

City of Wilmington

**WATER
DISTRIBUTION**

Specifications

Revised 2019

**CITY OF WILMINGTON
WATER DEPARTMENT
SPECIFICATIONS**

PLAN APPROVALS

**CITY OF WILMINGTON
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WILMINGTON, OHIO 45177**

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TABLE OF CONTENTS

	<u>PAGE</u>
WATER MAIN INSTALLATION	1-2
TRACER WIRE	3-7
HYDROSTATIC TESTING OF LINES.....	8-9
DISINFECTION OF NEW WATER MAINS MAINS.....	10-11
BACTERIOLOGICAL TESTING AND RE-DISINFECTION.....	12-13
FIRE HYDRANT SPECIFICATIONS AND INSTALLATION.....	13-16
INSIDE WATERMETER SETTING.....	17
OUTSIDE WATER METER SETTING.....	18
BACKFLOW PREVENTOR INSTALLATION.....	19-20
SERVICE LINE INSTALLATION.....	21
VALVE BOX IN GRASSY AREA.....	22
WATER METER PIT -3" & LARGER.....	23-24
WATER METER PIT – 1-1/2" & 2".....	25
WATER METER SETTING WITH BYPASS 1-1/2' & 2".....	26
WATER VALVE CHAMBER.....	27
WATER BLOW OFF.....	28
AIR RELEASE.....	29
CONCRETE BLOCKING FOR MAINS.....	30-31

WATER MAIN INSTALLATION

1. Main depth shall be a minimum of 4 feet-6 inches after final grade.
2. Main depth is not to exceed 60 inches after final grade without approval of Water Department.
3. All new main shall meet AWWA C909 Molecularly Oriented Polyvinyl Chloride (PVC0) Pressure Pipe.
4. All water main extensions shall be run to the far end of the property line.
5. Copperhead Industries tracer wire, or equivalent, shall be installed with the pipe. See separate section of this document for details.
6. Main and all appurtenances shall be disinfected according to chlorinating procedures listed in this document.
7. A hydrostatic test shall be performed in the presence of City personnel. Details are listed in separate section of this document.
8. The main will be approved after satisfactorily passing two bacteriological analyses, as detailed in separate section of this document, performed by the City Water Department.
9. All **water main trenches** shall be **inspected** by City personnel **prior to backfilling**.
10. All mains shall be bedded in 6 inches of sand. Backfilling will consist of #57 stone extending one foot above the pipe, then clean dirt except where it travels under sidewalks and streets. Further details are in section 8.8 of AWWA Standard C605.
11. Every 300 feet of water main installed shall have an earthen dam built.
12. Under sidewalks, the trench shall be filled with 411.02 stone compacted every 4 inches.
13. Under streets, the trench shall be filled with 411.02 stone compacted every 4 inches and/or LSM flowable fill. Consult with city for requirements under specific conditions.
14. Material used around any water service lines or fittings shall contain **no lime**.
15. All gate valves must open left (counter-clockwise), and be installed every 800 feet.
 - a) Valves shall meet or exceed ANSI/AWWA C515, latest revision, for water supply service.
 - b) Valves size shall be of a resilient wedge design with a rated working pressure of 250 psig.
 - c) All cast ferrous components shall be ductile iron and shall be manufactured in compliance with the latest edition of ANSI/AWWA C515.
 - d) The valve body design shall be lightweight in design and easy to handle. Valve body and bonnet shall be constructed of ductile iron with wall thickness per Table 2, of ANSI/AWWA C515. Heavy wall or and/or cast gray-iron bodies are not acceptable.
 - e) The valve shall have a smooth and oversize waterway and have the marking “DI” or “Ductile Iron” cast onto the body.
 - f) All wedges shall be constructed of ductile iron. Wedge shall be fully encapsulated with EPDM rubber and provided with polymer wedge guide covers.
 - g) Valve stuffing box and wrench nut shall be made of ductile iron.
 - h) Valve inlet shall be designed for use with ductile iron, cast iron, HDPE and PVC pipe materials.

i) Inlet shall incorporate stab-fit design requiring the use of only one Type 304 stainless steel fastener. The assembly of flange or mechanical joint restrainers using multiple fasteners or wedge bolts is not permitted.

j) Restraint accessories shall be factory installed.

k) All valve inlets shall be the ALPHA design furnished by AMERICAN Flow Control or equivalent.

