end lines must be provided with a properly sized blow-off assembly, flush hydrant or fire hydrant. Flushing device should be sized to flow a velocity of at least 2.5 feet per second in the water main being flushed. No flushing device shall be directly connected to any sewer.

Cul-de-sacs streets of less than 300 feet long may be considered for the installation of a 6" D.I. looped water main for the elimination of the dead end. A fire hydrant shall be installed at the intersection of the cross street and a valve installed between the two tees for the 6" line.

- 1.08 **MULTIPLE WATER MAIN FEEDS** A minimum of two supply sources shall be required for subdivisions of one hundred (100) customers or more, more than one street, and/or there is potential development area that exceeds the number of customers or streets previously mentioned.

- 1.09 **MINIMUM WATER FLOW REQUIREMENTS** The water main extension at the most remote location shall be able to provide a minimum fire flow of 250 gpm for the installation of fire hydrants and the water system supporting this flow has the capability of providing this flow for a period of not less than two (2) hours plus consumption at the maximum daily rate. A minimum of 30 psi must be available on the discharge side of all meters. All water mains, including those not designed to provide fire protection, shall be sized after a hydraulic analysis based on flow demands and pressure requirements. If the water system cannot support the installation of fire hydrants, anchoring tees and valves shall be installed to allow for future fire hydrant installation when adequate water is available. If the water system extension is part of a subdivision development, the developer will be responsible for installing the anchoring tees and valves as described above and providing the City with a fire hydrant for each tee and valve installed as part of the subdivision. These fire hydrants will be installed by the City after water main improvements are made in the area which support the installation of fire hydrants.

WATER SPECIFICATIONS

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- 1.10 **HIGH PRESSURE AREAS** Additional requirements may be necessary for high-pressure areas (125 psi static pressure or higher) as determined by the City.
- 1.11 **VALVES** Sufficient valves as determined by the City shall be provided on water mains so inconvenience and public health hazards are minimized during repairs, and their location shall be approved by the City. All valves shall be operated by or under the direction of City personnel only. Valves shall be installed at each end of cross-country water mains.
- 1.12 **FIRE HYDRANTS** Fire hydrants shall be connected only to water mains adequately sized to carry fire flows and in no case to lines smaller than six (6) inch. Fire hydrant spacing shall be as recommended by the Boone County Planning Commission and the local fire department. Fire hydrants shall be located on or as close to side property lot lines as possible.
- 1.13 **PARALLEL INSTALLATION OF WATER AND SEWER LINES** Water lines must be located at a minimum lateral distance of ten (10) feet from any existing or future sewer lines and sanitary sewer manholes measured from outside diameters. A sewer is defined as any conduit conveying fluids other than potable water. Where a water line must be placed in the same trench as a gravity sewer line, the water line shall be located on a shelf 24" above and 24" to the side of the sewer line. This deviation will not be allowed for force mains.
- 1.14 **CROSSING OF WATER AND SEWER LINES** Water lines crossing under sewer lines, or crossing less than twenty-four (24) inches above sewer lines, one full length of water pipe shall be located so both joints will be as far from the sewer line as possible. Special structural support for the water and sewer pipes may be required.
- 1.15 **WATER CROSSINGS** Surface water crossings, both over and under water, present special problems which should be discussed with the City before improvement plans are prepared.

Over water crossings, the pipe shall be adequately supported, protected from damage, freezing, and accessible for repair or replacement. The pipe shall be of special construction having flexible, watertight joints. Valves shall be provided at both ends of water crossings so that the section can be isolated for test or repair.

Where the water main is constructed under a blue line stream, the pipe shall be protected with concrete encasement. This encasement shall extend a distance equal to the width of the channel measured from top of bank to top of bank. The encasement shall be per Standard Drawing No. 110. Valves shall be installed on each side of the water crossing in areas not subject to flooding when the crossing water courses greater than 15 feet in width (bank to bank). Permanent taps shall be installed on each side of the system side valve for leakage and sampling purposes. The Developer will be responsible for meeting the requirements of 401 KAR 4:050 and KRS 151.250 for sub-fluvial pipe line crossings.

- 1.16 **SAFETY** The "Manual of Accident Prevention In Construction" published by the Associated General Contractors of America, O.S.H.A Regulations and other state and local safety regulations shall be followed.
- 1.17 **MAINTENANCE PERIOD** The Developer shall be responsible for the maintenance of the installed water mains and appurtenances to City Standards for a period of not less than one (1) year from the date the water main is placed in service by the City. Approximately ten (10) months after the main is placed in service, an inspection will be conducted by the City to ensure that the water main and appurtenances were installed and maintained to City standards. If the 10-month inspection reveals that the installation does not meet City standards, the developer will be notified in writing to correct all discrepancies and/or problems within 60 days after notification. If the problems are not corrected within the 60-day period, the City shall make the corrections at the expense of the Developer. The Developer shall then be billed by the City at a rate of time and material plus overhead or at the rate of actual cost plus overhead when done by an available contractor hired by the City. Payment is required within 30 days of invoice date.
- Non-payment of invoice after 45 days by the Developer creates an indebtedness to the City. This indebtedness to the City will result in no future water being provided to the Developer on all existing and future water main projects and/or phases until all indebtedness is paid in full.
- 1.18 **APPLICATION FOR SERVICE** Application for water service will only be accepted after the water main bacteria samples are shown to be negative following disinfection and the main is placed in-service by the City. No service installation will be scheduled until the water main is approved and turned on.
- 1.19 **CONDUITS FOR WATER SERVICES ON OPPOSITE SIDES OF WATER MAIN** The developer will be responsible to run conduit pipes for each lot that is on the opposite side of the water main. These conduits shall be 4" minimum in size and they must come across to the center of the lot from the center of the lot. The street shall be marked in the concrete curb with a "W" according to the crossover plan. The City of Florence does not supply the plan. This is noted on developer submitted plans.

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PART II - MATERIALS

2.01 WATER MAIN PIPE AND FITTINGS

- A. Class 50 Ductile Iron Pipe (D.I.P) shall be used where elevations are below 800'.

Class 50 Ductile Iron Pipe (D.I.P) - A minimum of Class 50 Ductile Iron pipe shall conform to the latest edition of AWWA C151. All pipe shall be clearly marked as to class by the manufacturer. "Push-on single gasket" type joints shall conform to the latest edition of AWWA C-111. Pipe shall have a standard thickness cement mortar lining in conformance with AWWA C-104.

Under no conditions shall pipe line deflection measured between joints exceed the manufacturer's published recommended standard for that type of pipe. The maximum deflection at push-on joints and/or mechanical joints shall be 5 degrees or as recommended by Manufacturer. All D.I.P. shall be polyethylene wrapped.

- B. Poly Vinyl Chloride (PVC) DR14 200 psi shall be used where elevations are 800' and above. No DR 18 is allowed.

Polyvinyl Chloride Pipe (P.V.C.) -14, Pressure Class of 200 psi P.V.C. pipe shall conform to the latest edition of AWWA C900, must be NSF approved and manufactured in accordance with ASTM standards. All pipe shall be clearly marked as to class by the manufacturer. The outside diameter shall be equivalent to D.I.P. Pipe shall have gasket bell end type joints furnished complete with gaskets meeting the latest edition of ASTM F477. Solvent weld joints are prohibited.

P.V.C. pipe shall be permitted for use in residential subdivisions and along city and county roads as approved by the City. Pipe size shall be limited to 6", 8" & 12". P.V.C. pipe shall not be installed in high pressure areas where the static system pressures exceeds 125 psi or other system conditions exist which increase pressures over 125 psi. as determined by the City. P.V.C. pipe cannot be used for cross country lines, along state highways, water crossings, or installed within 200 feet radius of oil or gasoline lines, underground storage tanks, petroleum storage tanks or pumping stations.

P.V.C. pipe may be tied into an existing ductile iron main in a subdivision when the extension is over 450 linear feet of main, or when the pipe is installed around a cul-de-sac or a dead-end street with no possible extension of the street as approved by the City. Transition between D.I.P. and P.V.C. pipe shall be made with some type of ductile iron fitting such as Field Loc gaskets.

Beveled spigot ends must have a minimum bevel of 8 degrees to a maximum bevel of 15 degrees. The vertical face of the spigot end may not exceed 75 % of pipe wall thickness and the horizontal length of the bevel shall not exceed 1.25 inches. Field beveled spigot end shall be made per manufacturers recommendation and as approved by the City. The degree of bevel shall be approved for the type of pipe being installed.

P.V.C. Pipe Shipping, Handling & Storage - The front end of all pipe delivered by truck shall be covered for protection against exhaust fumes. P.V.C. pipe shall be protected from exposure to sunlight according to manufacturer's recommendations. Pipe will not be accepted for installation if discoloration is evident due to sunlight or other exposure. Pipe shall be stored in such a manner to prevent beaming the pipe.

- C. Tracing Wire - All P.V.C. pipe and Cross-Country Water Main shall be installed with a 12 gauge solid copper (P.V.C coated) tracing wire taped to the top of the pipe every 5'. Maximum tracing wire length shall be 500' without terminating in a curb stop box. Water main installations that stop short of the permanent fire hydrant tee, the tracing wire shall be terminated in a curb stop box. Curb stop boxes shall not be located in pavement areas. Splices in the tracing wire shall be kept to a minimum and approved by the City. If splices are required, they shall be made with copper split bolt (Ilsc0 #IK-8 or approved equal) and taped with electrical tape. Should the type of pipe change to D.I.P., the tracing wire shall be terminated in a curb stop box at the point where the transition is made.

- D. Magnetic Identification Tape - "Water" Magnetic Identification Tape shall be placed, face up, on the surface of the cover material.

- E. Fittings - All fittings and accessories shall be Ductile Iron, rated for a minimum of 200 psi working pressure or as specified herein. The fittings and accessories shall be new and unused. All pipe fittings shall be mechanical joint fittings. Mechanical joints shall conform to AWWA C111. Bolts and nuts shall be high strength, corrosion resistant alloy, such as "Cor-Ten" or approved equal. Ductile Iron Compact Fittings shall conform to AWWA C153 and Full Body Fittings to AWWA C110. A bituminous seal coat shall be applied to the outside of the fitting. All ductile iron fittings shall be cement lined and seal coated in accordance to AWWA C104.

- 2.02 **POLYETHYLENE WRAP** All ductile iron pipe, fittings, valves, and fire hydrant leads shall be polyethylene wrapped, installed according to the current edition of AWWA C105. Ductile iron fittings, valves, and fire hydrant leads used in the installation of P.V.C. pipe shall be included. Polyethylene wrap shall be 8-mil thickness low-density film or 4-mil thickness high-density cross-laminated polyethylene tube per AWWA C105. The contractor shall cut the roll in tubes 2 feet longer than a standard length of pipe.

Each tube shall be slipped over the length of pipe, 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. Pipe shall not be wrapped and stored on site for any period of time, but wrapped and immediately placed in the trench, fittings shall be wrapped prior to installing blocking or pads. (see Standard Drawing #104) Polyvinyl chloride pipe requires no wrap. 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 appliances and bringing the edges together, folding twice, and taping down.

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- 2.03 **VALVES** All valves shall open by turning counter-clockwise with the operation of a 2 inch square operating nut. All valves shall have openings through the body of the same circular area as that of the pipe to which they are attached. Valves shall have mechanical joint ends except Tapping Valves.
- A. **GATE VALVES** Valves 12 inches and smaller shall be resilient seated gate valves, non-rising stem with rubber "O" ring packing seals, rated at 250 psi working pressure and conform to the applicable portions of AWWA Standard C509, Latest Edition. High pressure gate valves shall be required when the pressure exceeds 200 psi. Valve bodies shall be ductile iron, glands shall be the same material as the valve. All external dome and packing bolts shall be stainless steel. The valves shall open by turning counter-clockwise. All valves shall have openings through the body of the same circular area as that of the pipe to which they are attached. Valves shall have mechanical joint ends unless otherwise shown on the plans or directed by the City. An extension stem shall be furnished by Developer if required, to bring the operating nut within 3-1/2 feet of finished grade. Extension stems shall be securely fastened to the valve stem. The Contractor shall make all valves tight under their working pressures after they have been placed and before the main is placed in operation.
- B. **TAPPING SLEEVE AND VALVES** Tapping sleeves and valves shall be designed for a working pressure of 200 psi. The tapping sleeve together with the tapping valve shall be tested at 250 psi for visible leakage before the main is tapped. Tapping sleeve and valve used in high pressure areas shall be tested at 350 psi.
1. Tapping Sleeves - Tapping sleeves shall be a two piece body with mechanical joint type ends, and be so designed as to assure uniform gasket pressure and permit centering of the sleeve on the pipe.
 2. Tapping Valves - Tapping valves shall be resilient seated gate valves, rated at 200 psi (unless installed in high pressure service area) and conform to the applicable portions of AWWA Standard 509, latest edition except that the seat rings shall be oversized to permit entry of the tapping machine cutter. All external dome and packing bolts shall be stainless steel. Tapping valves shall be ductile iron body, non-rising stem with rubber "O" ring packing seals. Tapping valves shall have a flange on one end for bolting to the tapping sleeve and a mechanical joint type end connection on the slotted standard flange or other adapters for connection to the tapping machine.
- C. **BUTTERFLY VALVES** Valves 16 inches and larger shall be ductile iron body butterfly valves rated at 250 psi working pressure and conform to AWWA Standard C504, Latest Edition. City shall approve all butterfly valves before installation.
- D. **VALVE STEM EXTENSIONS** A valve stem extension shall be installed by the contractor to bring the operating nut within 2 1/2 to 3 1/2 ft. of final grade. Extension stems will be supplied by the Contractor if the extension is justified.
- 2.04 **VALVE BOXES** All valves shall be provided with valve boxes. Valve boxes shall be of standard, adjustable, heavy duty cast iron extension type, two piece, 5 1/4 inch shaft, screw type, and of such length as necessary to extend from valve to finished grade, Tyler #562-S, Tyler #564-S or approved equal. Valve box cover shall be stamped "Water". Tops shall be set at final established grade. If valve boxes are not of sufficient height to bring the top of the box to final grade, a section of 6" ductile iron pipe for pavement areas and 6" PVC for non-pavement areas may be used to extend the valve box to final grade with prior approval from the City. The length of pipe shall permit the valve box to be adjusted up and down. All valves will be installed with a box-lok type valve box centering ring or approved equal.
- 2.05 **FIRE HYDRANTS** All fire hydrants shall have auxiliary valves for isolating water flow to the hydrant. All fire hydrants and auxiliary valves shall be positively locked to the water main by restrained joints, hydrant adapters, or other approved method. Hydrants shall be designed to 200 psi working pressure and shall be shop tested to 300 psi hydrostatic pressure with the main valve both open and closed. High pressure fire hydrants will be required when pressures exceed 150 psi.

The barrel shall have a breakable safety section and/or base bolts just above the ground line. Hydrants shall have a main valve opening of 5 1/4 inches, a 6 inch mechanical joint inlet to be suitable for setting in a trench 3' 6" deep minimum, and shall be the traffic style hydrant so that the main valve remains closed when the barrel is broken off. Hydrants shall have a dry top and shall be self draining, when the main valve is closed. Self draining hydrants shall drain to dry wells provided exclusively for that purpose. Hydrant drains shall not be connected to storm or sanitary sewers. Hydrants shall be rotatable in a minimum of eight (8) positions in 360 degrees.

All hydrants shall have two (2) - two and one half (2 1/2) inch hose nozzles and one (1) steamer or pumper connection threaded to conform to City of Florence's Standards: steamer nozzle shall be National Standard Thread and 2 1/2" outlets shall be Old Cincinnati Thread. The operating nut and the nuts of the nozzle caps shall be square in shape, measuring one (1) inch from side to side. Hydrant body shall be painted yellow for areas designed for 150 psi working pressure and red for areas in excess of 150 psi. Hydrants used in areas in excess of 150 psi working pressure shall be designed to operate at the higher pressures and shall have independent operating valves on each 2 1/2" outlet.

All hydrants shall be right hand open, clockwise, as determined by the City and shall have a direction arrow of operation cast into the dome of the hydrant. Installation per Standard Drawing 109.

The following fire hydrants are approved for installation in the City's system: Mueller, Clow Eddy, Kennedy, American Darling, American AVK, and American Flow.

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- 2.06 **PRESSURE REDUCING VALVES** Pressure reducing valves will be installed by the City in regular 2" and smaller meter settings when the static system pressure is at or above 125 psi for new and old services when deemed necessary by the City. Pressure reducing valves are only installed to protect the meter. The City will not be liable for any damage due to pressure conditions caused by or arising out of the failure or defective condition of such pressure regulator or for damage that may occur through the installation, maintenance, or use of such equipment.
- 2.07 **AIR RELEASE VALVES AND/OR TAPS** Air release valves shall be installed in the high points of the water mains where fire hydrants are not installed and as required by the City and in accordance with Standard Drawing No. 106. 8" and smaller water mains, tap size and piping shall be 3/4", 12" water main - 1", & 16" and larger water main - 2". Temporary taps of suitable size may be required at certain points on the water main for the release of air for filling and/or flushing purposes. Temporary taps will be removed and plugged after use. Automatic air relief valves shall not be used in situations where flooding of the manhole or chamber may occur.
- 2.08 **STEEL CASING PIPE** Casing pipe shall be steel pipe with a minimum yield strength of 35,000 psi with a minimum wall thickness as listed below:

Nominal Diameter Casing Pipe	Normal Wall Thickness	Nominal Diameter Casing Pipe	Normal Wall Thickness
Under 14"	0.251"	26"	0.438"
14" & 16"	0.282"	28" & 30"	0.469"
18"	0.313"	32"	0.501"
20"	0.344"	34" & 36"	0.532"
22"	0.375"	38", 40", & 42"	0.563"
24"	0.407"	48"	0.626"

The inside diameter of the casing pipe shall be at least four (4) inches greater than the outside diameter of the carrier pipe joints. Steel casing sections shall be connected by welding, conforming to AWWA C206.

Adequate pipe spacers shall be installed to ensure that the carrier pipe is adequately supported in the center of the casing pipe throughout its length, particularly at the ends to offset settling and possible electrical shorting. Manufactured pipe spacers shall be installed per manufacture's installation requirements. There shall not be any metallic contact between the casing and carrier pipe. Casings shall have both ends sealed up in such a way as to prevent the entrance of foreign material. See Standard Drawing #114 for installation details.

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PART III - INSTALLATION OF WATER MAINS AND APPURTENANCES

- 3.01 **GENERAL** Installation of water mains and appurtenances shall conform to the latest edition of AWWA Standard C600 for D.I.P., C605 for P.V.C. type pipe.

Water main pipe and fittings shall be laid on a good level foundation with no gaps or humps under the pipe or fittings. Excavation shall be done by hand at joints to prevent the pipe and fittings from being supported by the mechanical joint or slip joint bell. Transition between D.I.P. and P.V.C. type pipe shall be made with some type of ductile iron fitting. Repairs to or section replacement of D.I.P. shall not be made using P.V.C. materials. Pipe shall be laid with the bell ends facing in the direction of laying.

The interior of the pipe shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations. ALL OPEN ENDS ARE TO BE CLOSED WITH CAPS OR PLUGS AT ALL TIMES WHEN PIPE LAYING OPERATIONS ARE NOT IN OPERATION AND AT THE END OF THE DAY. All caps or plugs shall be properly installed and blocked in advance of filling, flushing, and testing mains. All securing and blocking shall be inspected by the City prior to back filling of ditch.

- 3.02 **CONTRACTORS RESPONSIBILITY** All work performed on any water mains and/or appurtenances that are owned or anticipated to be owned by the City shall be completed under the direction of the City adhering to an acceptable plan approved by the City. A minimum of 24 hours notice shall be given to the City by the contractor prior to the start of water main work. If the interruption of service to any customer of the City is necessary, the Contractor shall make arrangements to provide such shutdown and notify City customers at the direction of the City Inspector. One set of City approved plans shall be on the job site during construction. Water main construction will not be permitted to start until all approvals are received. There shall be no deviation from the approved plans without written approval from the City.

- 3.03 **HANDLING** Pipe, fittings, valves, hydrants, and accessories shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Pipe hooks that extend inside the ends of the pipe shall not be used for handling the pipe since they could damage the lining. Under no circumstances shall such materials be dropped. Pipe handled on skid ways shall not be skidded or rolled against other pipe. All bolts shall be tightened with proper wrenches and must have equal tension. The interior of all pipe, fittings and other accessories shall be kept free from dirt and foreign material at all times. When handling P.V.C. pipe care should be taken to avoid abrasion damage, gouging of the pipe, rocks, and any stressing of the bell joints or damage of the bevel ends.

- 3.04 **TRENCHING, GRADE, AND COVER** Typically no trenching or laying of pipe or fittings shall be done until pavement (curbs) has been installed. In cases where water main installation is required under new pavement (side streets) main may be installed from trench stakes. When main installation is done prior to the pavement completion, test holes may be required by the City if valve depth, service taps or other evidence indicates that the minimum or maximum cover requirements are not met or that the main is in the wrong location. The contractor will be responsible for digging test holes at intervals required by the City to verify depth and location.