The AMERICAN Flow Control 2500 Series Valves with ALPHA end connections, or equivalent, shall be used on Main Lines as well as Hydrant Laterals. When using AMERICAN Flow Control 2500 Series valves with ALPHA end connections on hydrant laterals, the use of anchor or fabricated pipe is not necessary. Pipe shall be cut to the length needed to place the hydrant in the exact and desired location.

Flushing:

Foreign material left in pipelines during installation often results in valve or hydrant-seat leakage during pressure tests. Every effort shall be made to keep lines clean during installation. Thorough flushing is recommended prior to a pressure test. Flushing should be accomplished by partially opening and closing valves and hydrants several times under expected line pressure, with flow velocities adequate to flush foreign material out of the valves and fire hydrants.

Tracer Wire

Tracer wire must be installed on all new water mains, hydrant laterals and service lines. This specification provides the technical requirements necessary to ensure proper installation of tracer wire and related components for the purposes of locating underground water utilities. It recognizes that the first step in protecting underground utility assets is installing a quality, reliable locating system.

Materials

General

- All system components, including tracer wire, connectors, ground rods and access points, must be compatible to Copperhead Industries Complete Utility Locating System. For convenience, Copperhead parts are listed.
- All tracer wire and tracer wire products shall be manufactured in the USA.
- All tracer wire shall have HDPE insulation for direct bury, blue-color coded.

Tracer wire

- Open Trench - Tracer wire shall be Copperhead copper-clad steel 12-AWG High Strength, high carbon with minimum 450 lb. break load, minimum 30 mil HDPE insulation thickness.
- Directional Drilling/Boring - Tracer wire shall be Copperhead copper-clad steel 12-AWG Extra High Strength with minimum 1,150 lb. break load, minimum 45 mil HDPE insulation thickness.

Connectors

- All mainline tracer wires shall be interconnected at intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single, three-way SnakeBite Locking Connector (LSC1230C). At crosses, the four wires shall be joined using two, three-way Copperhead SnakeBite Locking Connectors (LSC1230C) with a short jumper wire between them.
- Direct bury wire connectors shall include three-way lockable Copperhead SnakeBite™ Locking Connectors (LSC1230C) and Copperhead Mainline-to-Service Connectors (3WB-01) specifically manufactured for use in underground tracer wire installation. Connectors shall be dielectric silicone filled to seal out moisture and corrosion and shall be installed in a manner as to prevent any uninsulated wire exposure.
- Non-locking, friction fit or taped connectors are prohibited.

Grounding

- Tracer wire must be properly grounded at all dead-ends/stubs.
- Grounding of tracer wire shall be achieved by using a 1.5-lb, drive-in, magnesium Copperhead Ground Rod (ANO-12) with a minimum 20-feet, #12 red HDPE insulated copper-clad steel wire connected to the rod specifically manufactured for this purpose.

Termination/Access

- All tracer wire termination points must provide a direct connection point to the tracer wire by a utility locate transmitter (above ground or at grade) specifically manufactured for light duty, concrete/driveway, or roadway applications.
- All at-grade access points shall be appropriately identified with “water” on the cap and be color coded blue.

- All two-terminal tracer wire access points must include a manually interruptible conductive/connective link between the terminal for the tracer wire connection and the terminal for the ground rod wire connection.
- All two-terminal tracer wire access points must have external direct connection points to both the tracer wire and ground rod wire from top of lid.
- All at-grade access points shall include an encapsulated magnet molded into the top portion of the tube, to allow for detection by a ferrous metal detector.
- All at-grade access points shall be supplied with anti-corrosion wax/gel to protect wires.
- Service laterals on public property – Tracer wire shall terminate at an approved at-grade, two-terminal switchable Copperhead SnakePit Lite Duty (LD14B2T-SW), Lite Duty Adjustable (LD14B2T-ADJ-SW), Lite Duty XL (LDXL36B2T-SW), or Concrete/Driveway (CD14B2TP-SW) Access Point located at the edge of the road right-of-way, and out of the roadway.
- Service laterals on private property – Tracer wire shall terminate at an approved Copperhead single-terminal access point (when grounding isn't required) affixed to or near the building exterior directly above where the utility enters the building, or at a two-terminal access point (when grounding is required) located within two linear feet of the building being served by the utility.
- Hydrants – Tracer wire shall terminate at an approved above-grade Copperhead Cobra Access Point properly affixed to the hydrant-grade flange (T2-B-FLPKG-5/8 for hydrants with 5/8" bolts, and T2-B-FLPKG-3/4 for hydrants with 3/4" bolts). Affixing with tape or plastic ties shall not be acceptable. Tracer wire may also terminate at an approved at-grade Copperhead SnakePit Lite Duty (LD14B2T-SW), Lite Duty Adjustable (LD14B2T-ADJSW), Lite Duty XL (LDXL36B2T-SW), or Concrete/Driveway (CD14B2TP-SW) Access Point.
- Long-runs, more than 2,500 linear feet, without service laterals or hydrants – Tracer wire access must be provided utilizing an approved at-grade Copperhead SnakePit® Access Point and grounded at dead-ends utilizing a drive-in magnesium Copperhead Ground Rod (ANO-12).