All trenching, grade, and cover work shall conform to the lines and grades established, and shall be done according to the drawings and specifications, subject to such modifications as the City may determine to be necessary during the execution of the work. Trenches for water lines shall be of a depth that will provide a minimum cover over the top of pipe of three (3) feet and a maximum of four (4) feet from the final finished grade. Cover over four feet in depth will not be allowed unless approved by the City to avoid interference with other utilities. Kentucky Dept. of Transportation requires a minimum of 42" of cover for water mains under roadways, ramps and ditch lines.

The Contractor shall establish all locations, lines, and grades in advance of all work where practical. In addition the Contractor will keep the City of Florence informed a reasonable time in advance of the times and places in which the Contractor intends to work (minimum advance notice shall be one working day, 24 hours).

3.05 TRENCH EXCAVATION

- A. **TRENCH WIDTH** Widths of trenches shall be held to a minimum to accommodate the pipe and appurtenances. The trench width shall be measured at the top of the pipe barrel and shall conform to the following limits:

Earth

Minimum - outside diameter of the pipe barrel plus 8 inches, 4 inches each side of pipe.

Maximum - nominal pipe diameter plus 24 inches.

Rock

Minimum - 24" or less, nominal pipe size: outside diameter of pipe barrel plus 12 inches, @ 6 inches each side.

Minimum - Larger than 24", nominal pipe size: outside diameter of pipe barrel plus 18 inches, @ 9 inches each side.

Maximum - nominal pipe diameter plus 24 inches.

- B. **BUTTERFLY VALVES** Trench width shall be over excavated 24" on the side that the operating mechanism is located on the butterfly valve when the surrounding area cannot be hand dug.

- 3.06 **BOTTOM PREPARATION** The Contractor shall use excavation equipment that produces an even foundation. For the entire length of the trench, a compacted 6" layer of sand, bankrun or granular material shall be installed below the pipe. Bell holes and depressions for joints, valves, and fittings shall be dug after the trench bedding has been graded in order that the pipe rest upon the prepared bedding for as nearly its full length as practicable. Bell holes and depressions shall be only of such length, depth, and width as required for properly making the particular type of joint.

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- 3.07 **UNSTABLE SUBGRADE MATERIAL** When the sub-grade is found to include non-approved backfill material (rock, refuse, organic material, etc.), such material shall be removed to a minimum of six (6) inches below the bottom of the pipe and backfilled with sand, backrun or granular material and thoroughly compacted.
- 3.08 **UNSTABLE SUB-GRADE** If the material forming the trench bottom is not suitable for a good foundation, a further depth shall be excavated and backfilled with an approved backfill material and thoroughly compacted or a foundation shall be constructed using piling, treated timbers, concrete, or other materials as directed and approved by the City.
- 3.09 **PIPE LAYING** Pipe shall be laid with bell ends facing in the direction of laying. After placing a length of pipe in the trench, the spigot end shall be centered in the bell and the pipe forced home. All pipe shall be laid with ends abutting and true to line and grade. Deflection of pipe joints in excess of the manufacturer's recommendations shall not be permitted. Caps or plugs shall be installed to prevent the entrance of foreign material whenever pipe laying operations are not in progress.
- 3.10 **PIPE CUTTING** Cutting of pipe for installing valves, fittings, or hydrants shall be done in a neat and workmanlike manner without damage to the pipe or lining. The end shall be smooth and at right angles to the axis of the pipe. Flame cutting of metal pipe by means of an oxyacetylene torch shall not be permitted.
- 3.11 **PUSH-ON JOINTS** The surfaces with which the rubber gasket comes in contact shall be thoroughly cleaned just prior to assembly. The gasket shall then be inserted into the groove in the bell. Before starting joint assembly, a liberal coating of special lubricant, per manufacturers recommendation, shall be applied to the spigot end. (Special lubricant shall be suitable for use in potable water) With the spigot end centered in the bell, the spigot is pushed home per manufacturers recommendations. Insertion of spigot into PVC type pipe bell should be inserted until the reference mark is flush with the end of the bell. Over insertion of the pipe is not recommended per the manufacturer. Pipe joint materials which prevent permeation by petroleum products shall be used within 200 foot radius of oil or gasoline lines, underground storage tanks, petroleum storage tanks or pumping stations.
- 3.12 **MECHANICAL JOINTS** Mechanical joints for D.I.P. and P.V.C. type pipe require that the spigot be carefully located in the bell. The surfaces with which the rubber gasket comes in contact shall be thoroughly cleaned just prior to assembly. These clean surfaces shall be brushed with a special lubricant just prior to slipping the gasket over the spigot end and into the bell. (Special lubricant shall be suitable for use in potable water) The lubricant shall also be brushed on each gasket prior to installation to remove the loose dirt and lubricate the gasket as it is force into its retaining space. P.V.C. type pipe spigot ends shall be field cut smooth and at right angles to the axis of the pipe for installation in mechanical joint fittings. Care shall be taken to ensure that the P.V.C. plain end is completely home into the mechanical joint fitting.
- 3.13 **RESTRAINED JOINTS** Ball and Socket joints shall be assembled and installed according to the manufacturers recommendations. Other restrained joint-type pipe and fittings shall only be used as approval by the City. Retaining glands, field lock gaskets, or retaining flanges maybe used as temporary blocking but shall not be considered as providing a permanent restrained joint or as an alternate for permanent concrete blocking. The use of these type of restraining joints need to be approved by the City prior to installation.
- 3.14 **SETTING VALVES** Valves shall be set on a firm solid concrete block foundation so that no load will be transferred to the connecting pipe. Valves in water mains shall, where possible, be located on the side property lines extended, unless otherwise shown on the plans. A valve box shall be provided for every valve. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the operating nut of the valve. The box cover shall be set flush with the surface of the finished pavement unless otherwise shown. All valves boxes with the exception of isolating valves for fire hydrants that are located in non-paved areas shall have a minimum 2' by 2' by 4" concrete pad as shown in Standard Drawing No. 105, unless a smaller pad is approved by the City.
- 3.15 **SETTING FIRE HYDRANTS** Hydrants shall be located as shown on the plans or as directed by the City. The location shall provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians. All hydrants shall stand plumb with the pumper nozzle facing the curb. Hydrant shall be set to the established grade, with the traffic flange within 4" above final grade in accordance to Standard Drawing No. 109. Each hydrant shall be controlled by an independent gate valve with valve box. All valves used for hydrant control shall be anchored to the branch tee. Fire hydrant barrel extension shall be limited to a one piece assembly only, stacking two or more extensions is prohibited. Maximum fire hydrant barrel extension is 2 feet.
- 3.16 **CROSS-COUNTRY WATER MAINS** All cross-country water mains shall be installed with a tracing wire as described in Part II, Section 2.01 - F- Tracing Wire.
- 3.17 **THRUST BLOCKING** All bends over five (5) degrees shall be securely blocked against movement with concrete thrust blocks placed against undisturbed earth in accordance with Standard Drawing No. 104 & 104-A. Two forms of restraint are required on bends 45 degrees and larger. Thrust blocks shall be approved by the City prior to backfilling. Water mains shall have concrete thrust block at all pipe intersections and changes of direction to resist forces acting on the pipeline. All concrete thrust blocks shall be poured in such a manner that the bolts can be replaced without disturbing the blocking. All caps or plugs used in mains to undergo hydrostatic test shall be properly installed and blocked in advance of testing mains. All caps or plug installations shall be approved by the City representative before the main is subjected to the pressure test. The City may permit the use of restrained type glands, gaskets, 3/4" welded eye bolts @ a 90 degree bend & 3/4" threaded rods or other means as prior approved by the City for temporary restraint only. Permanent concrete thrust restraint shall be provided with any temporary restraint. Duc-Lucs are prohibited for use.
- 3.18 **TRENCH BACKFILL TO 12" OVER PIPE BARREL** All trench excavations shall be backfilled immediately after pipe is laid with the exception of thrust blocks. Compacted sand, bankrun or granular material shall be used to backfill the trench from the bottom of the pipe barrel to the 12" over the pipe barrel. Backfill material shall be free from cinders, refuse, organic material, boulders, top soil, frozen material, material with a high void content, rocks 1 1/2" or larger measured in any direction, sharp stones and crushed rocks larger than 3/4", or other materials which in the opinion of the City is unsuitable. No flushing of backfill shall be permitted to achieve compaction.

WATER SPECIFICATIONS

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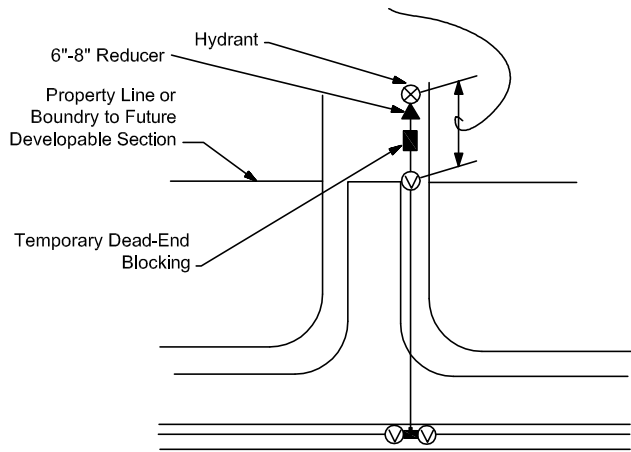
- 3.19 **REMAINING TRENCH BACKFILL IN NON-PAVEMENT AREAS** From 12" above the pipe barrel to the surface, excavated trench material may be used as backfill material or as required by local or county authorities. No material shall be used for backfill that contains frozen earth, vegetable or organic material, debris, rocks 8" or larger measured in any direction, or earth with an exceptionally high void content. Compaction of remaining trench backfill shall be as required by local or county authorities.
- 3.20 **REMAINING TRENCH BACKFILL IN EXISTING PUBLIC ROADWAYS** Roadway opening permits shall be obtained from the local City, County or Ky. State Dept. of Highways if applicable. The minimum requirements for backfill beneath all existing public roadways from 12" above the pipe barrel to subgrade shall be flowable fill unless City, County, or State have additional requirements. The flowable fill shall comply with the latest edition of the Kentucky Transportation Cabinet/Department of Highways "Standard Specifications for Road and Bridge Construction". The remaining trench backfill to final grade shall match the existing pavement/surface conditions.
- 3.21 **DISINFECTION** Water Mains designed to carry water for domestic consumption shall be thoroughly cleaned, flushed, and disinfected before being put in service and before acceptance by the City. Disinfection shall be done by the addition of suitable amounts of chlorine or liquid sodium hypochlorite in such amounts to produce a concentration of at least fifty (50) ppm and a residual of at least twenty five (25) ppm at the end of 24 hours and followed by thorough flushing. The application shall be as approved by the City and in accordance with AWWA C651 and applicable Ky. Division of Water requirements. The Contractor shall be responsible for de-chlorination of the disinfection water. All non-disinfected fittings used for tie-ins or repairs shall be cleaned and swabbed with a hypochlorite disinfecting solution prior to installation. New water distribution lines shall not be placed into service until bacteriological samples taken at the points specified in 401 KAR 8:150 Section 4 (2) are examined and are shown to be negative following disinfection.
- A. **TABLET METHOD** Calcium hypochlorite tablets shall be installed in each length of pipe to insure a sufficient dosage of 50 ppm based on the following table:
- | Pipe Diameter | Tablets per Length |
|---------------|-----------------------|
| 6" | 2 ea. -5 gram tablets |
| 8" | 4 ea. -5 gram tablets |
| 10" | 6 ea. -5 gram tablets |
| 12" | 8 ea. -5 gram tablets |
| 16" | 14 ea. -5gram tablets |
- The tablets shall be attached by a food-grade adhesive such as Permatex No. 2 or Permatex Clear RTV Silicone Adhesive Sealant. Tablets shall be attached inside and at the top of the main with approximately equal numbers of tablets at each end of the pipe. Tablets must be water soluble.
- B. **LIQUID CHLORINE METHOD** Disinfection may be done by the addition of suitable amounts of chlorine in the form of liquid sodium hypochlorite as per AWWA B300 to obtain the results as the previous method described. Note: Permission for this method of disinfection shall be obtained by the City prior to construction.
- 3.22 **PRESSURE TESTING** The water main being tested shall have all air expelled by additional flushing or the installation of taps on high points in the line. The pressure of the water main shall be gradually increased to obtain a minimum pressure of 100 psi over the design pressure (50 psi minimum) at the lowest elevation point of the water main or as directed by the City. The test will be for a two (2) hour duration and will not lose pressure or 200psi for twenty (20) minutes with no loss of pressure. All tests performed for each test section shall be witnessed and approved by a representative of the City. In the event any test is performed without a representative of the City, the Contractor shall be required to test the section again.

WATER SPECIFICATIONS

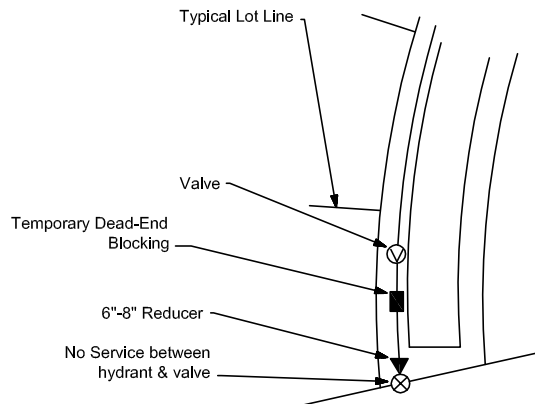
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NO SERVICES

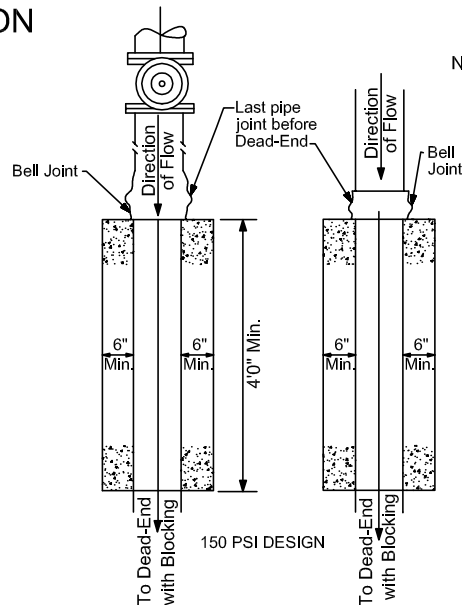
between hydrant & valve.



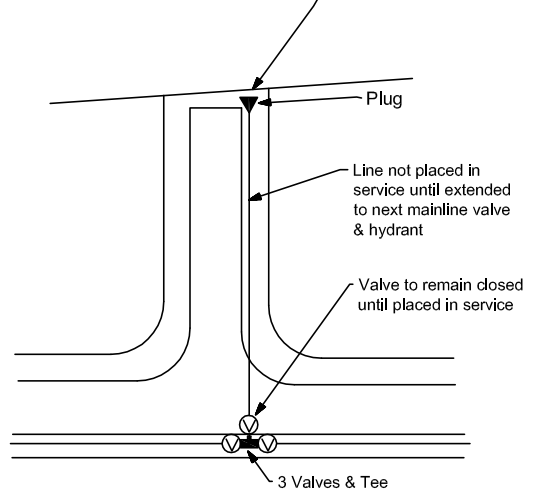
FUTURE SIDE STREET WITH SERVICE ON BRANCH LINE



DEAD-END STREET WITH PROPOSED FUTURE EXTENSION

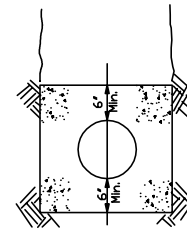


Property Line or Boundry to Future Developable Section



FUTURE SIDE STREET WITHOUT SERVICES ON BRANCH LINE

Water Mains under paved surface shall not exceed maximum 30 lin.Ft., this does not apply to street intersections.



Blocking shall be Class "A" Concrete or Flowable Fill as approved by the City.

DETAIL FOR TEMPORARY DEAD-END BLOCKING

NOTE: Blocking shall be inspected by the City prior to backfilling.

WATER MAINS TERMINATIONS

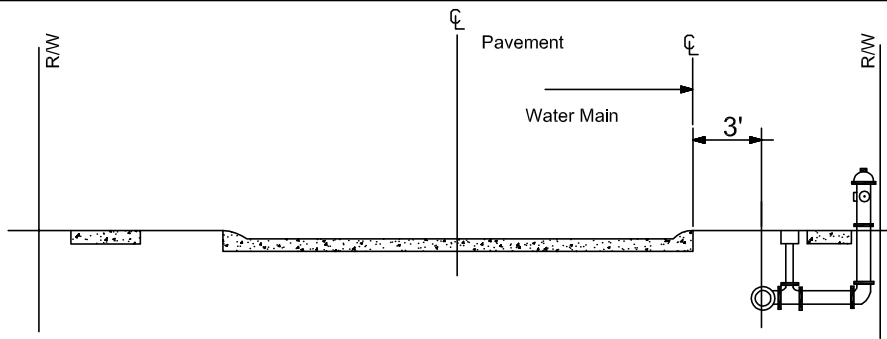
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REVISION	BY	DATE

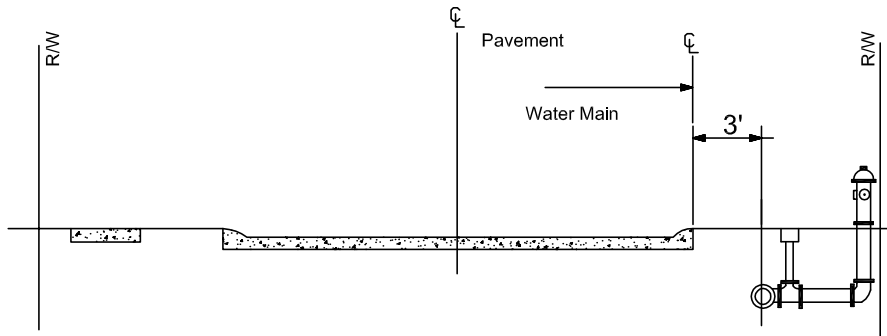


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STREET WITH SIDEWALK

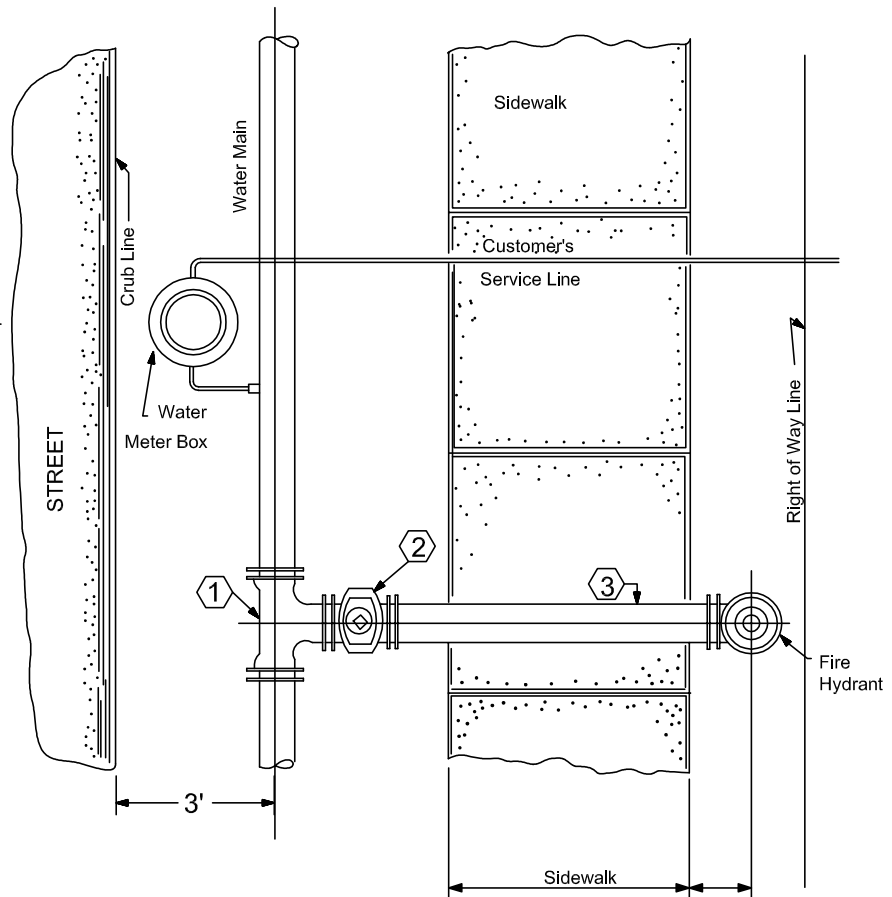


STREET WITHOUT SIDEWALK

DRAWING NOTES

- ① Mechanical Joint Anchoring Tee-Clow No.F-1217 or equal as approved.
- ② Mechanical Joint Gate Valve
- ③ Mechanical Joint Anchoring Pipe Clow No.F-1216 or Approved equal Length as required.

All ductile iron pipe, fittings and valves shall be wrapped with polyethylene encasement in accordance with specifications.



WATER MAINS TERMINATIONS

N.T.S.

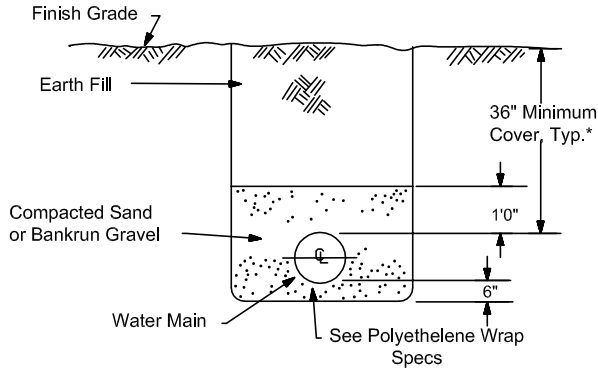
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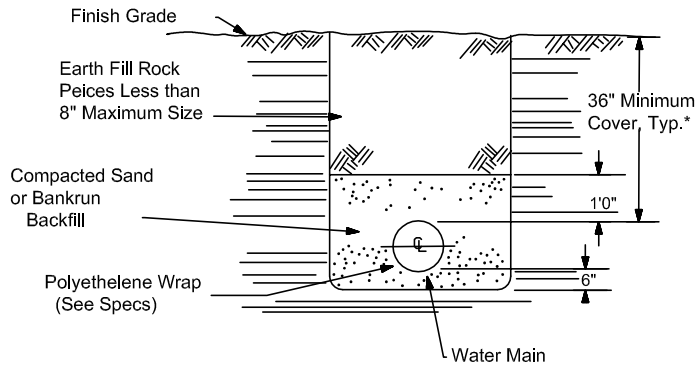
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SUBDIVISION CONSTRUCTION

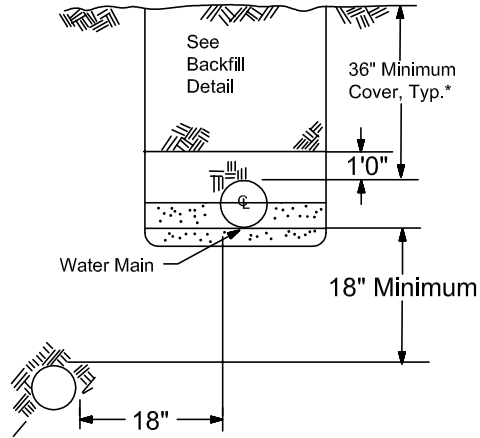


**EARTH CUTS
TRENCH DETAIL**



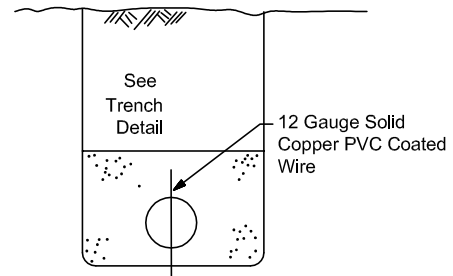
**ROCK CUTS
& UNSTABLE SUBGRADE
TRENCH DETAIL**
* 48" Maximum Cover

ALTERNATE TO BE USED ONLY ON APPROVAL
BY THE CITY

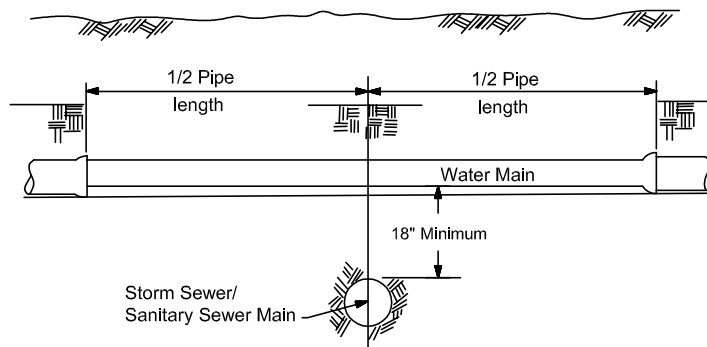


Water Main must be located a minimum of 10 feet lateral distance from any existing or future sewer lines or manholes, or as shown in the above alternate.

**WATER MAIN PARALLELING
SEWER MAIN**



PVC PIPE



WATER MAIN CROSSING SEWER

TYPICAL PIPELINE TRENCH DETAIL

N.T.S.

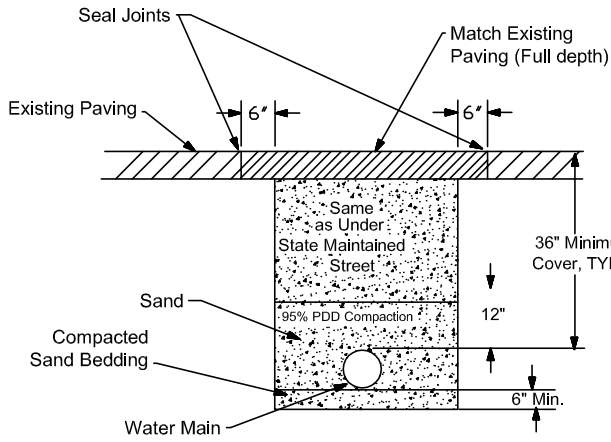
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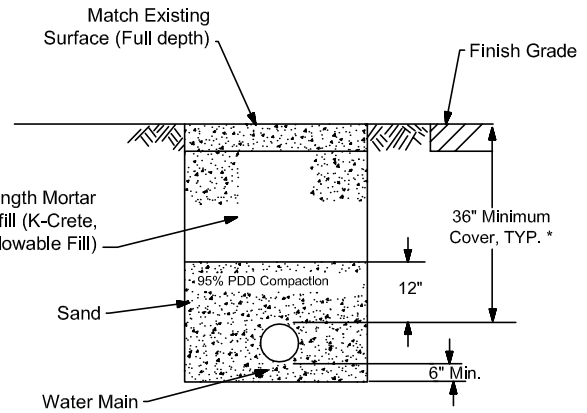
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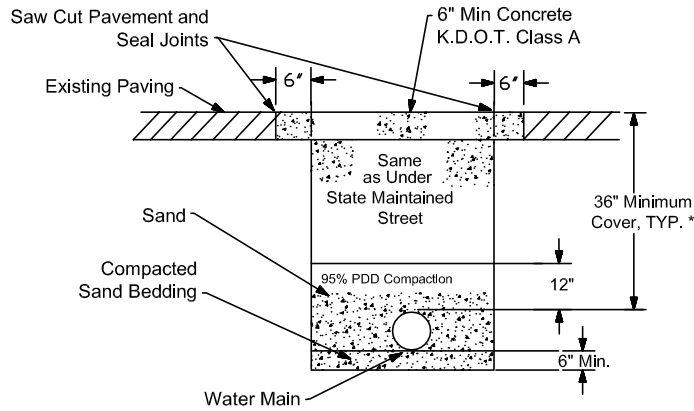
ALL CONSTRUCTION



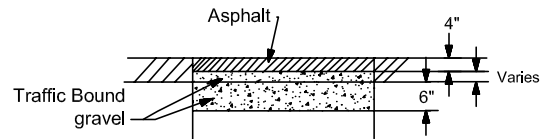
UNDER ASPHALT CONCRETE PAVEMENT



UNDER SHOULDER OF STATE MAINTAINED STREET

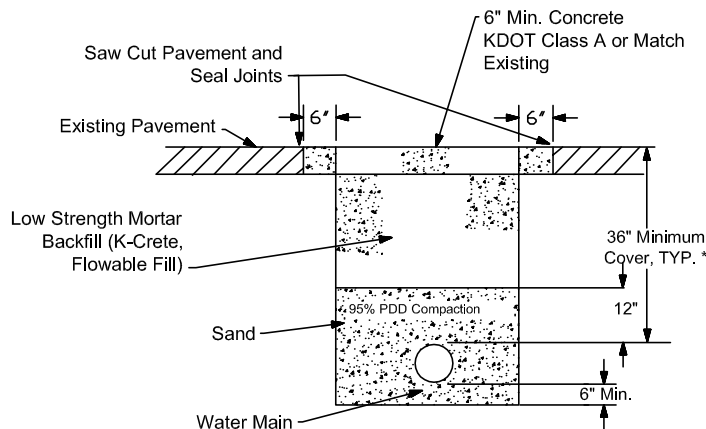


UNDER CONCRETE PAVEMENT



TEMPORARY STREET RESTORATION

PDD= Standard Proctor Dry Density
-ASTM D698

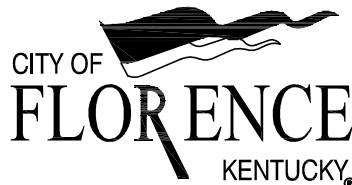


UNDER STATE MAINTAINED STREET
* 48" Maximum Cover

TYPICAL PIPELINE TRENCH DETAIL

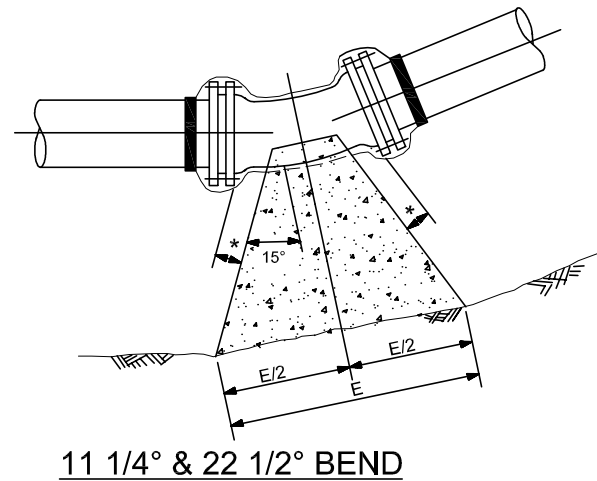
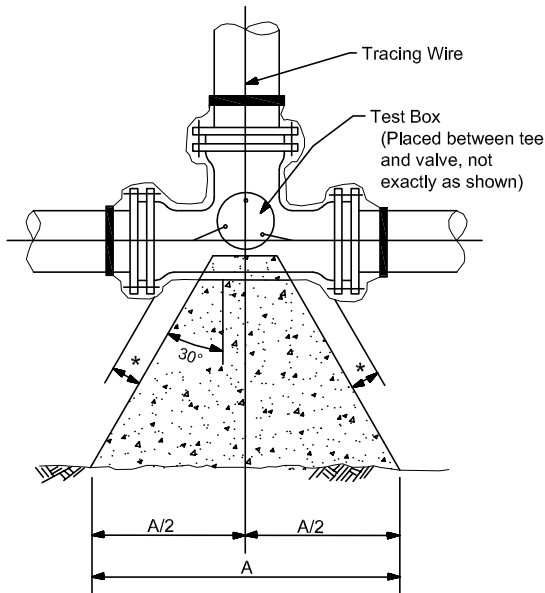
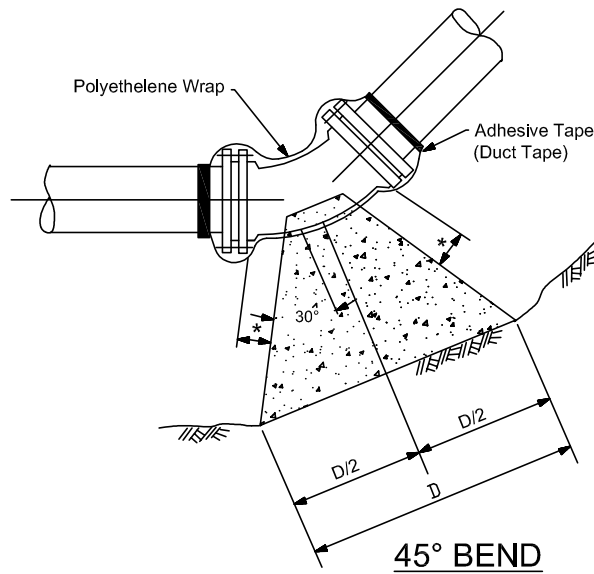
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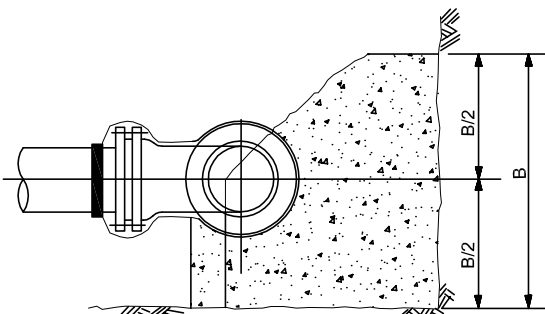
150 PSI/250 PSI

PIPE SIZE	A	B	C	D	E
6"	2'0"/2'6"	1'6"/1'6"	3'0"/3'6"	1'6"/2'0"	1'0"/1'0"
8"	2'6"/3'6"	2'0"/2'0"	3'6"/4'6"	2'0"/2'6"	1'0"/1'6"
10"	3'6"/4'0"	2'6"/2'6"	4'6"/5'6"	2'6"/3'0"	1'6"/1'6"
12"	4'0"/5'0"	3'0"/3'0"	5'6"/6'6"	3'0"/3'6"	1'6"/2'0"
16"	5'0"/6'0"	3'0"/4'0"	7'0"/8'6"	4'0"/4'6"	3'0"/3'0"
20"	6'0"/7'6"	5'0"/5'0"	7'0"/10'6"	4'0"/6'0"	3'0"/3'0"

* Distance to be 1/2" longer than entire length of the bolt used.

NOTES

1. DIP Fittings shall be per specifications.
2. Concrete to be 3500 psi.
3. All fittings to be Mechanical Joint.
4. Thrust blocks to be placed against undisturbed earth - use additional concrete as required for over excavation.
5. Blocking to be placed in a manner so that bolts can be removed without disturbing the block.
6. Second form of restraint for 45° required.



Blocking shall be poured after polyethylene wrap is in place.
Blocking shall be inspected by the City prior to backfilling.

CONCRETE THRUST BLOCK DETAIL

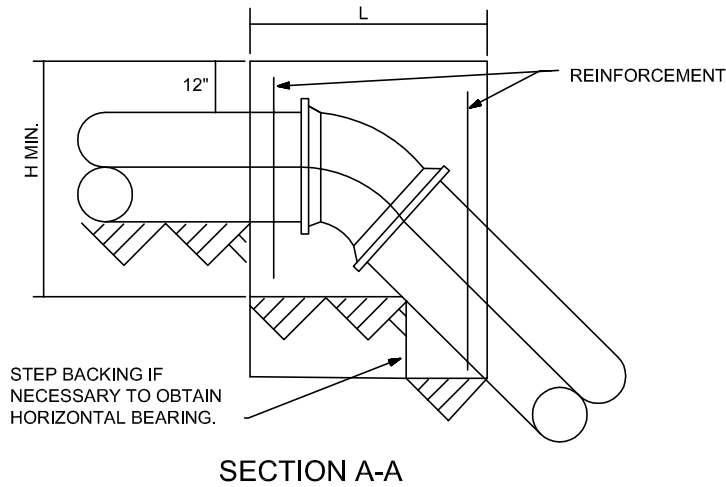
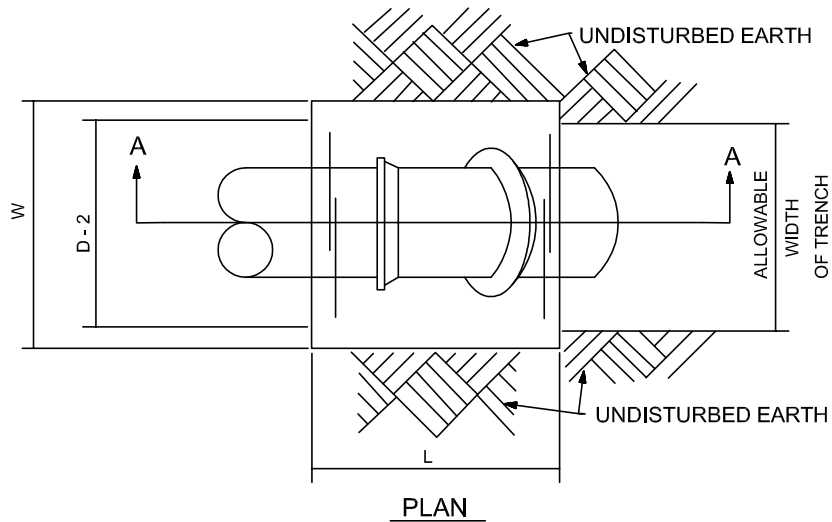
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CONCRETE BACKING FOR VERTICAL BENDS

1. BACKING DESIGNED FOR 3000 POUNDS PER SQUARE FOOT SOIL BEARING AND 150 POUNDS PER SQUARE INCH INTERNAL PRESSURE.
2. PROVIDE MINIMUM CONCRETE REINFORCEMENT OF 2 PAIR OF TWO 5" "U" BARS @ 12" C.
3. CENTER BACKING ON BEND.

SIZE of PIPE	DEGREE OF BEND											
	11 1/4				22 1/2				45			
	L"	W"	H"	VOL.	L"	W"	H"	VOL.	L"	W"	H"	VOL.
4"	12	24	16	2.7	15	30	18	4.7	22	36	24	11.0
6"	12	43	18	5.4	16	48	34	15.1	30	55	24	22.9
8"	12	54	24	9.0	18	57	36	21.4	36	57	33	39.2
12"	20	63	36	26.3	37	62	37	49.2	48	62	51	88.0
16"	31	65	38	44.4	60	65	39	88.2	65	65	65	159.2
20"	45	70	40	73.0	56	70	60	136.4	72	76	78	247.5
24"	47	72	54	106.0	67	74	69	198.4	88	84	84	360.1

NOTE: VOLUMES GIVEN IN CUBIC FEET

BLOCKING FOR SIZES NOT SHOWN SHALL USE THE NEXT LARGER SIZE.

CONCRETE THRUST BLOCK DETAIL FOR VERTICAL BENDS

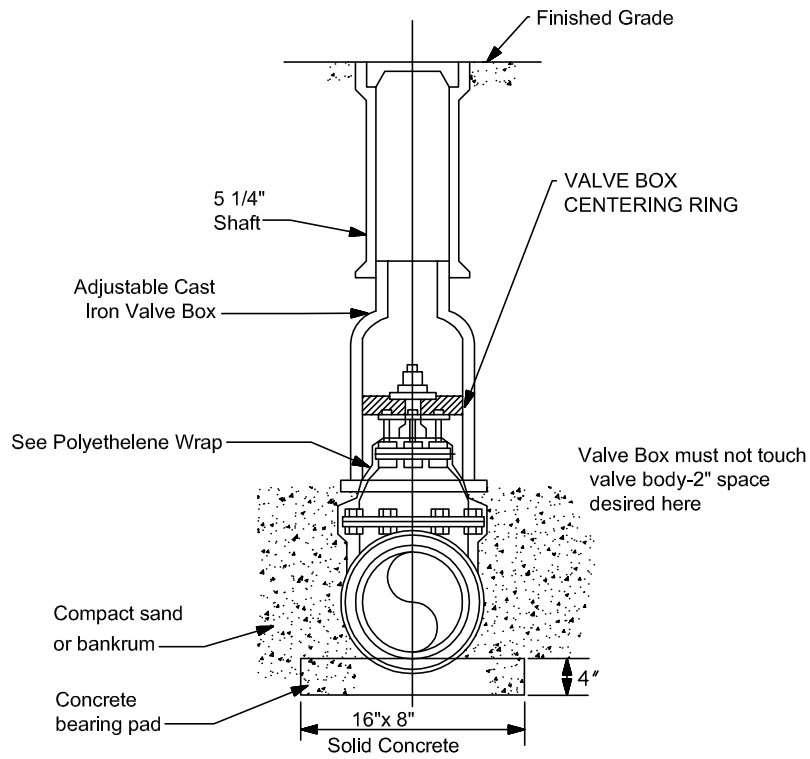
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104-A

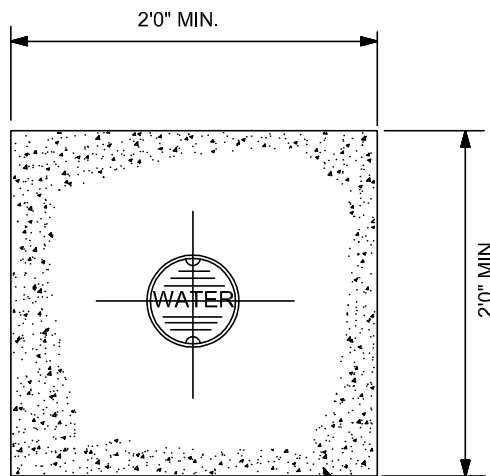


Detail Valve Box Installation

Note: Valve box shall not transmit shock or stress to the valve

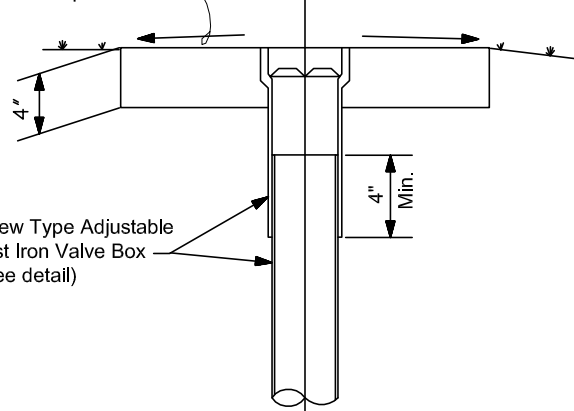
NOTES

Concrete Pads shall be constructed around all main line valve boxes except within hard paved areas.
Concrete Pads shall be constructed around customer service line valve boxes 3" and larger valves.