Installation

General

- Tracer wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512 Hz) signal, and without distortion of signal caused by more than one wire being installed in close proximity to one another.
- Tracer wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.
- Any damage of the tracer wire occurring during installation must be immediately repaired by removing the damaged wire and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.
- Tracer wire shall be installed at the bottom half of the pipe and secured (taped/tied) at 5-foot intervals.
- Mainline tracer wire shall not be connected to existing conductive pipes. Treat as a mainline dead-end ground using an approved waterproof connector to a Ground Rod driven into virgin soil beneath and in line with the utility.

- All service lateral tracer wire shall be a single wire, connected to the mainline tracer wire using a three-way mainline-to-service connector, installed without cutting/splicing the mainline tracer wire.
- In occurrences where an existing tracer wire is encountered on an existing utility that is being extended or tied into, the new tracer wire and existing tracer wire shall be connected using approved connectors.
- Tracer wire on all service laterals/stubs must terminate at an approved tracer wire access point located directly above the utility, at the edge of the road right-of-way, but out of the roadway.
- One foot of excess/slack wire is required in all tracer wire access points after meeting final elevation.
- Tracer wire must be properly grounded as specified.
- At all mainline dead-ends, tracer wire shall go to ground using an approved connection to a drive-in magnesium ground rod.
- When grounding the tracer wire at dead-ends/stubs, the Ground Rod shall be driven into virgin soil directly beneath and in line with the utility.
- Ground rod wire shall be connected to the ground rod terminal on the two-terminal SnakePit Access Point Lid or to the bottom terminal on the two-terminal Cobra Access Point.
- Where the Ground Rod wire will be connected to a tracer wire access point, one foot of excess/slack wire is required after meeting final elevation.

Water System

- A mainline tracer wire must be installed, with all service lateral tracer wires properly connected to the mainline tracer wire, to promote tracing/locating capabilities from a single connection point.
- Lay mainline tracer wire continuously, by-passing around the outside of valves and fittings on the north or east side.
- Tracer wire on all water service laterals must terminate at an approved tracer wire access point, color coded blue and located directly above the service lateral at the edge of road right-of-way.
- Tracer wire access points will be installed at all fire hydrants.
- All conductive and non-conductive service lines shall include tracer wire.

Prohibited Products and Methods

The following products and methods shall NOT be allowed or acceptable:

- Uninsulated tracer wire
- Stainless steel tracer wire
- Tracer wire insulations other than HDPE
- Tracer wire not domestically manufactured
- Non-locking, friction fit or taped connectors
- Brass or copper ground rods
- Wire connections utilizing taping or spray-on waterproofing
- Looped wire or continuous wire installations that have more than one wire laid side-by-side or in close proximity to one another
- Tracer wire wrapped around the corresponding utility
- Brass fittings with tracer wire connection lugs

- Wire terminations within the roadway in valve boxes, cleanouts, manholes, etc.
- Connecting tracer wire to existing conductive utilities.