PLAN

All side slopes 1/4"/Ft.



ELEVATION

VALVE BOX AND VALVE PAD DETAIL

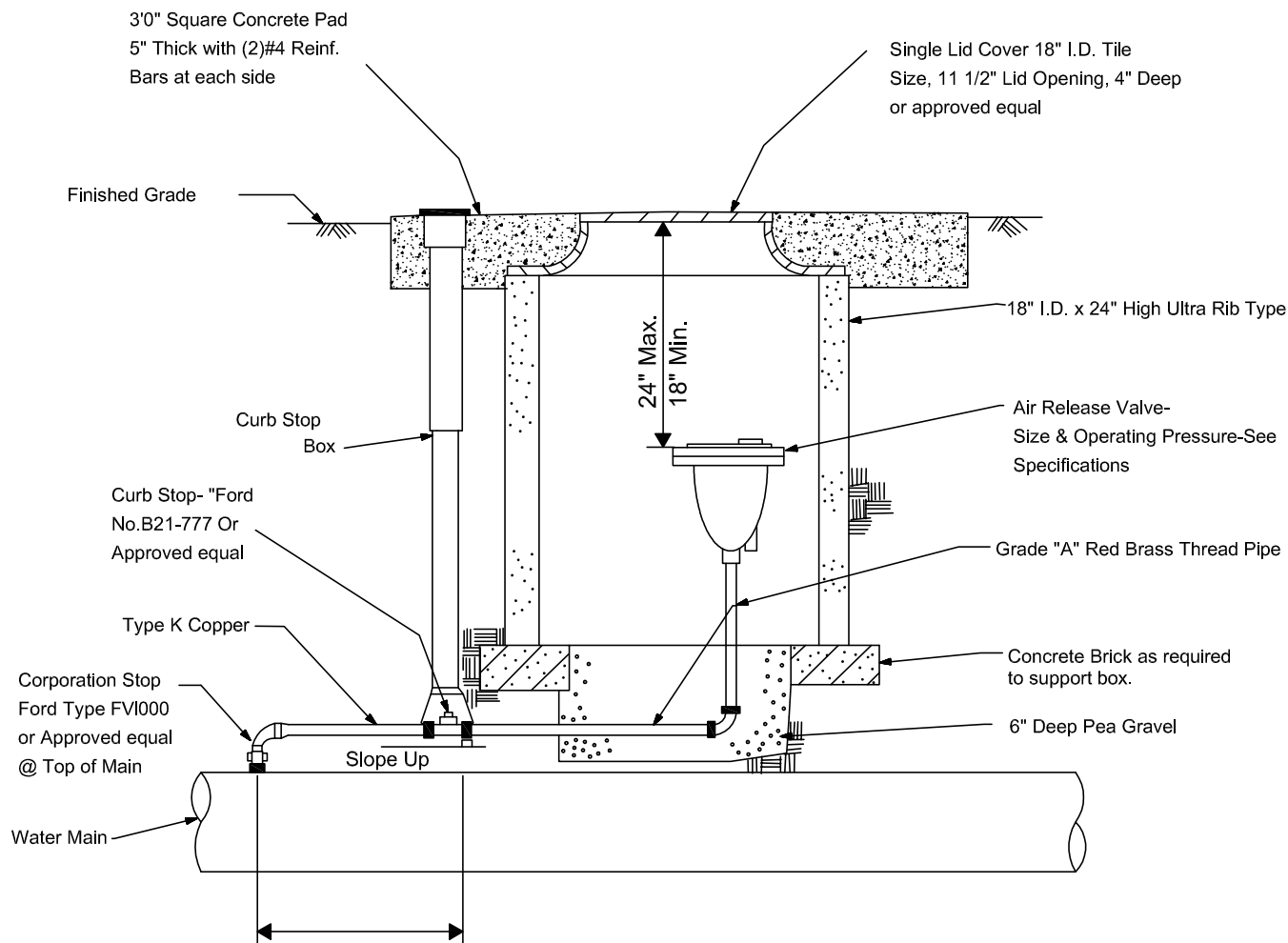
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105



AIR RELEASE VALVE

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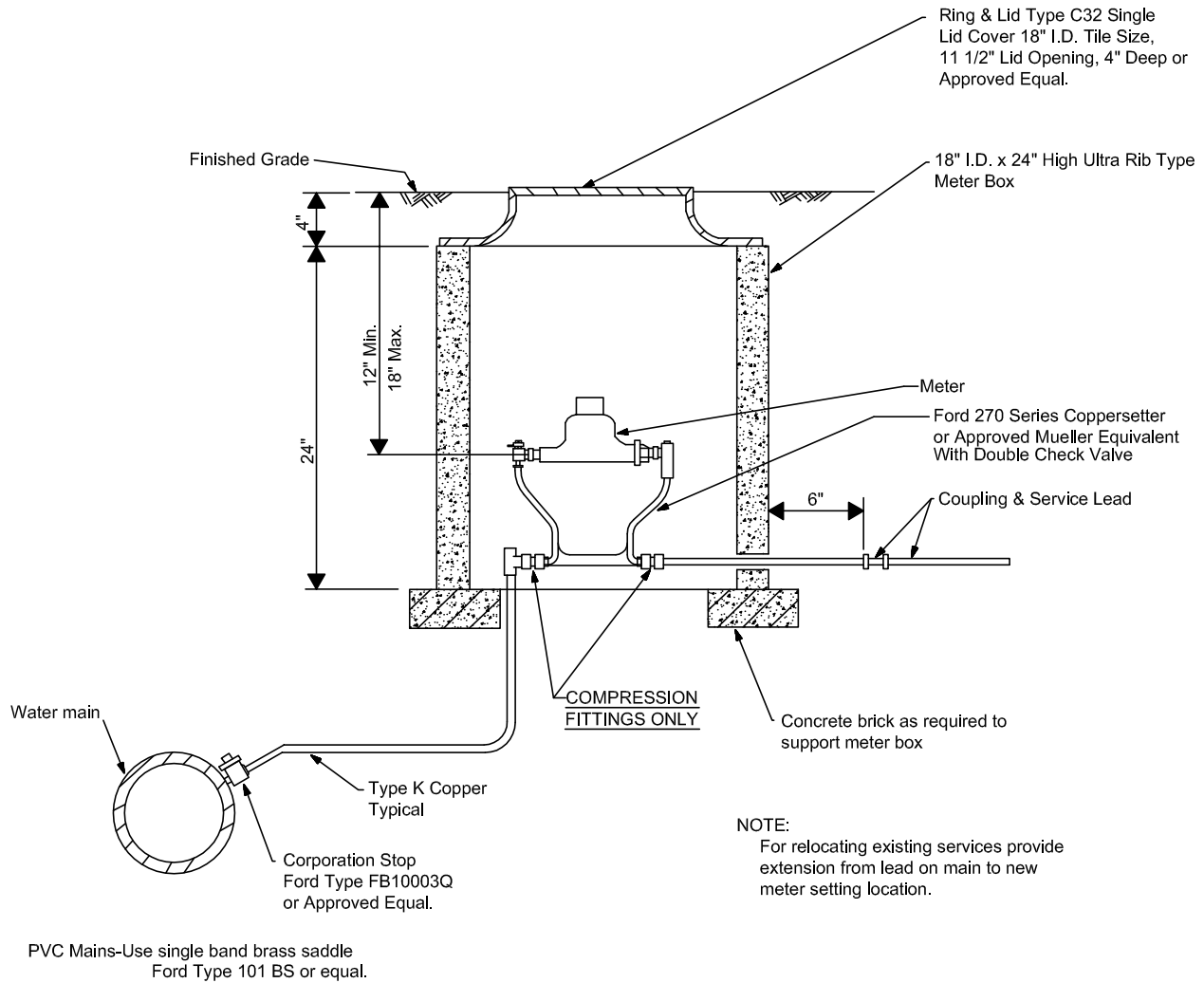
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NOTE:

Services installed in concrete areas, not subject to vehicle traffic, a Ford Type A32, or approved equal, lid and ring shall be used. Areas subject to vehicle traffic, a Ford Type A32HH, or approved equal, lid and ring shall be used.

NOTE:

Services to be removed & abandoned are to be disconnected at corporation stop. Cap corporation stop if required to prevent leaks or replace stop.



5/8" & 1" METER SETTING

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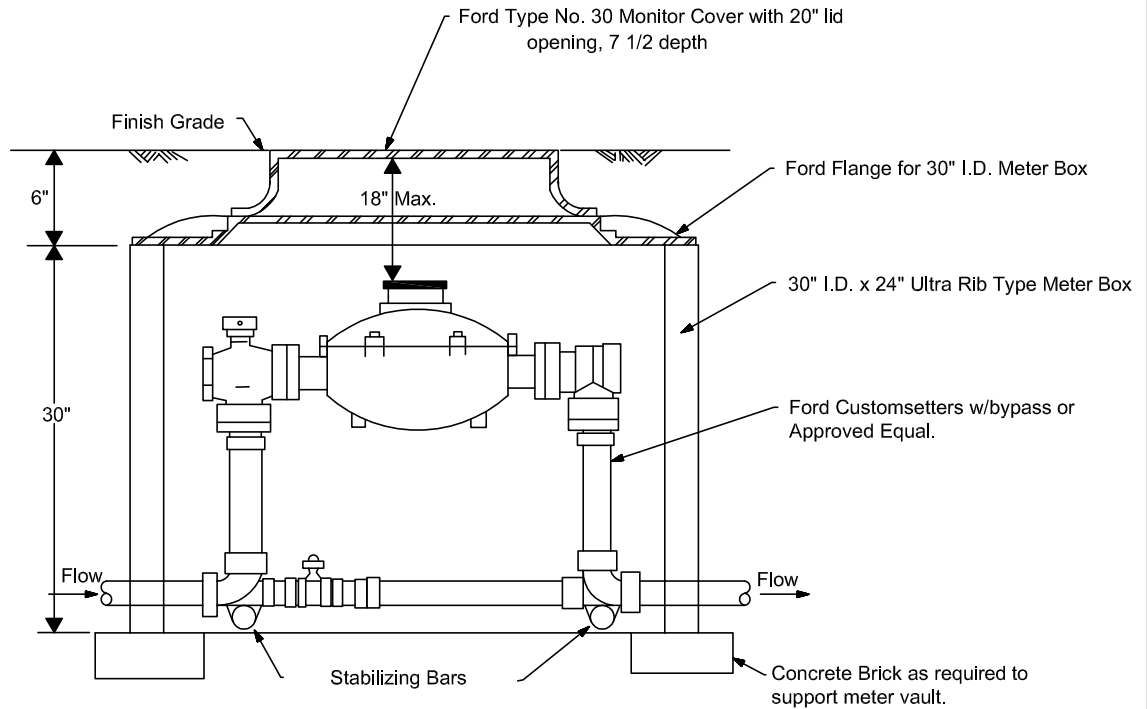


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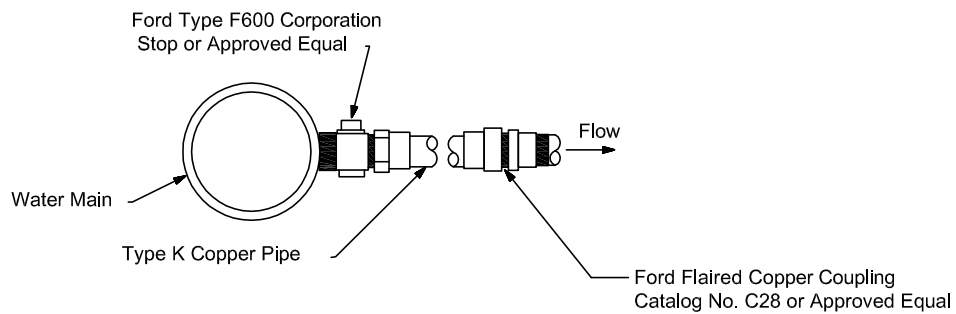
DATE: 2011
STANDARD DRAWING NO: 107

Note: Services to be removed & abandoned are to be disconnected at corporation stop. Cap corporation stop if required to prevent leaks or replace stop.
For relocating existing services provide extension from lead on main to new meter setting location.

Note: If service is installed in sidewalk or pavement area, a heavy duty lid shall be installed.



PVC and D.I.P. Mains 12" or smaller use a double strap stainless steel tapping saddle Ford Type 202B or equal.



1-1/2" & 2" METER SETTING

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DATE: 2011
STANDARD DRAWING NO: 108

The diagram illustrates the installation of a fire hydrant. The side view shows the hydrant body, lead pipe, and nozzle assembly. Key dimensions include a total height of 2.5' ± from the finish grade to the top of the valve, a 4" gap between the hydrant body and the lead pipe, and a 36" minimum length for the hydrant lead pipe. The top view shows the hydrant's base, which is anchored into a concrete thrust blocking pad. This pad is supported by a 6" mechanical joint and a concrete bearing pad. The pad is surrounded by 1 cubic yard of washed gravel and has a 2'0" diameter. A 6" mechanical joint inlet is also shown. Callouts specify materials like polyethylene wrap, tape, and specific components like the extension type cast iron valve box and mechanical joint.

1. 5 1/4" Valve opening with 6" barrel.
2. (2) 2 1/2" Nozzles-Old Cincinnati Thread Outlet.
3. (1) 4 1/2" Nozzle-National Standard Thread Outlet.
- * 4. Right Hand Open-1" Square Operating Nut on Hydrant & Caps.
5. Ground line breakable flange.
6. Self draining
7. High Pressure Locations (Greater than 150 P.S.I.) shall have independent gate valves on both 2 1/2" nozzles.
8. High Pressure Hydrants shall be red in color. Normal Pressure Hydrants to be yellow.
9. All hydrants leads shall be anchoring pipe unless the length is over 18ft. then Ci. 52 ductile iron shall be used.
10. Fire Hydrants barrel extension shall be limited to one piece assembly only. Maximum fire hydrants barrel extension is two (2) feet.

Callouts:

- Extension Type Cast Iron Valve Box (See Valve Box Installation Detail)
- Mechanical Joint Anchoring Tee with Roto-ring Gland Clow No. F-1217 or Approved Equal.
- 6" Mechanical Joint
- Concrete bearing pad (See Valve box installation detail)
- Hydrant lead pipe
- See Polyethylene Wrap Specs.
- Clow No.F-1216 Anchoring Pipe 6" Size with Roto-ring Glands or Approved Equal.
- Tape
- Thrust Blocking
- 2'0"
- 2'0"
- 1 Cubic Yard washed gravel around hydrant drains
- Finish Grade
- 4"
- 2.5' ±
- R/W
- locking shall be 3500P.S.i. lock to be placed against bed earth. Use al concrete excavation.
- 6" Mechanical Joint Inlet
- Concrete bearing pad
- See Concrete Thrust Blocks Details

Thrust Blocking

1. Concrete shall be 3500P.S.i.
2. Thrust block to be placed against undisturbed earth. Use additional concrete for over excavation.

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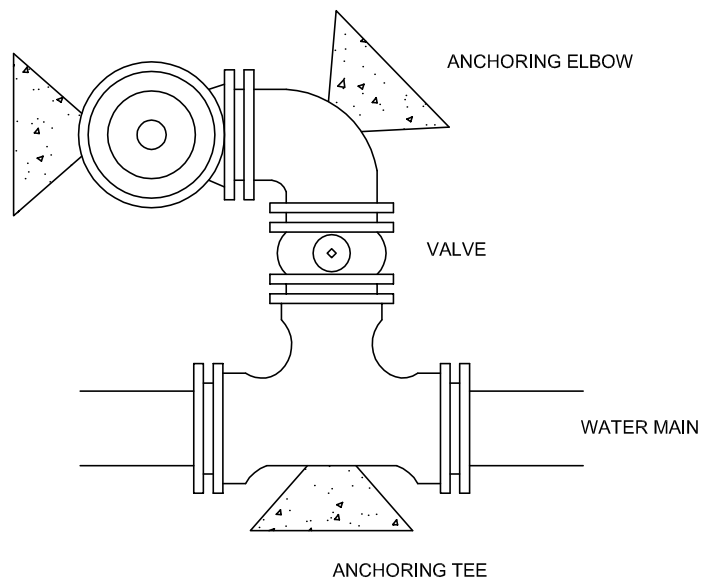
DATE: 2011

STANDARD
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109

REVISION		BY	DATE

HYDRANT POINTS UP GRADE
(FOR PROPER AIR RELEASE)



SPECS SAME AS FIRE HYDRANT ASSEMBLY
(STD. DRWG. NO. 109)

FIRE HYDRANT ASSEMBLY WITH 90° BEND

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REVISION	BY	DATE



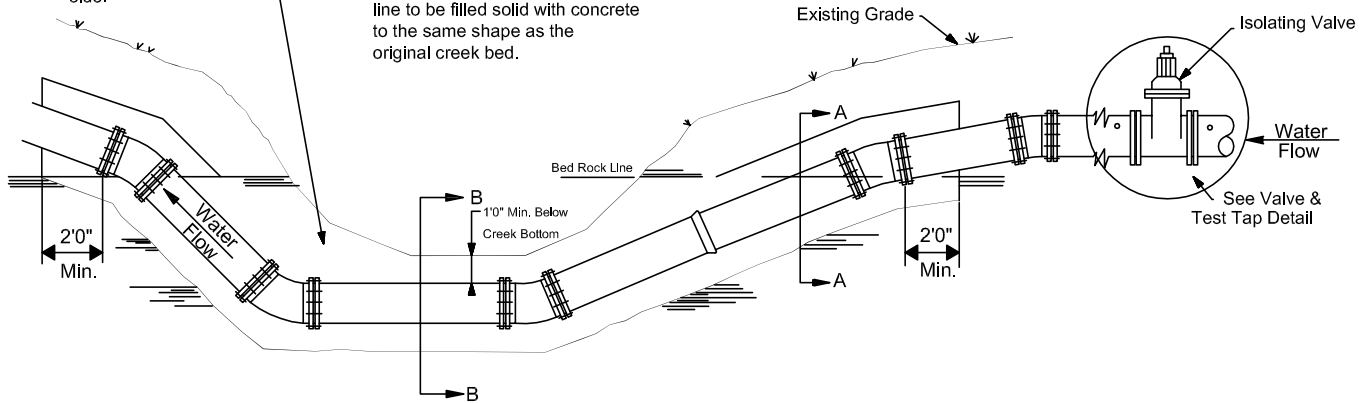
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109A

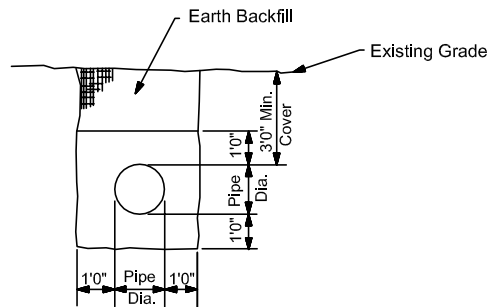
NOTE: Isolating Valve
same as other
side of crossing.

No test taps on this
side.

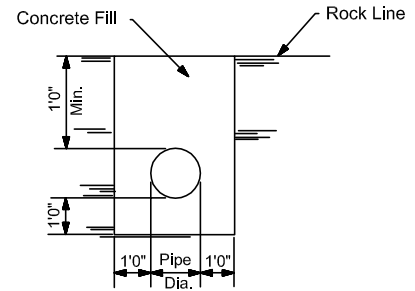
NOTE: Entire excavation below rock
line to be filled solid with concrete
to the same shape as the
original creek bed.



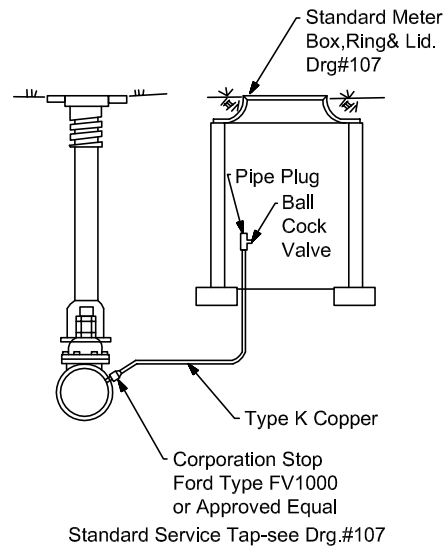
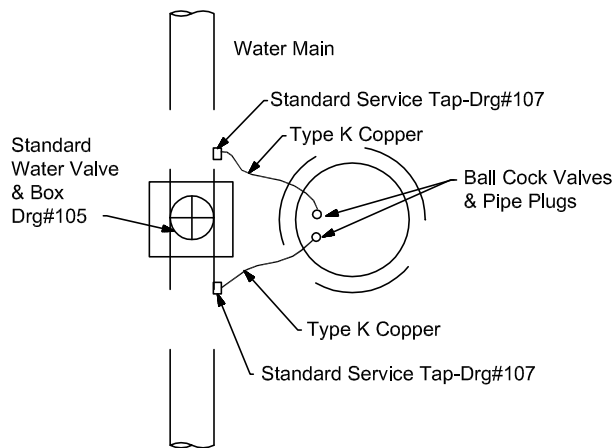
NOTE: All concrete to be KDOT Class "A"



"Section A"



"Section B"



VALVE & TEST TAP DETAIL

Valve shall be installed in areas not subject to flooding
No services will be tapped between the isolating valve
on the creek crossings.

CONCRETE ENCASEMENT AT CREEK CROSSING

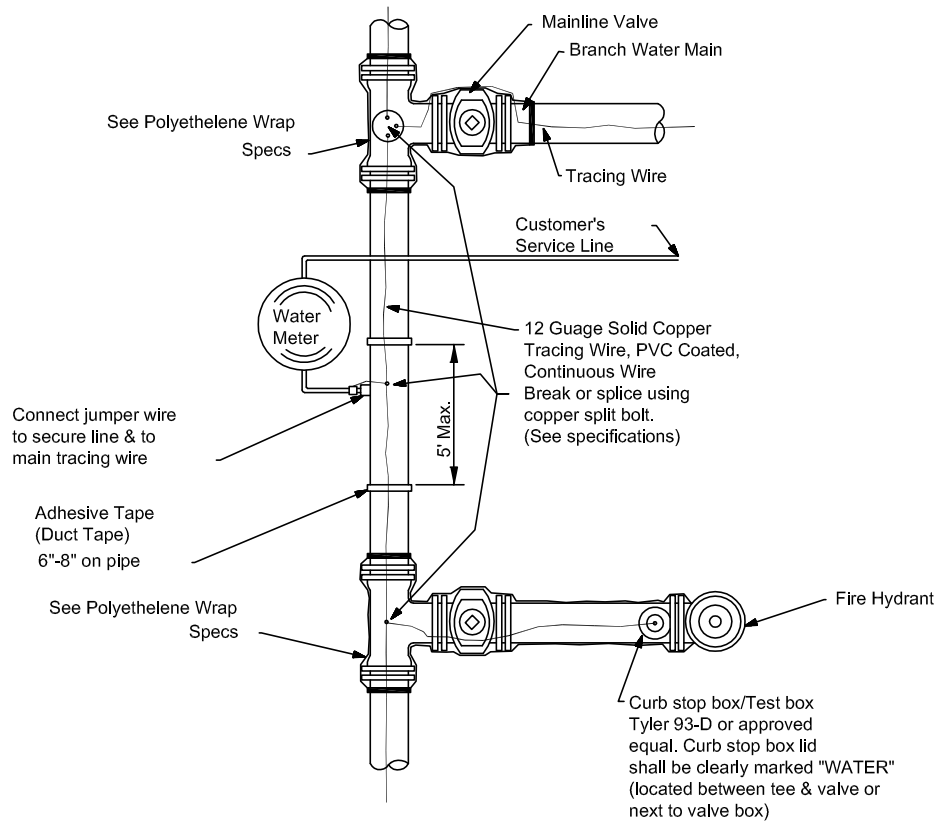
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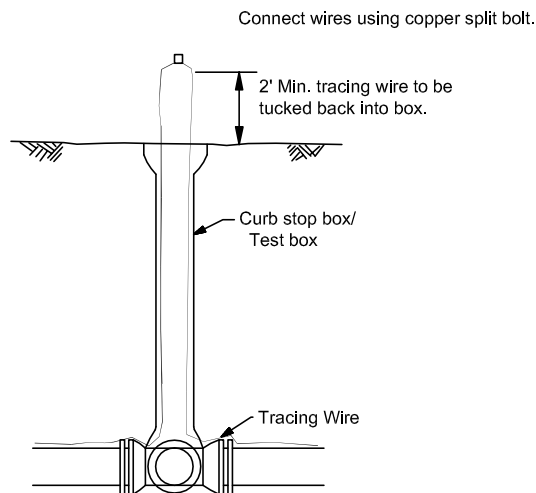
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110



PVC PIPE WITH DUCTILE IRON FITTINGS

Note: Curb stop box/test box shall not be installed in paved areas.



TRACING WIRE INSTALLATION DETAIL

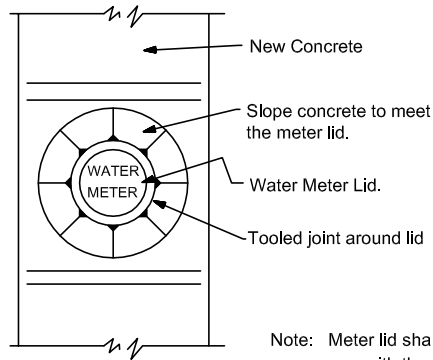
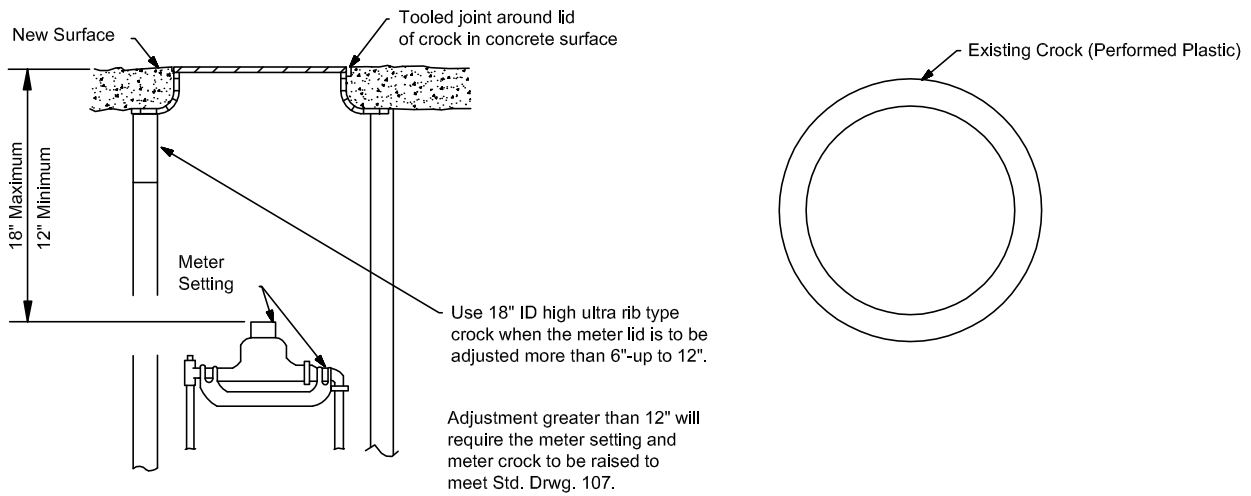
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Note: Meter lid shall be flush with the top of the concrete surface. The concrete surface shall be tapered to provide a smooth transition to the meter lid. A tooled joint shall be formed around the meter lid.

NOTE: SERVICES INSTALLED IN CONCRETE AREAS, NOT SUBJECT TO VEHICLE TRAFFIC, A FORD TYPE A32, OR APPROVED EQUAL, LID AND RING SHALL BE USED. AREAS SUBJECT TO VEHICLE TRAFFIC, A FORD TYPE A32HH, OR APPROVED EQUAL, LID AND RING SHALL BE USED.

PLASTIC (PVC) METER CROCKS shall be raised by use of an adapter with a section of plastic crock cut to achieve final grade.

At no time shall wood be used to adjust the ring and lid to grade.

Meter ring and lids shall be reset solidly and shall have no broken edge to allow dirt to enter the crock.

If the meter box is damaged beyond repair it shall be replaced. See Standard Drawing 107.

RAISING CURB STOPS OR VALVE BOXES:

Curb stop boxes and valve boxes shall be raised by turning the upper section to meet grade. If the upper section cannot be raised in this manner it shall be carefully broken off and replaced.

New upper sections shall be supplied by Contractor.

ADJUSTING RING & LID TO GRADE

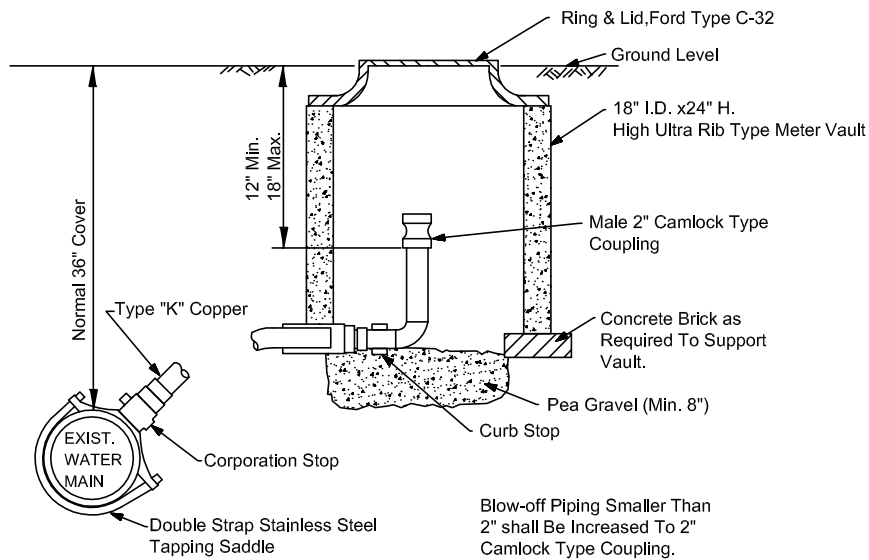
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TYPICAL FLUSHING DEVICE INSTALLATION

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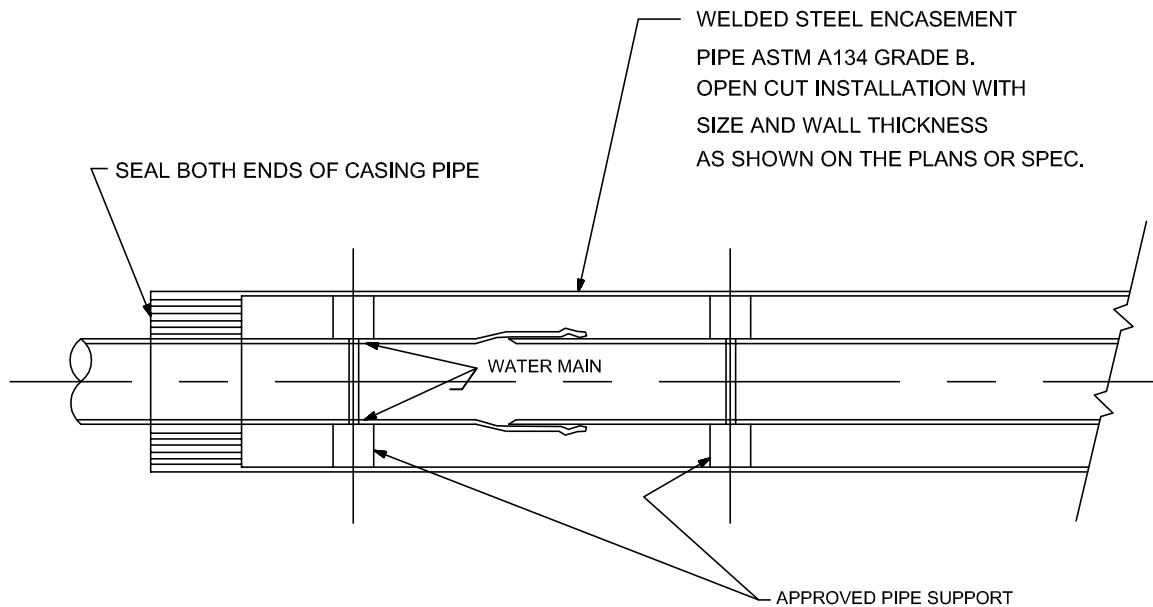
REVISION	BY	DATE



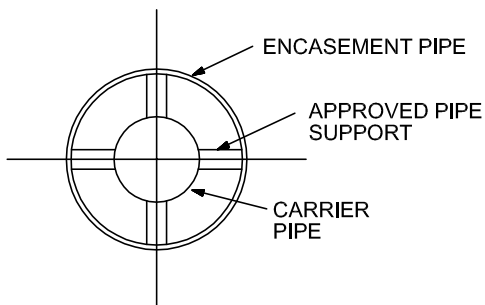
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NOTE: CASING PIPE JOINTS SHALL BE SEAM WELDED SO
THAT CASING IS WATER TIGHT FROM END TO END.



ENCASEMENT PIPE DETAIL

N.T.S.

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2011

CITY OF FLORENCE
PUBLIC SERVICES - WATER DIVISION

STANDARD SPECIFICATIONS & DRAWINGS FOR THE INSTALLATION OF METER PITS

PIT CONSTRUCTION SPECIFICATIONS

PART I - GENERAL

- 1.01 **INTRODUCTION** Unless modified, deleted, replaced, or otherwise changed, the latest published addition of the following documents shall be the accepted standard for materials and/or procedures for the construction of meter pits:
- A. City of Florence's Standard Drawings
 - B. Natural Resources & Environmental Protection Cabinet, Division of Water
 - C. American Water Works Association Standards (AWWA)

If a conflict exists between referenced sources, the more restrictive requirements shall prevail. The City shall provide interpretation as requested.

- 1.02 **REQUIREMENTS FOR METER PIT INSTALLATION** The following are guidelines for meter pit installations:

- A. Meter pit will not be required to be installed if the following conditions can be met:

- Firelines-- 1. An approved backflow prevention device shall be installed as the first device inside the building on the fireline before any taps or branches -and-
2. The fire department connection shall be located downstream of the approved backflow prevention device -and-
3. The domestic water service is 2" or smaller which will be installed per Standard Drawings #107, or 108.

Domestic Services-- 1 1/2" or larger domestic water services shall be installed by the Contractor per Standard Drawings #107 or 108.

- B. Meter pits shall be required to be installed if one or more of the following conditions exists:

Firelines-- The fire department connection is required by the authority having jurisdiction to be installed near the public right-of-way. An approved double check detector assembly shall be required to be installed per Standard Drawing #203.

Domestic Services-- 3" or larger domestic water services shall be installed per Standard Drawings #204, 206, or 207.

A meter pit may not be required to be installed as specified above if one or more of the following conditions exists as determined by the City: the distance between the building and public right-of-way is fifty (50) feet or less -or- there is a major conflict with other utilities or public improvements and there are no other available options.

If the meter pit is not required, as approved by the City, a room of sufficient size with proper drainage will need to be provided for the proper piping installation. No taps or branches will be permitted between the City's isolating valve and the meters. An additional agreement between the Property Owner and the City will be required if the meter pit is not required by the City.

- 1.03 **CONTRACTORS RESPONSIBILITY** All work performed on any meter pit and/or appurtenances that are owned or anticipated to be owned by the City shall be completed under the direction of the City adhering to an acceptable plan approved by the City. A minimum of 24 hours notice shall be given to the City by the contractor prior to the start of work. If the interruption of service to any customer of the City is necessary, the Contractor shall make arrangements to provide such shutdown and notify City customers at the direction of the City Inspector.

One set of City approved plans shall be on the job site during construction. There shall be no deviation from the approved plans without written approval from the City.

- 1.04 **EXISTING PITS** Any changes, modifications, or alterations made to an existing pit structure, piping, etc., it shall be brought up to current standards. Compliance subject to the discretion of the City.

- 1.05 **PLANS** Plans are approved subject to the conditions of compliance with all applicable laws, rules, regulations and standards. The proposed project may be constructed only in accordance with the approved plans. Plans submitted to the City for approval shall have a Ky. Professional Engineer or Certified Fire Suppression Technician stamp and signature. Two sets of plans should be submitted for preliminary review and four sets for final review.

- 1.06 **DESCRIPTION** In general the following specifications are minimum requirements as pit design. Construction may be dictated by location, soil conditions, ground water, topography, etc. Additional provisions may be required upon submission for approval.

- 1.07 **ACCESSIBILITY OF PITS** Accessibility for maintenance and testing of all meter pits shall be provided. A means of access for maintenance vehicles shall be constructed of a hard, all weather surface at least 10' wide and designed to support the heaviest vehicle, within 15' of the pit.

- 1.08 **WATER MAINS ON PRIVATE PROPERTY** Meter pits and appurtenances installed on private property outside of normal conditions which are going to be maintained by the City shall have proper documentation provided for all easement areas. See appropriate sections of City's Standards Specifications & Drawings for the Installation of Water Mains for procedures.

- 1.09 **HIGH PRESSURE AREAS** Additional requirements may be necessary for high pressure areas (125 psi static pressure or higher) as determined by the City.

MATERIAL SPECIFICATIONS FOR PIT CONSTRUCTION

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					STANDARD DRAWING NO:
					200

1.10 **MAINTENANCE PERIOD** The Owner shall be responsible for the maintenance of the installed meter pit and appurtenances to City Standards for a period of not less than one (1) year from the date the meter pit is placed in service by the City. Meter pits will be placed in service when the meter pit is 100% completed to City Standards.

1.11 **MINIMUM REQUIREMENTS** Floor slab shall be 6" thick concrete sloping at 1/8 inch per foot to drain or sump location. Dimensions of slab shall be 4 inches larger all around than outside pit walls. Pit shall be drained to a storm sewer by a 4" drain or larger as required. When a drain is not practical an electric operated sump pump shall be used.

Walls shall be 8" thick concrete. Top slab shall be 8" thick reinforced concrete with #5 bars @6" O.C. maximum, spanning in short direction and #5 bars @18" O.C. maximum, in long direction. Two (2) #5 bars, two (2) feet long are to be placed at 45 degree to each corner of slab openings. Reinforcing shall be placed 1-1/2" clear from the bottom of the slab or inside wall faces. Additional reinforcement may be required.

Pit openings shall have lids as indicated or as approved in traffic areas of a type operable by a single person. Removable aluminum ladders shall be furnished in all pits.

1.12 **METER PIT DIMENSIONS** Minimum inside pit dimensions shall be: Height - 6 feet; Width - 7 feet; Length - 8 feet.

1.13 **QUALITY ASSURANCE**

A. Standards: The following publications shall be hereby made a part of these specifications:

1. "Specifications for Structural Concrete for Buildings ACI 301-72 (Revised 1975) with Selected ACI and ASTM Referenced, Sp-15(73)" by the American Concrete Institute.
2. "Placing Reinforcing Bars, CRSI-WCRSI Recommended Practices" by the CRSI-WCRSI Committee on Bar Placing.
3. "Standard Specifications for Road and Bridge Construction by the Kentucky Department of Transportation, Bureau of Hwy. 4. Specifications for the Design and Construction Load-Bearing Concrete Masonry by the National Concrete Masonry Association.

1.14 **Or Equal** All materials referenced are for design purpose only. Any other materials that are "equal" can be used with prior approval from the City.

MATERIAL SPECIFICATIONS FOR PIT CONSTRUCTION

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PART 2 - PRODUCTS

2.01 MATERIALS

- A. Concrete: Ready mixed type meeting K.D.O.T "Class A", 3,500 psi at 28 days compressive strength, 4" maximum slump.
- B. Reinforcing Steel: Deformed #5 bars conforming to ASTM A615, A616, or A617, grade 60.
- C. Curing Compound: Acrylic based "non-residual" type meeting ASTM C309 Type 1 not less than % to cure, harden and seal concrete.
- D. Lid: 36" x 48" double door, aluminum lid with locking padlock bar, centered over the meters, Halliday Products Model #A4854 or approved equal.
- E. Removable Metal Ladder: Removable metal ladder shall be an approved OSHA Type 1 Industrial Heavy, 250 pound aluminum ladder. Ladder must reach from the pit floor and extend into the pit opening. The bottom of the ladder shall be blocked to prevent it from kicking out but still be removable.
- F. Waterproofing: The exterior side of the pit walls shall be waterproofed with one coat of one of the following materials applied in accordance with the Manufacturer's recommendations: Thoroseal; U.S.S. Chemical Tarmastic #102; Koppers Bitumastic Super Service Black; Damchex; Amercoat #78; or an approved equal.
- Voids between pipes and chamber walls shall be grouted with a hydraulic cement such as Waterplug or an approved equal before waterproofing pit.
- G. Waterstop: A waterstop shall be provided in the pit floor to the pit walls.
- H. Floor Drain: Raised or beehive dome grate, 4" minimum, similar to Wade #1634; Josam #7324-N; or an approved equal.
- I. Pit Drain Line: Cast iron, Schedule 40 PVC, Plastic STM #35 or ductile iron, 4" minimum.
- J. Alternate to Pit Drain Line: Electric Submersible Sump Pump, Little Giant, Big John, Stock #3P-639A Model #6-CIA or approved equal. Note: This alternative shall only be used when a drain line is impractical as determined by the City. (See drawing #202 & 202-A , Part 4 of Pit Specifications)
- K. Packaged, Prefab Meter Vaults: Packaged, prefab meter vaults are acceptable with approval from the City.