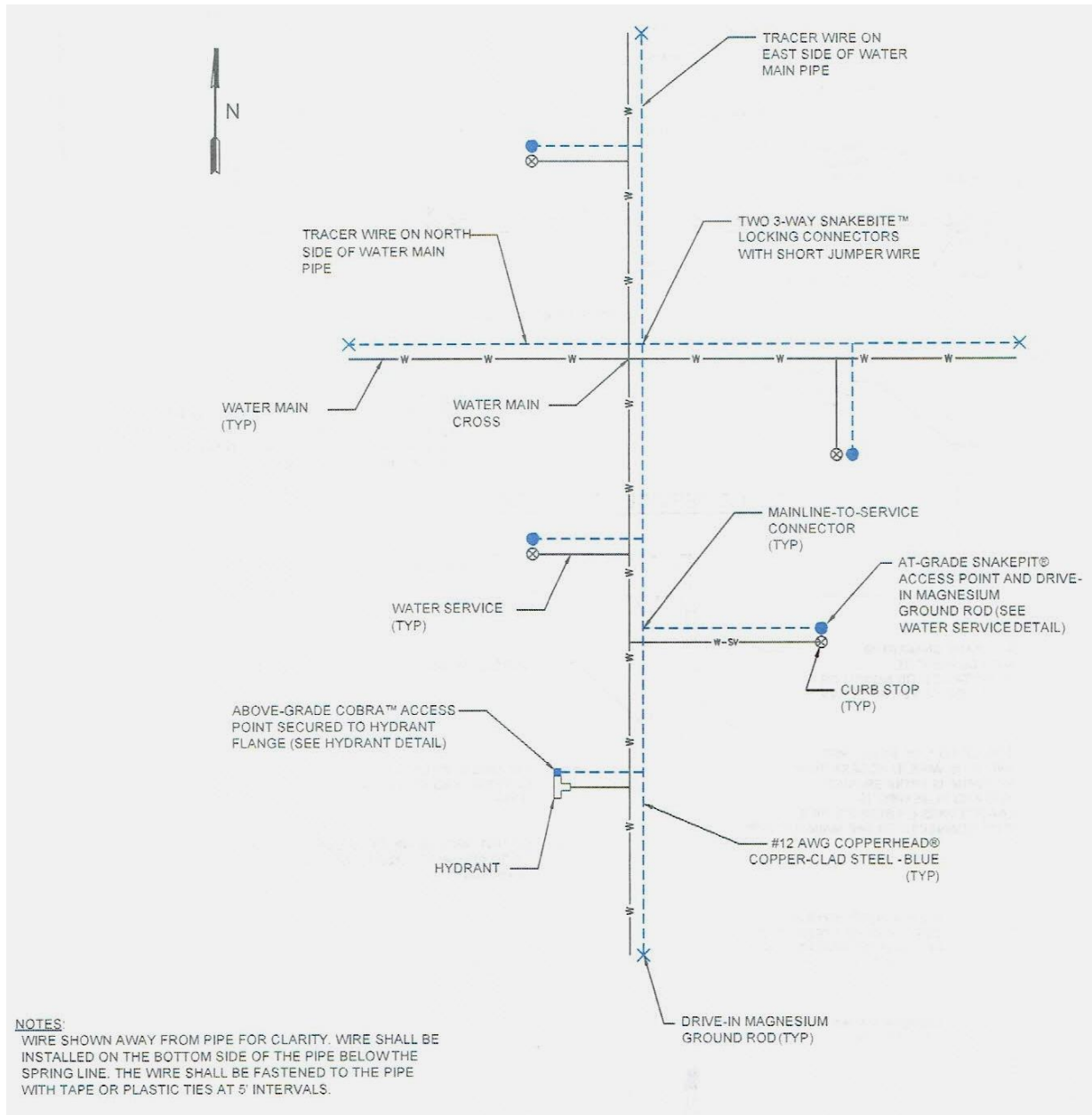
Testing

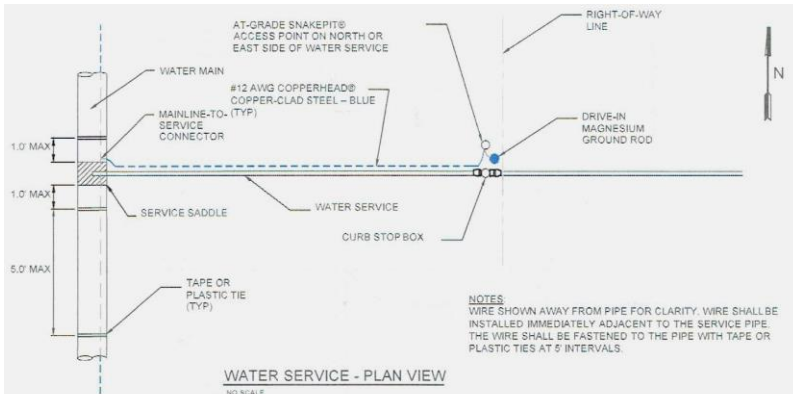
All new tracer wire installations shall be located using typical low frequency (512 Hz) line tracing equipment, witnessed by the City or designee, as applicable, prior to acceptance of the City.