MATERIAL SPECIFICATIONS FOR PIT CONSTRUCTION

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PART 3 - EXECUTION

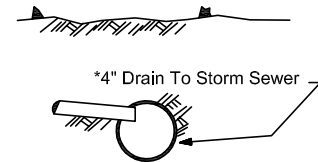
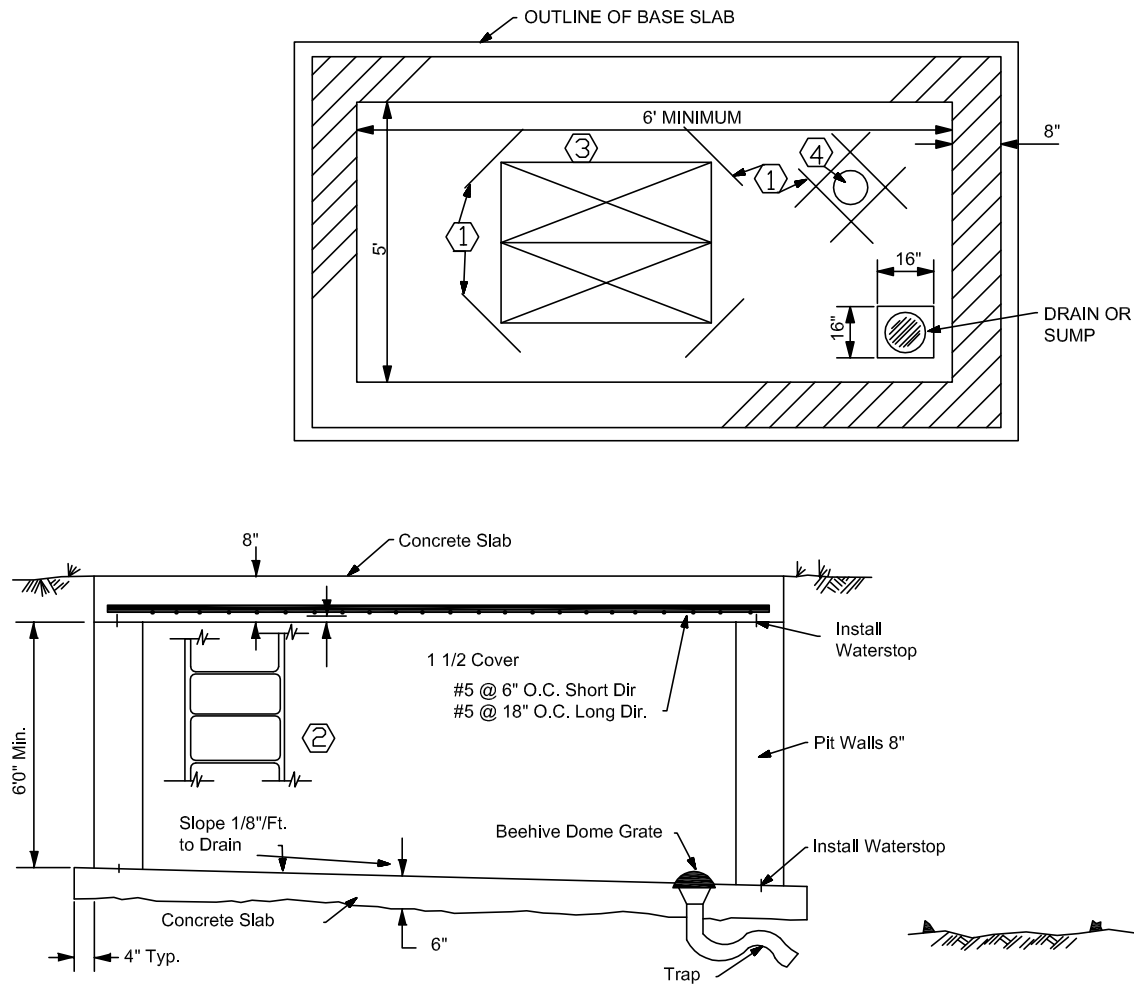
- 3.01 **WORKMANSHIP** Earth cuts may be used for forms of base slab provided vertical sides are kept true and sharp. All embedded items, reinforcing, piping, etc. shall be secured in place prior to placing of the concrete. Concrete shall be protected from loss of moisture for a curing period of at least 7 days. All concrete shall be deposited within 1-1/2 hours following the initial mixing of water and cement. Wall finish may be a rough form finish. Top slab finish shall be wood float with tooled edges.

PART 4 - ELECTRIC SUMP PUMPS

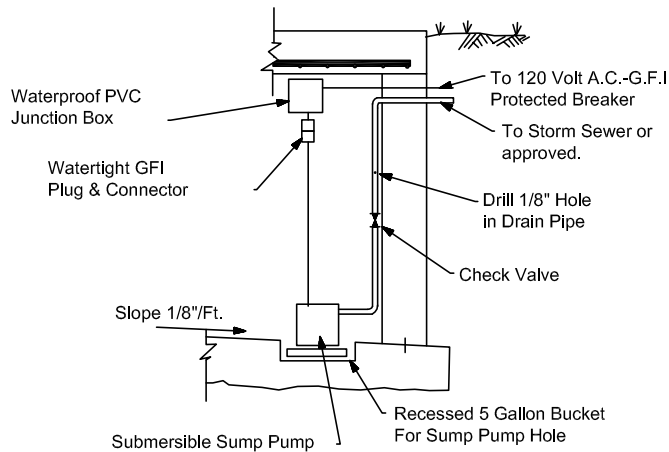
- 4.01 **DESCRIPTION** In general the following specifications are a minimum requirements for the design and installation of Electric Submersible Sump Pumps in meter pits where a normal drain line is impractical.
- 4.02 **ELECTRIC WORK** All electric work shall be installed according to the National Electric Code and all other applicable codes. All work shall be inspected by an Electrical Inspector and certification provided to the City.
- 4.03 **RESPONSIBILITY** The property owner is responsible for providing continuous electric service for the electric sump pump at the owner's expense. The property owner shall be responsible for the maintenance and upkeep of all electrical boxes, conduit, circuit breaker box, circuit breaker, outlet and wiring outside the pit.
- 4.04 **MATERIALS**
- A. **Electric Submersible Sump Pump:** Electric sump pump shall be U.L. Listed, Little Giant Stock #3P639, Model #6-CIA.
 - B. **Electric Junction Box:** Water resistant, U.L. Listed, P.V.C electrical box shall be installed on the inside of the pit on the wall closest to the sump pump nearest the ceiling.
 - C. **Electrical Piping:** Electric piping shall be U.L. Listed for underground use, rigid or plastic installed at least 18" below grade.
- 4.05 **INSTALLATION**
- A. **Sump Pump Hole:** A 4" deep hole shall be provided in the floor of the pit.
 - B. **Discharge Piping:** Piping for the water discharge from the electric sump pump shall be plastic or copper. Minimum piping size shall be 1 1/2". A 1/8" hole shall be bored above the check valve of the discharge pipe if freezing temperatures will affect the pipe.
 - C. **Water Discharge:** Water discharge shall be directed into a storm sewer. Any other arrangements shall be based on City approval.
 - D. **Electric Service Line:** The electric line to the pit shall be only used for the pit sump pump, no other electrical taps shall be made on this line.
 - E. **Manufacturer Instructions:** Manufacturer's instructions should be followed for installation.

MATERIAL SPECIFICATIONS FOR PIT CONSTRUCTION

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				200-C



* At No Time Will Drain Line Be Tied Into A Sanitary or Combination Sewer



DRAWING NOTES

- ① (2) #5 Reinforcing Bars, 2'6" Long @ 45° Each Corner of Lid or Pit Opening.
- ② Removable Aluminum Ladder Within Pit.
- ③ Lid In Top Slab To Be Centered Over Meter(S). Lids Shown Are For Non-Traffic Area Locations. Minimum size 36"x48".
Lids Within Traffic Areas Shall Be Guarded With Approved Post Surrounding The Pit Or Lid, Or The Lid Shall Be Adequate To Support The Imposed Weight And Be Operated By A Single Person As Approved By City of Florence.
- ④ Opening In Top Slab As Required.

TYPICAL PIT DETAIL

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PART 1 - PRODUCTS

1.01 MATERIALS

- A. Underground Piping & Appurtenances: All underground piping and appurtenances shall conform to appropriate sections of City's "Standard Specifications & Drawings for the Installation of Water Mains". All underground piping 4" and larger shall be polyethylene wrapped Class 50 or higher Ductile Iron Pipe from the public water main to the meter pit.
- B. Piping Inside Pits: Pipe installed inside the pit shall be a minimum thickness of Class 53 flanged ductile iron pipe for 3" and larger piping. The pipe shall extend through the pit walls.
- C. Fittings: All fittings and accessories shall be Ductile Iron, rated for a minimum of 200 psi working pressure or as specified herein. The fittings and accessories shall be new and unused. (NOTE: Certain areas of the City of Florence require materials used, to be of a higher working pressure than 200 psi.) All pipe fittings inside the meter pit shall be flanged.
- D. 2" and Smaller Service Branch Lines: Type K copper conforming to ASTM B88. Valves, fittings, and nipples shall be brass.
- E. Gate Valves 3" & Larger, Inside Pit: Conforming to AWWA Standard C509. Outside stem and Yoke (OS&Y), ductile iron body, left hand open, resilient wedge, wheel operated, flanged connection, gate valves. Clow Resilient Wedge Gate Valve or approved equal. Valves installed as part of a backflow prevention assembly shall be approved by the F.C.C.C.R., U.S.C.
- F. Valves 2" & Smaller: All 2" and smaller valves shall be ball valves.
- G. Glands, Gaskets, Bolts, & Nuts: Conforming to AWWA C111.
- H. Bypass Lines on 3" & Larger Meter Lines: A bypass line of equal or one size less than the domestic line shall be installed on all domestic meter services 3" or larger. Minimum bypass line size is 3".
- I. Meters: As purchased from City of Florence.
- J. Pressure Reducing Valves: On domestic lines, pressure reducing valve will be required to be installed when the static system pressure is at or above 125 psi. They will be installed before the meter and are installed to protect the meter only. The City will not be liable for any damage due to pressure conditions caused by or arising out of the failure or defective condition of such pressure regulator or for damage that may occur through the installation, maintenance, or use of such equipment. Pressure reducing valves shall be installed at least 5 pipe diameters away from the meter. Cal-Val Model 690-48 shall be installed on 3" and larger lines.
- K. Backflow Prevention Assembly: All assemblies shall be listed and approved by the Foundation for Cross-Connection Control Research, University of Southern California (F.C.C.C.R., U.S.C.) and the City. The testable assembly consists of the backflow prevention unit and two approved shut-off valves. Valves shall be full port ball valves for 2" and smaller and outside stem and yoke, resilient wedge, left hand open, gate valves for 3" and larger. Assemblies shall be delivered completely assembled by the original manufacturer with all components as approved by F.C.C.C.R., U.S.C. The assembly shall not be separated or altered in anyway. The type of backflow prevention assembly to be installed shall be determined by the City (see Backflow Prevention Device Assembly Standard Drawings Figure II-a for general guidelines). All approved backflow devices shall be tested and certified that it works properly after system activation. A copy of the test results shall be provided to the City. Special permission must be obtained from the City to install a reduced pressure backflow prevention assembly in a pit.
- L. Booster Pumps: Booster pumps 3" and larger installed on water lines shall be equipped with a Pump Suction Control Valve and/or a Low Pressure Cut-off Device which is designed to modulate the pump discharge or shut-off the booster pump when the pressure on the suction side of the pump drops to 20 psi.
- These devices shall be designed to prevent water hammer to the public water system. Pump Suction Control Valve and/or a Low Pressure Cut-off Device shall be inspected and tested for proper operation at the time of installation and at least annually thereafter. The property owner shall maintain a complete record of all test, inspections and repairs to the devices. The devices shall not be bypassed, made inoperative, or removed without authorization from the City.
- M. Double Detector Check Valve: Conforming to applicable sections of AWWA Standard C508, UL & FM approved, flanged connections, 175 psi maximum working pressure, tapped for 3/4" x 5/8" bypass meter.

PIPING SPECIFICATIONS FOR PIT CONSTRUCTION

REVISION	BY	DATE	 <div>CITY OF FLORENCE 8100 EWING BLVD. FLORENCE, KENTUCKY 41042 Ph: (859) 647-5416 Fax: (859) 647-5438</div>		DATE:
					2011
					STANDARD DRAWING NO:
					202

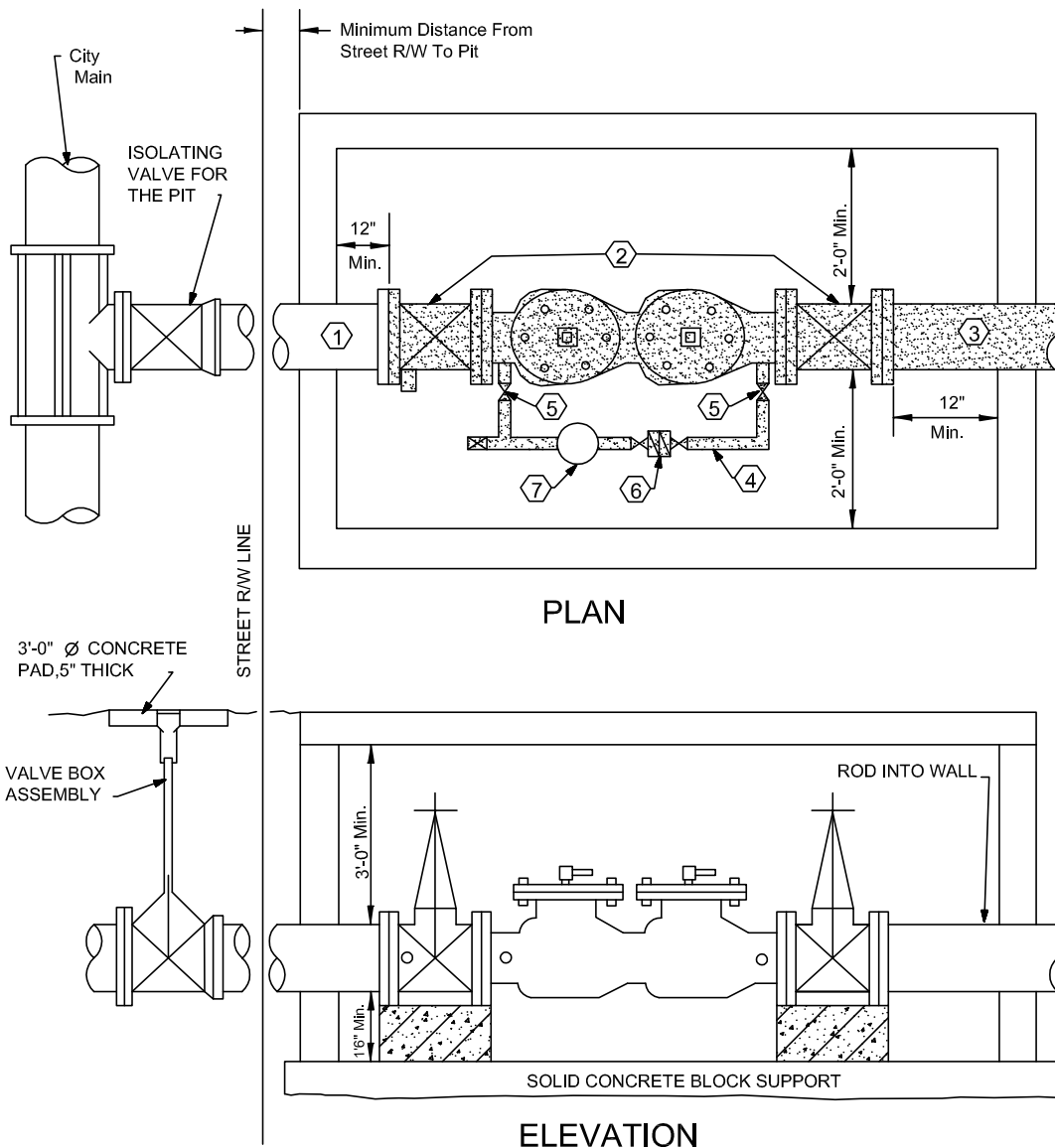
PART 2 - EXECUTION

2.01 INSTALLATION

- A. Pipe Laying: Conforming to AWWA Standard C600. Maintain a minimum pipe cover of 3'-0" with continuous pipe support for entire length. All underground piping and appurtenances shall be installed according to appropriate sections of City's "Standard Specifications & Drawings or the Installation of Water Mains".
- B. Pit Components: Adequately supported by solid concrete blocks or supports set on the floor slab. 2" or smaller domestic service lines may be supported by brackets mounted on the pit wall.
- C. Anchorage: Inlet valves on 3" or larger piping shall be securely anchored to the pit wall when piping is sleeved through the wall. Additional rodding may be required at the discretion of the City.
- D. Disinfection: The interior of all surfaces in contact with the potable water system, tapping sleeve, valves, couplings and pipe shall be swabbed with a 5% hypochlorite solution prior to installation.
- E. Valve Box Protection: The valve box over the tapping sleeve if located outside of a hard paved area shall have a minimum 2'x2'x4" square pad cast around the lid. Refer to standard drawing No. 105.
- F. Flushing of Mains: Lines shall be flushed at a rate 2.5 ft/s.

PIPING SPECIFICATIONS FOR PIT CONSTRUCTION

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					2011
					STANDARD DRAWING NO:
					202-A



DRAWING NOTES

- ① Piping Class 52 With Flanged Ends Within Pits.
- ② Approved Double Check Detector Assembly Which Includes Outside Stem & Yoke Valves (Resilient Seated) Plus Bypass Meter Assembly. For Class 1,2 & 3 Fire Systems. For Fire Systems Class 4,5 & 6 A Required Pressure Detector Check Valve Assembly Shall Be Installed Above Ground (Drawing No. 303) Just Outside Of R/W Line.
- ③ Plain End Pipe By Plain End Pipe With Uniflange Coupler In Pit
- ④ Bypass Meter Assembly
- ⑤ Valve
- ⑥ Double Check Valve Assembly
- ⑦ Meter Purchased From the City.

GENERAL NOTES

1. SEE DRAWING NO.201 FOR PIT CONSTRUCTION DETAILS.
2. SEE DRAWING NO. 200 - 200C FOR PIT MATERIALS SPECIFICATIONS.
3. SEE DRAWING NO. 202 & 202-A FOR PIT SPECIFICATIONS.
4. ANY PUMPER CONNECTION SHALL BE INSTALLED DOWNSTREAM OF OUTLET VALVE & BACKFLOW DEVICE.
5. ANY POST INDICATOR SHALL BE TYPE THAT WILL ATTACH TO WHEEL OPERATOR AND ALLOW OPERATION OF VALVE WITHIN PIT.
6. SHADED AREAS INDICATE WHAT THE PROPERTY OWNER WILL MAINTAIN AFTER THE WARRANTY PERIOD EXPIRES.
7. REDUCED PRESSURE DETECTOR CHECK VALVE ASSEMBLY CAN BE INSTALLED IN A PIT, IF THE PIT IS DRAINED TO ATMOSPHERE AND DRAIN LINE IS SIZED TO RELIEF VALVE FLOW RATE.

DOUBLE CHECK DETECTOR VALVE SETTING FOR FIRE SYSTEM ONLY

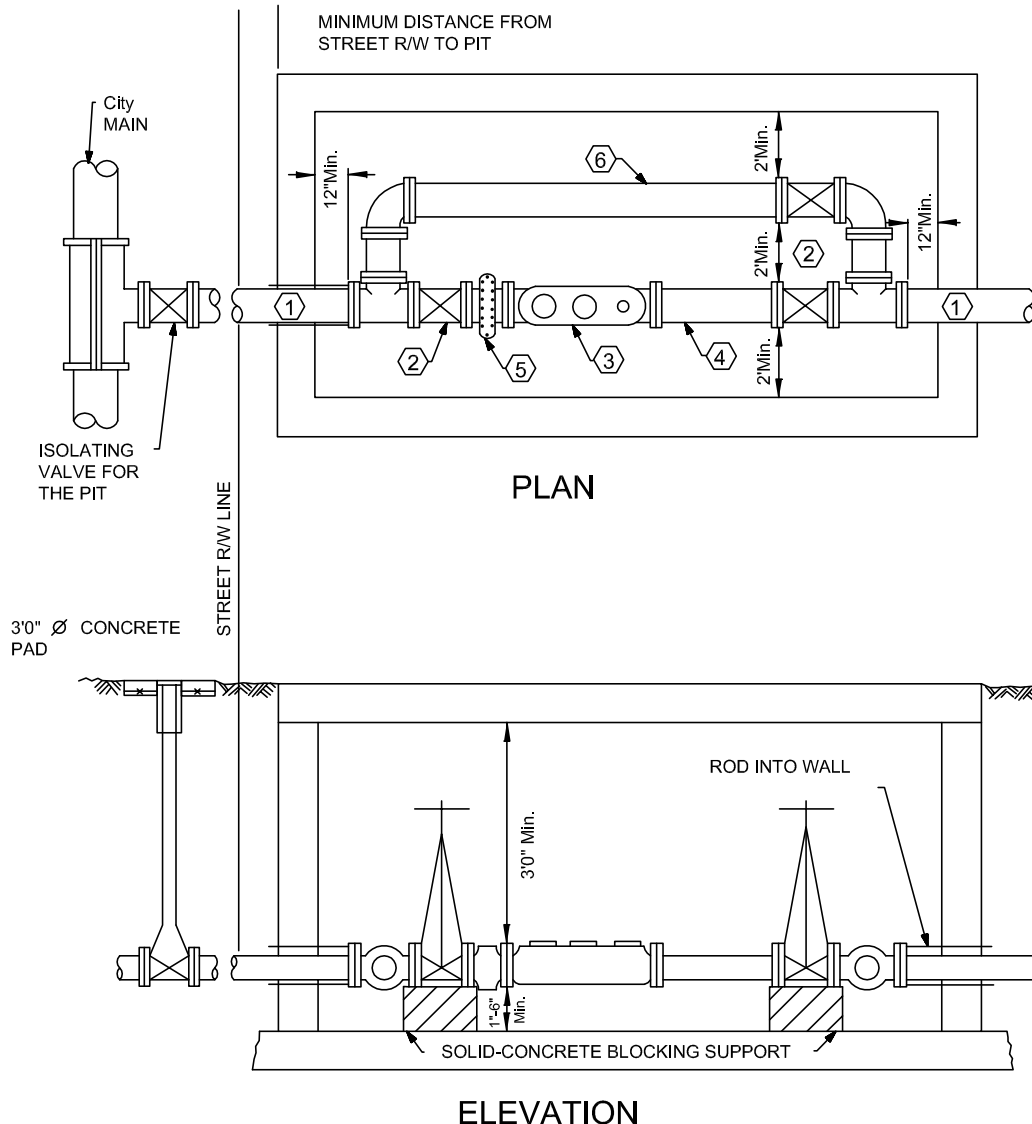
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STANDARD
DRAWING NO:
203



DRAWING NOTES

- ① PIPING CLASS 52 WITH FLANGED END WITHIN PIT.
- ② VALVES WITH OUTSIDE SCREW AND YOKE, FLANGED CONNECTIONS. (RESILENT SEATED VALVES)
- ③ 3" OR LARGER COMPOUND METER
- ④ FLANGED COUPLING ADAPTER OVER PLAIN END PIPE FLANGED BY PLAIN END PIPE WITH 2" TAP, 2"X6" BRASS NIPPLES AND 2" BALL VALVE FORM METER TEST.
- ⑤ STRAINER PURCHASED FROM CITY.
- ⑥ BYPASS LINE SHALL BE EQUALIVANT IN SIZE AS THE FEED LINE OR THE NEXT SIZE SMALLER (3" MINIMUM SIZE)

GENERAL NOTES

1. SEE DRAWING 201 FOR PIT CONSTRUCTION DETAILS.
2. SEE DRAWING 200 - 200-C FOR PIT MATERIALS SPECIFICATIONS.
3. SEE DRAWING 202 & 202-A FOR PIPING SPECIFICATIONS.
4. A BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED AS FIRST DEVICE INSIDE OF THE BUILDING. THERE SHALL BE NO BRANCHES OR TAPS BETWEEN THE METERING ASSEMBLY AND THE BACKFLOW PREVENTION ASSEMBLY.

METER SETTINGS 3" AND LARGER

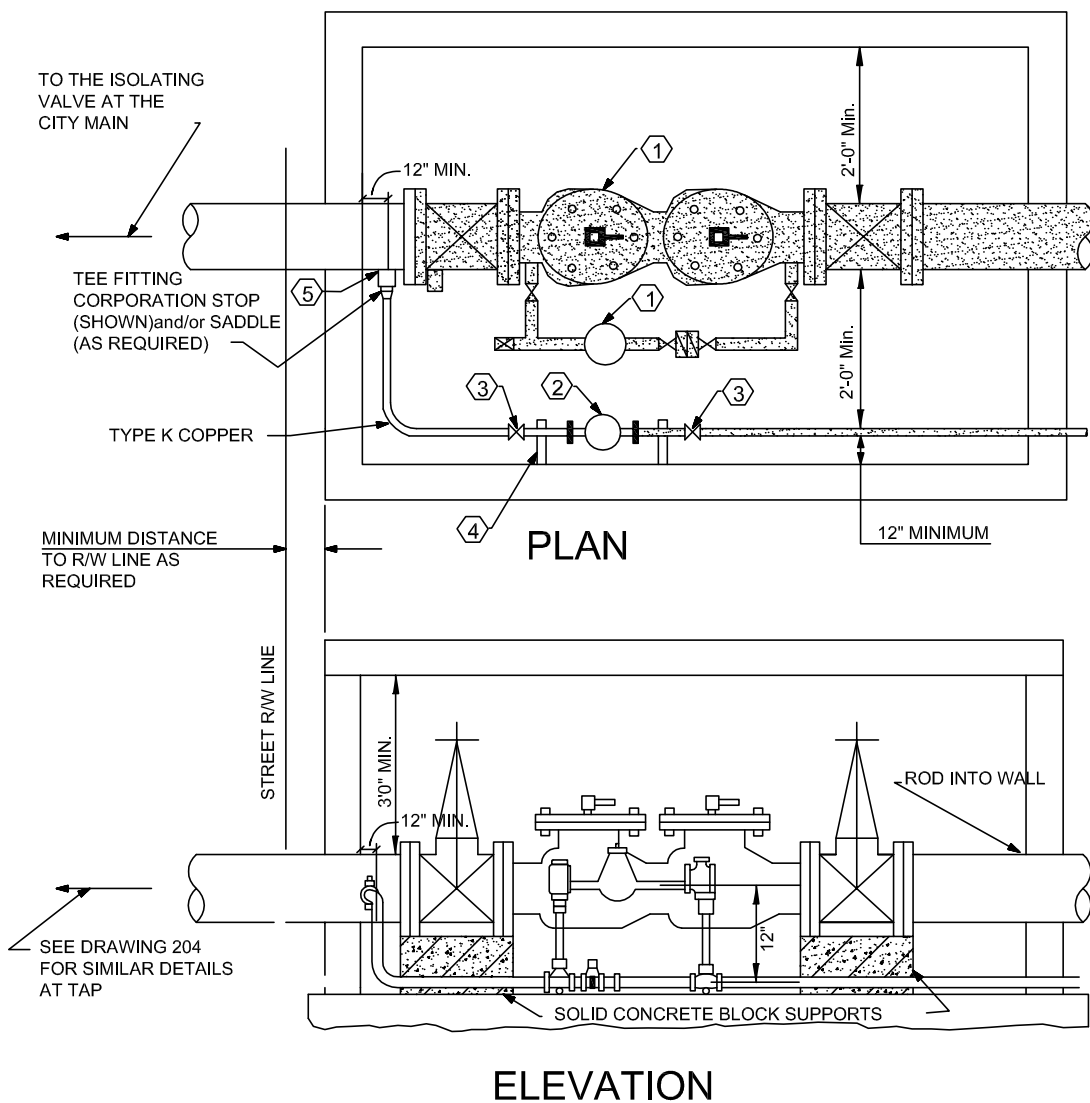
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204



DRAWING NOTES

- ① REFER TO DRAWING NO.203 FOR DETAILS OF FIRE BRANCH PIPING.
- ② 2" OR SMALLER DOMESTIC METER TO ALIGN WITH BY-PASS METER.
- ③ VALVE
- ④ BRACKETS FOR PIPE SUPPORT.
- ⑤ ON 8" AND SMALLER PIPING, TAPS MADE SHALL BE MADE WITH DOUBLE STAINLESS BAND STEEL SADDLE FOR 1 1/2" OR 2" TAPS.

GENERAL NOTES

1. SEE DRAWING 201 FOR PIT CONSTRUCTION DETAILS.
2. SEE DRAWING 200 - 200-C FOR PIT MATERIALS SPECIFICATIONS
3. SEE DRAWING 202 & 202-A FOR PIPING SPECIFICATIONS.
4. ANY PUMPER CONNECTION SHALL BE INSTALLED DOWNSTREAM OF OUTLET VALVE & BACKFLOW DEVICE.
5. ANY POST INDICATORS SHALL BE TYPE THAT WILL ATTACH TO WHEEL OPERATOR AND ALLOW OPERATION OF VALVE WITHIN PIT.
6. 1 1/2" & 2" METERS WILL COME WITH CUSTOM SETTER.(BOTH TO BE PURCHASED FROM THE CITY)
7. SHADED AREAS INDICATES WHAT THE PROPERTY OWNER WILL MAINTAIN AFTER THE WARRANTY PERIOD EXPIRES.
8. A BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED AS THE FIRST DEVICE INSIDE OF THE BUILDING ON THE DOMESTIC WATER LINE. THERE SHALL BE NO BRANCHES OR TAPS BETWEEN THE METERING ASSEMBLY & THE BACKFLOW PREVENTION ASSEMBLY.

DUAL SERVICE BRANCH SETTING WITH 2" OR 1 1/2" METERS

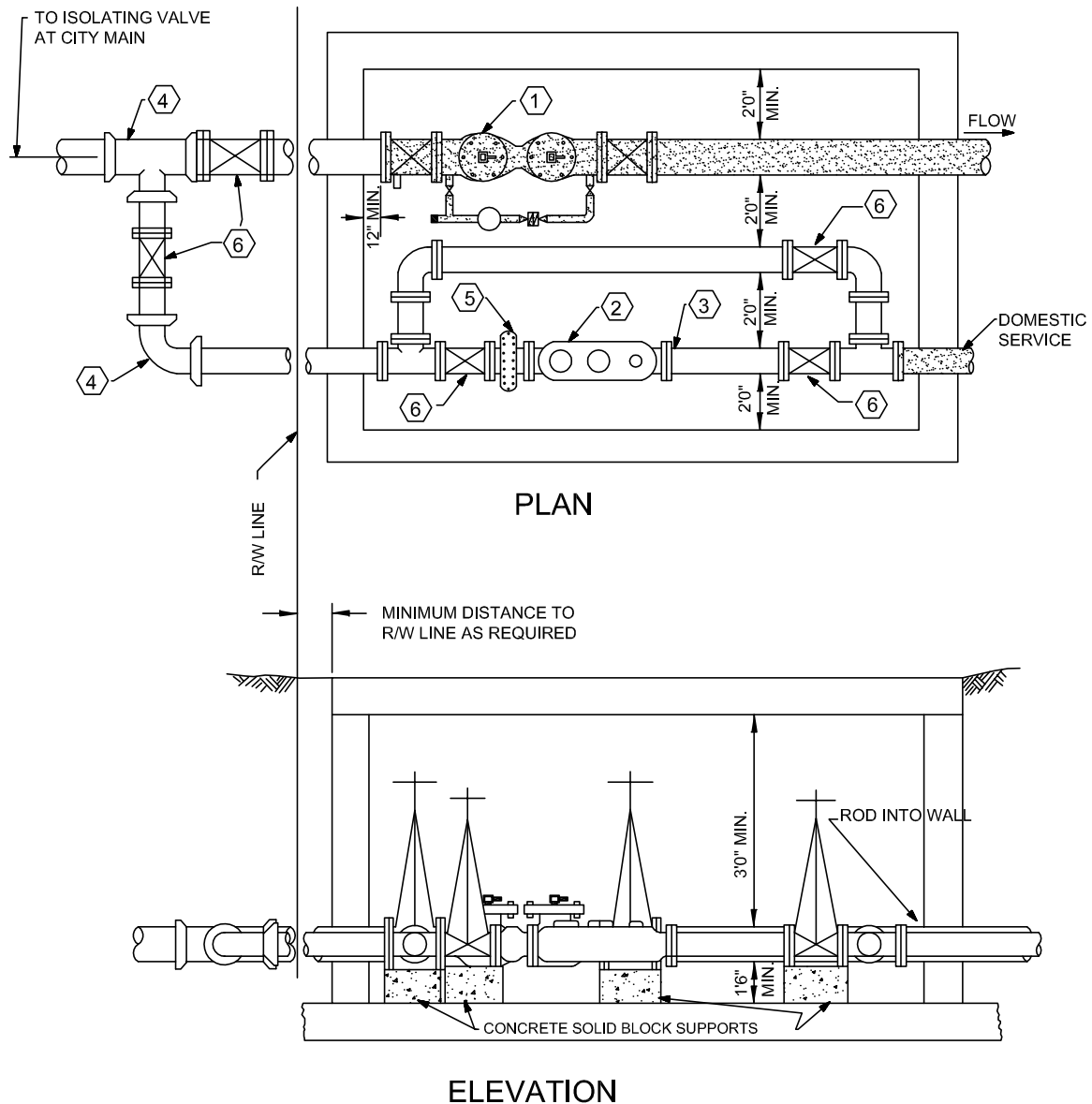
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STANDARD
DRAWING NO:
205



DRAWING NOTES

- 1 REFER TO DRAWING NO. 203 FOR DETAILS OF FIRE BRANCH PIPING.
- 2 3" OR LARGER DOMESTIC COMPOUND METER REFER TO DRAWING NO. 204 FOR DETAILS OF DOMESTIC SERVICE LINE PIPING.
- 3 FLANGED COUPLING ADAPTER OVER PLAIN END PIPE 1'0" LONG MINIMUM. (OPTIONAL) WITH 2" TAP WITH 2"x6" BRASS THREADED NIPPLE, 2" BALL VALVE
- 4 PROVIDE CONCRETE THRUST BLOCKS (SEE DRAWING NO. 104) OR OTHER APPROVED MEANS AS REQUIRED TO RESTRAIN JOINTS.
- 5 STRAINER
- 6 GATE VALVE

GENERAL NOTES

1. SEE DRAWING NO. 201 FOR PIT CONSTRUCTION DETAIL.
2. SEE DRAWING NO. 200 - 200-C FOR PIT MATERIALS SPECIFICATIONS.
3. SEE DRAWING NO. 202 & 202-A FOR PIPING SPECIFICATIONS.
4. ANY POST INDICATOR SHALL BE TYPE THAT WILL ATTACH TO WHEEL OPERATOR AND ALLOW OPERATION OF VALVE WITHIN THE PIT.
5. ANY PUMPER CONNECTION SHALL BE INSTALLED DOWNSTREAM OF FIRE BRANCH OUTLET VALVE AND ANY BACKFLOW DEVICE.
6. SHADED AREA INDICATES WHAT THE PROPERTY OWNER WILL MAINTAIN AFTER THE WARRANTY PERIOD EXPIRES. A BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED AS THE FIRST DEVICE INSIDE THE BUILDING ON THE DOMESTIC WATER LINE. THERE SHALL BE NO BRANCHES OR TAPS BETWEEN THE METERING ASSEMBLY AND THE BACKFLOW PREVENTION ASSEMBLY.
- 7.

DUAL SERVICE BRANCH SETTING WITH 3" AND LARGER METER

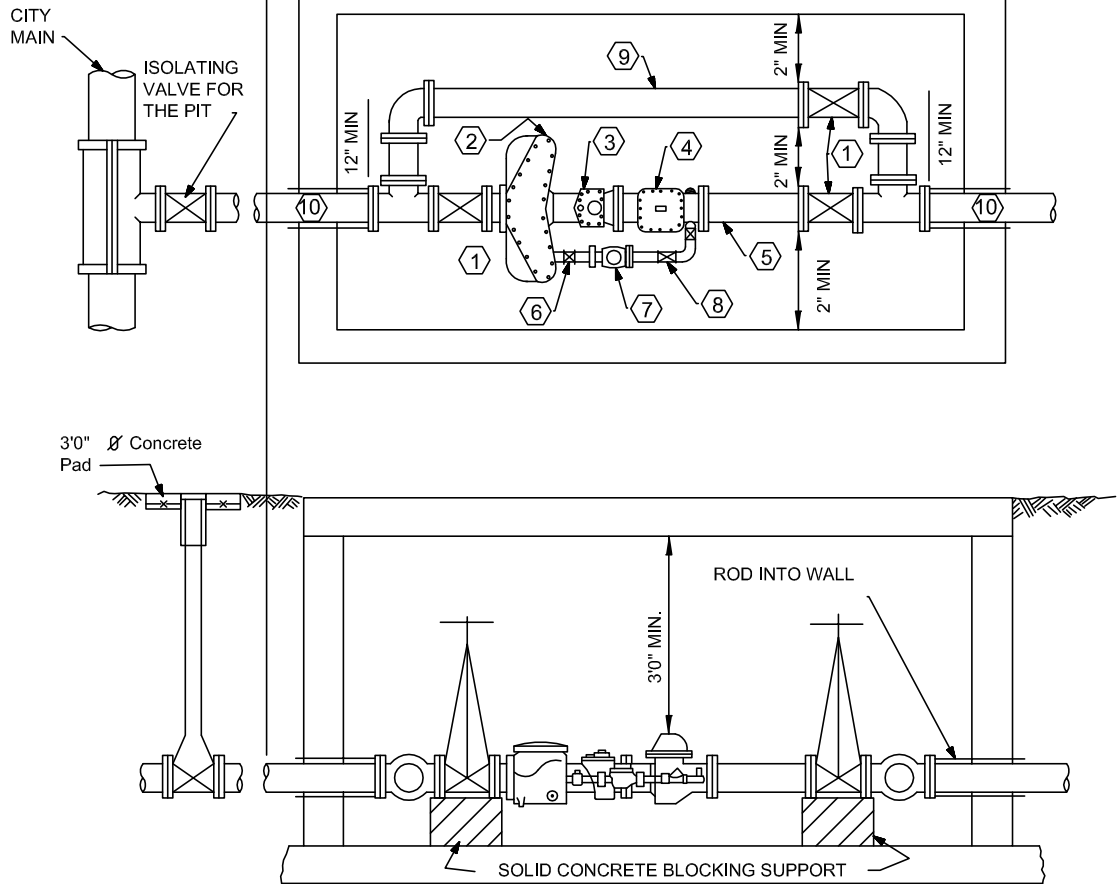
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206



NOTE: STRAINER, METER & DETECTOR CHECK VALVE SHALL BE U.L. LISTED ASSEMBLY PURCHASED FROM CITY OF FLORENCE.

DRAWING NOTES

- 1 VALVES WITH OUTSIDE STEM AND YOKE, FLANGED CONNECTION (RESILIENT SEATED VALVES)
- 2 U.L. FIRE RATED STRAINER
- 3 METER
- 4 U.L. LISTED DETECTOR CHECK
- 5 SPOOL PIECE, 12", FLANGED & PLAIN END
- 6 GATE VALVE
- 7 LOW FLOW METER
- 8 CHECK VALVE
- 9 BYPASS LINE SHALL BE EQUALIVANT IN SIZE AS THE FEED LINE OR THE NEXT SIZE SMALLER (3" MINIMUM SIZE)
- 10 CLASS 52 PIPING WITH FLANGED END WITHIN PIT.

GENERAL NOTES

- 1. ANY PUMPER CONNECTION SHALL BE INSTALLED DOWN STREAM OF OUTLET VALVE & BACKFLOW DEVICE
- 2. ANY POST INDICATOR SHALL BE THE TYPE THAT WILL ATTACH TO THE WHEEL OPERATOR AND ALLOW OPERATION OF VALVE WITHIN THE PIT.
- 3. SEE DRAWINGS 200 - 200-C, 201 & 202 - 202-A
- 4. A BACKFLOW PREVENTION ASSEMBLY SHALL BE INSTALLED AS FIRST DEVICE INSIDE OF THE BUILDING. THERE SHALL BE NOT BRANCHES OR TAPS BETWEEN THE METERING ASSEMBLY AND THE BACKFLOW PREVENTION ASSEMBLY.

FIRE RATED METER SETTING 4" AND LARGER FOR PROPERTIES WITH PRIVATE FIRE AND DOMESTIC WATER SERVICE

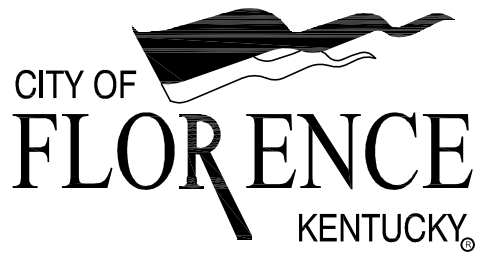
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207



2011

CITY OF FLORENCE
PUBLIC SERVICES - WATER DIVISION

STANDARD SPECIFICATIONS &
DRAWINGS FOR THE
INSTALLATION OF BACKFLOW
PREVENTION DEVICES

www.florence-ky.gov

PART 1 - GENERAL

- 1.01 **INTRODUCTION** Unless modified, deleted, replaced, or otherwise changed, the latest published addition of the following documents shall be the accepted standards for materials and/or procedures for the installation of backflow devices.
- A. City of Florence Meter Pit Standard Drawings
 - B. City of Florence "Manual for Cross-Connection Prevention"
 - C. American Water Works Association Standards (AWWA)
 - D. Foundation for Cross-Connection Control Research, University of Southern California "Cross -Connection Control Manual"
 - E. Kentucky Division of Water Regulations 401 KAR 8:020
- If a conflict exists between referenced sources, the more restrictive requirements shall prevail, the City shall provide interpretation as requested.
- 1.02 **PROGRAM** The City's Program is designed to take every reasonable precaution to protect the public water system from any and all cross-connection originating from the customers system, that may allow the backflow of pollutants and/or contaminants, by isolating the customers water service from the public water system.
- 1.03 **PLANS** Plans are approved subject to the conditions of compliance with all applicable laws, rules, regulations and standards. The proposed project may be constructed only in accordance with the approved plans. There may be no deviation from the approved plans without the written approval from the City. It is strongly suggested that preliminary plans be reviewed by the City prior to bidding to save time and money. Plans shall show all plumbing, fire system, industrial and any other uses of the public potable water. Four (4) sets of plans need to be submitted to the City for review and approval.
- 1.04 **DESCRIPTION** In general the following specifications are minimum requirements for design and installation purposes. Construction may be dictated by location, soil conditions, ground, water, topography, etc. Additional provisions may be required upon submission for approval.
- 1.05 **ACCESSIBILITY OF BACKFLOW PREVENTION DEVICES** Accessibility for maintenance and testing of every backflow prevention device shall be provided.
- 1.06 **MINIMUM REQUIREMENTS** Backflow prevention devices shall be installed in the horizontal position except those that are designed for a vertical position as approved by the Foundation for Cross Connection Control Research, University of Southern California. The service line between the meter and the backflow prevention device shall be void of branches or outlets of any kind. The devices shall be installed by a competent person.
- 1.07 **LOCATION** Backflow prevention devices shall be located after the meter before any taps or branches. The location shall be accessible for maintenance and testing purposes. The device shall be installed in a location where it is not subject to abuse from the weather and other damaging factors, etc. All devices shall be installed so they will be easily accessible for testing and repairs. The device must be protected from freezing.
- A. Inside of the building located as close as possible to the point where the piping enters the building, down stream of any meters maintained by the City (see Standard Drawing #301).
 - B. Above the ground, in a protective enclosure. (see Standard Drawing #302)
 - C. In a pit with proper drainage. (see Standard Drawing #303)
- 1.08 **COST** Any and all cost incurred with the installation, maintenance, testing, etc. of a backflow prevention device shall be borne by the customer.

BACKFLOW PREVENTION DEVICE ASSEMBLY INSTALLATION SPECIFICATIONS

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				STANDARD DRAWING NO:
				300

PART II - PRODUCTS

2.01 MATERIALS

- A. Backflow Prevention Device Assembly: All devices shall be listed and approved by the Foundation for Cross-Connection Control Research, University of Southern California and be approved by the City. The testable assembly consists of the backflow prevention unit and two shut-off valves. Valves shall be ball valves for 2 1/2" or less and outside stem and yoke, resilient wedge, left hand open gate valves for 3" and larger. The assembly shall not be separated or altered.

The type of device to be installed shall be determined by the City based on the degree of existing or potential hazard that the plumbing system poses.

- B. Packaged, Prefab Vaults or Protective Enclosures: Packaged, prefab vaults or protective enclosures are acceptable when approved by the City.
- C. Drain Line: Cast iron, Schedule 40 PVC, Plastic STM #35 or Ductile Iron, 4" minimum. If reduced pressure backflow prevention device is installed in pit, the drain line shall be sized according to Figure II-a.
- D. Protective Enclosure: A protective enclosure shall be provided if the backflow prevention device is to be installed above grade outside of the building. It shall be designed to protect the device from freezing. Adequate space shall be provided for testing, repair and maintenance of the device.
- E. Pit Structure: Pit structure shall be built according to City's Standard Drawings #200 - 200-C, 201, 202 & 202-A.
- F. Fire Service Lines: A Double Detector Check Valve Assembly or a Reduced Pressure Detector Check Valve Assembly (depending on hazard class) shall be installed in place of a signal detector check valve. Fire department connections shall be located down stream of backflow prevention device.
- G. Bypass Lines and Multiple Service Lines: All bypass lines and multiple service lines shall be protected with the same type of backflow prevention device.

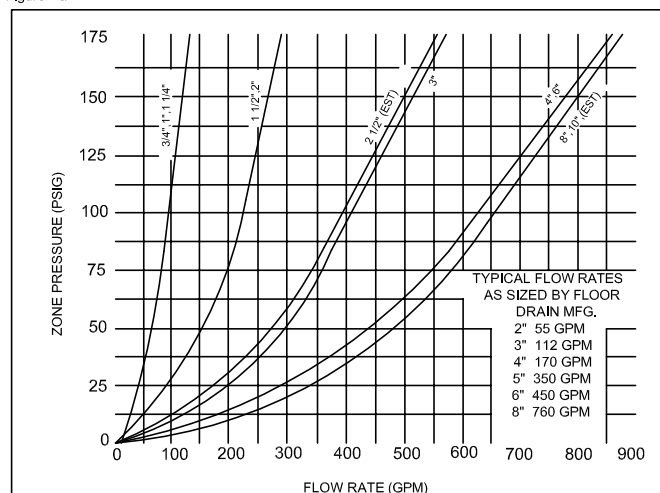
BACKFLOW PREVENTION DEVICE ASSEMBLY INSTALLATION SPECIFICATIONS

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					STANDARD DRAWING NO:
					300-A

PART III - EXECUTION

- 3.01 **INSTALLATION** Proper installation of backflow prevention devices and/or methods is essential to an effective cross-connection prevention program. The approved assembly must be installed as one unit. Separation of the various parts is grounds for rejection. The piping arrangement shall be installed according to the City of Florence Standard Drawings.
- A. Manufacturer's Instructions: All devices shall be installed according to manufacturers instructions and as approved by the Foundation for Cross-Connection Control Research, University of Southern California.
 - B. Flushing of Lines: Water lines shall be thoroughly flushed prior to installing a backflow prevention device to remove all debris.
 - C. Testing: All approved backflow prevention devices shall be tested and certified that it works properly by a certified backflow technician immediately after system activation and every year thereafter according to manufacturer's recommendation. All test results shall be recorded on the City's form and returned to the City. Any device failing to meet performance standards, it shall be repaired and retested promptly. If repairs cannot be made promptly, the City shall exercise prudence in evaluating the hazard that is created and appropriate actions shall be taken. Spare parts should be kept available by the customer to repair devices.
 - D. Thermal Water Expansion and/or Water Hammer: Downstream of the backflow prevention assembly thermal water expansion and/or water system, water hammer arresters, surge protectors or thermal expansion tanks should be installed as required by the Ky. State Plumbing Code - 815 KAR 20:120.
 - E. Devices Installed Inside Pits: The pit structure and piping arrangement shall be installed According to the City of FLorence Standard Drawings. The type of device installed in pits shall be limited to double check valve type assemblies, except as specified in 3.03.
 - F. Consumers Requiring Continuous Service: Where a consumer requires continuous uninterrupted service and where it is not possible or practical to provide water service from two separate service lines into a premises, as permitted by the City, provisions must be made for the installation of two backflow prevention devices in parallel.
- 3.02 **AIR-GAP SEPARATION** The only absolute means to eliminate backflow and back-siphonage s through the use of a vertical air-gap separation. Air-gaps should be used whenever possible. The minimum required air-gap shall be measured vertically from the lowest end of the potable water outlet to the flood rim or line of the fixture or receptacle into which it discharges. This air-gap shall be twice the effective inside diameter of the potable water outlet. In no case shall the minimum required air-gap be less than one (1) inch. There shall be no provisions for extending the fixture outlet below the flood level rim.
- 3.03 **REDUCED PRESSURE BACKFLOW PREVENTION DEVICE** The reduced pressure backflow preventer shall be installed in the horizontal position, unless approved for vertical installation by the Foundation for Cross-Connection Control Research, University of Southern California, with adequate space to facilitate maintenance and testing.
- These devices should never be installed below grade level. The only case where they may be installed in a pit-type structure is where the drain of the box will permit direct drainage to the atmosphere. The drain must be capable of handling the volume of water that can be discharged from the relief port. The relief port shall be located twelve (12) inches above ground level at the point of discharge. Under no circumstances, should the relief port be plugged. This device depends upon an open relief port for safe operation. Care must be taken to protect the device from freezing. When the device is located inside a building, there must be suitable means of taking care of any discharge. If there is a drain provided for the relief valve port, there must be a fixed air gap separation between the relief port and the drain line.
- 3.04 **DOUBLE CHECK VALVE ASSEMBLIES :** Double check valves shall be installed in the horizontal position, unless approved for vertical installation by the Foundation for Cross-Connection Control Research, University of Southern California, with adequate space to facilitate maintenance and testing.
- A double check valve should only be considered when the probability of backflow and the degree of hazard is considered low as determined by the City. The degree of protection offered by this device is much less than that of an air-gap separation or a reduced pressure backflow prevention device.

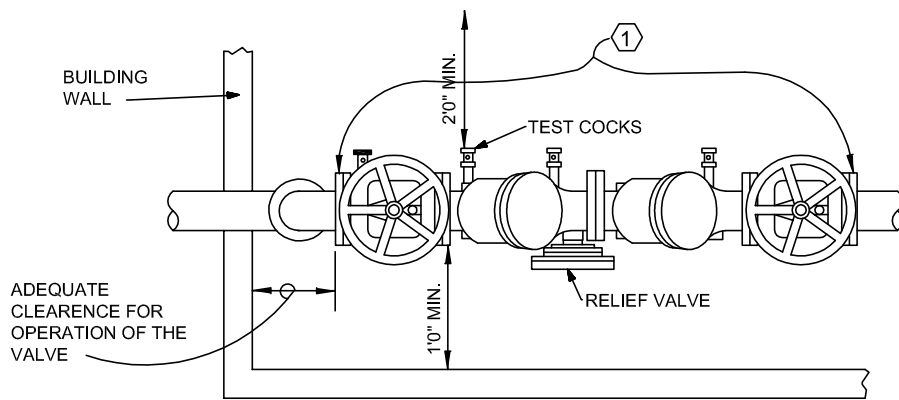
Figure II-a



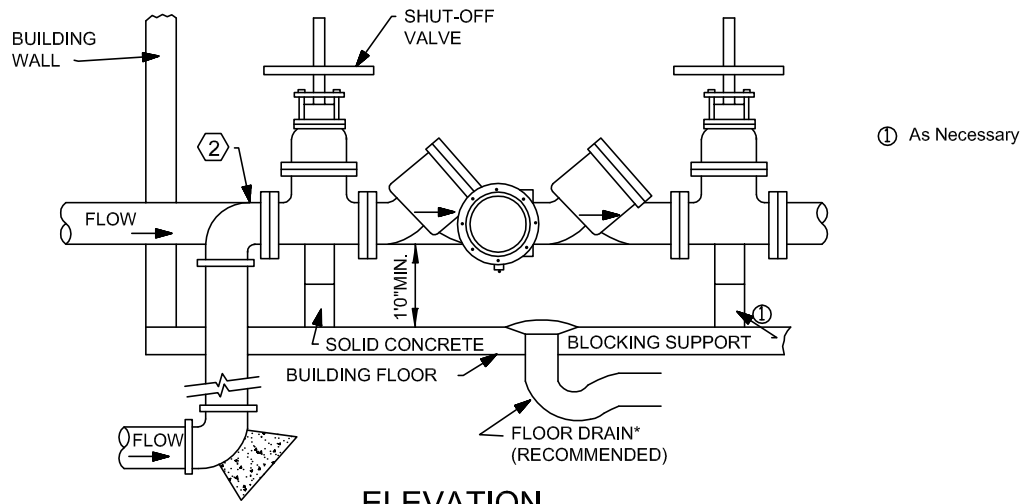
Relief Valve Discharge Rates For Reduced Pressure Backflow Assemblies.

BACKFLOW PREVENTION DEVICE ASSEMBLY INSTALLATION SPECIFICATIONS

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					300-B



PLAN



ELEVATION

* In Lieu of a Floor Drain, The Discharge From The Reduced Pressure Backflow Prevention Device May Be Piped to a Sewer Provided an Approved Air-Gap is Maintained @ The Relief Valve of the Device.

DRAWING NOTES

- ① APPROVED BACKFLOW PREVENTION ASSEMBLY.
- ② PIPING - FLANGED ENDS AND ANCHORED AS NECESSARY.

GENERAL NOTES

- 1. THE DEVICE SHALL BE LOCATED AS CLOSE AS POSSIBLE TO THE POINT WHERE THE PIPING ENTERS THE BUILDING.
- 2. THE SERVICE PIPING BETWEEN THE METER AND THE BACKFLOW PREVENTION DEVICE SHALL BE VOID OF ANY BRANCHES OR OUTLETS.
- 3. THE DEVICE SHALL BE LOCATED NO MORE THAN 5 FEET FROM THE FLOOR.
- 4. A MINIMUM OF 2 FEET SHALL BE MAINTAINED BETWEEN THE TEST COCKS AND ANY WALLS OR ANY OTHER OBJECTS.

BACKFLOW PREVENTION ASSEMBLY INSTALLED IN A BUILDING

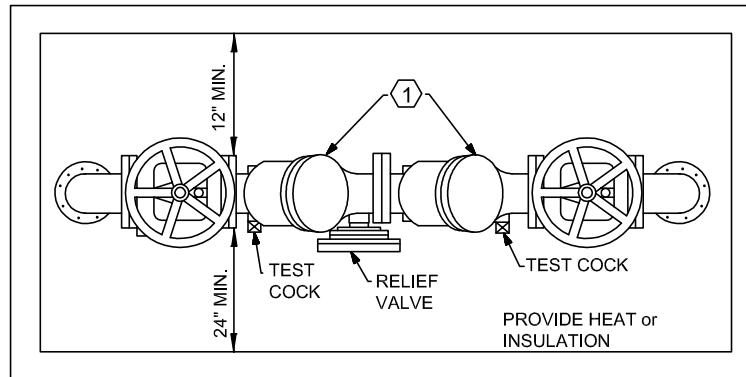
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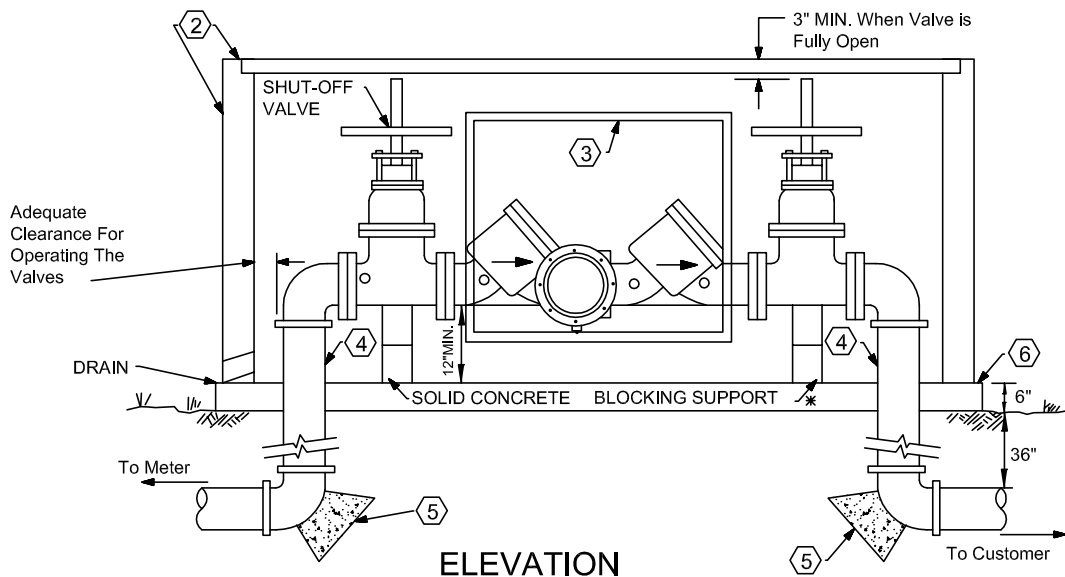


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2011
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301



PLAN



ELEVATION

* As Necessary

DRAWING NOTES

- ① APPROVED BACKFLOW PREVENTION ASSEMBLY WITH APPROVED VALVES - OUTSIDE STEM & YOKE VALVES
- ② PROTECTIVE ENCLOSURE DESIGNED TO PROTECT THE BACKFLOW PREVENTOR FROM FREEZING & WEATHER
- ③ ACCESS DOOR 3'X 4' MIN. SIZE UNLESS THE STRUCTURE CAN BE MANUALLY LIFTED OFF. TEST TEES SHALL FACE THE ACCESS DOOR.
- ④ PIPING - FLANGED ENDS WITHIN STRUCTURE ANCHORED AS NECESSARY
- ⑤ CONCRETE THRUST BLOCKS
- ⑥ 6" THICK CONCRETE PAD

GENERAL NOTES

1. THE SERVICE PIPING BETWEEN THE METER AND THE BACKFLOW DEVICE SHALL BE VOID OF ANY BRANCHES OR OUTLETS.
2. DRAINAGE SHALL BE PROVIDED
3. THE DEVICE SHALL NOT BE IN AN AREA SUBJECT TO FLOODING.
4. METERING DEVICE & APPURTENANCES CAN BE LOCATED ABOVE GRADE BEFORE THE BACKFLOW PREVENTION ASSEMBLY.
 - NEEDS TO BE LOCATED JUST OUTSIDE OF R/W
 - NEEDS TO BE PROTECTED FROM FREEZING

BACKFLOW PREVENTION ASSEMBLY INSTALLED ABOVE GROUND

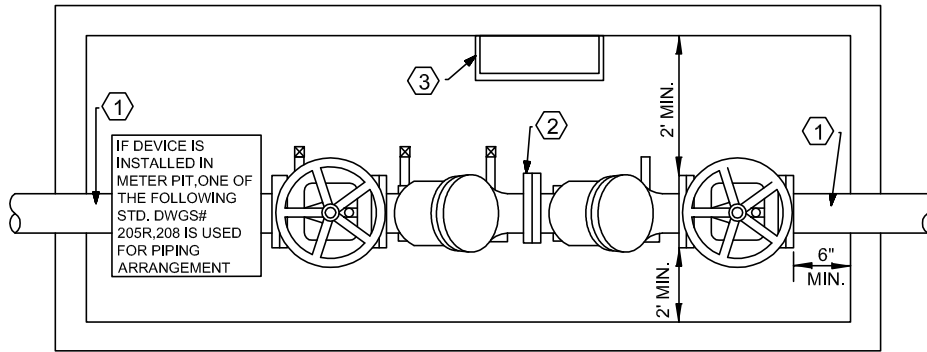
N.T.S.

REVISION	BY	DATE

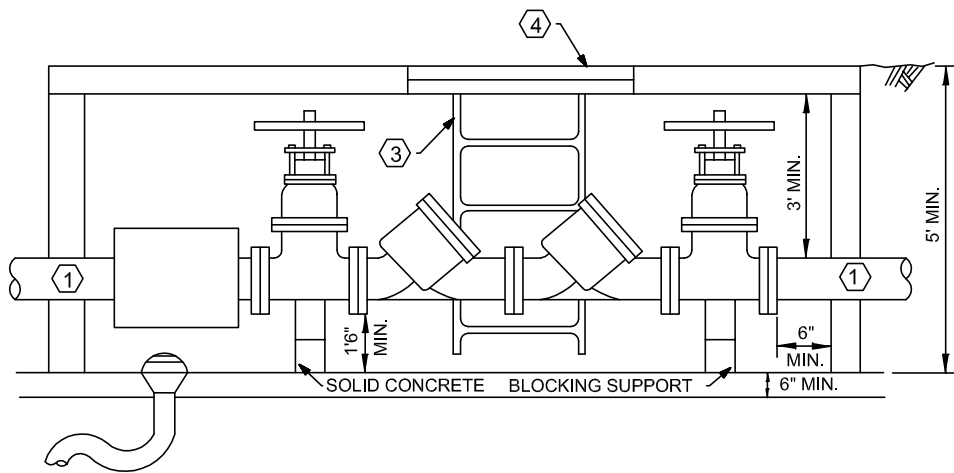


CITY OF FLORENCE
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PLAN



ELEVATION

DRAWING NOTES

- ① PIPING CLASS 52 WITH ENDS WITHIN THE PIT. ANCHORED AS NECESSARY
- ② APPROVED BACKFLOW PREVENTION ASSEMBLY WITH APPROVED VALVES. (OUTSIDE STEM & YOKE VALVES)
- ③ REMOVABLE ALUMINUM LADDER WITHIN THE PIT.
- ④ ACCESS LID, ALUMINUM, DOUBLE DOOR LID, 48"x54" WITH LOCKING BAR, CENTERED OVER METER, IF ANY.

GENERAL NOTES

1. SERVICE PIPING BETWEEN THE METER ASSEMBLY AND THE BACKFLOW DEVICE SHALL BE VOID OF ANY BRANCHES OR OUTLETS.
2. DRAINAGE SHALL BE PROVIDED PER CITY STANDARDS.
3. REDUCED PRESSURE BACKFLOW PREVENTION CAN BE INSTALLED IN A PIT ONLY IF THE PIT IS DRAINED TO ATMOSPHERE AND DRAIN LINE IS SIZED TO RELIEF VALVE FLOW RATE.
4. STANDARD DRAWINGS #200 - 200-C, 201, 202, & 202-A.

BACKFLOW PREVENTION ASSEMBLY INSTALLED IN A PIT

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