This verification shall be performed upon completion of rough grading and again prior to final acceptance of the project.

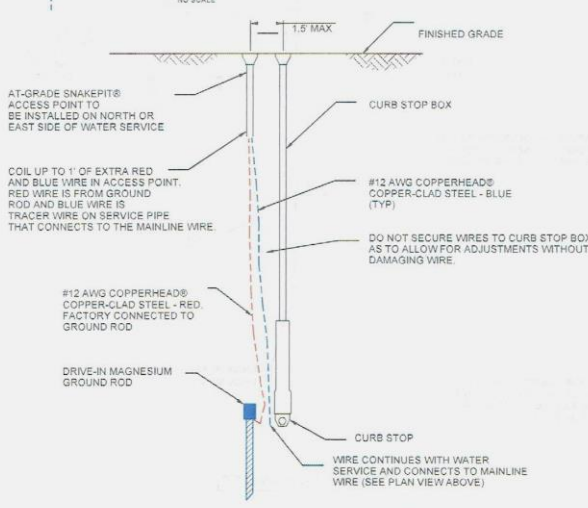
Continuity testing in lieu of actual line tracing shall not be accepted.

SAMPLE TRACER PLAN:

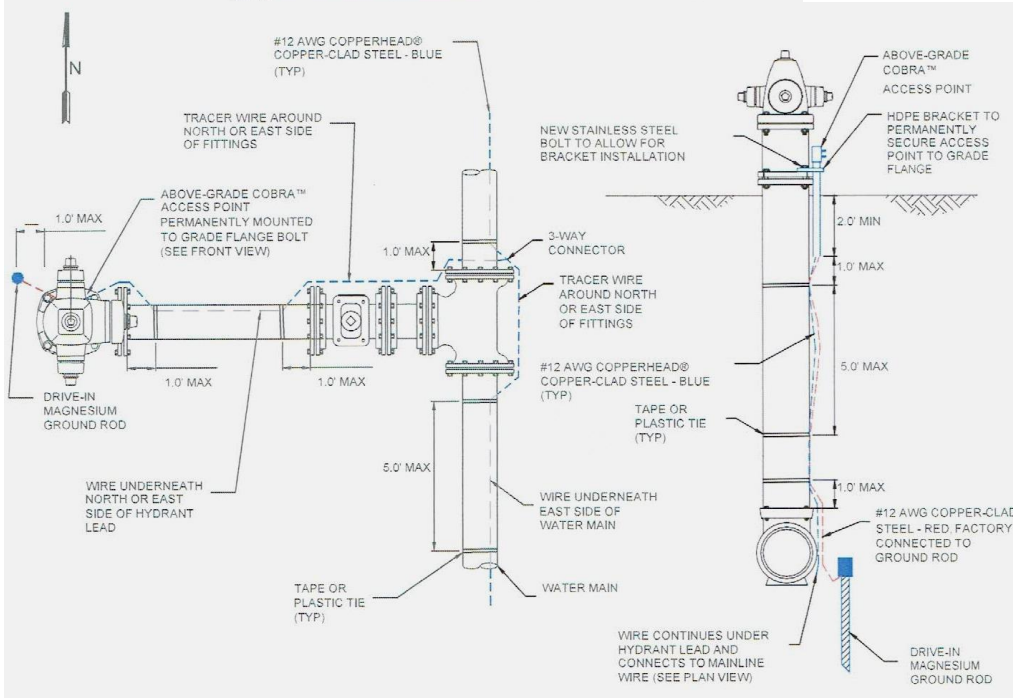




WATER SERVICE - PLAN VIEW
NO SCALE



WATER SERVICE - SECTION VIEW
NO SCALE



HYDRANT - PLAN VIEW
NO SCALE

HYDRANT - SECTION VIEW
NO SCALE

HYDROSTATIC TESTING

Hydrostatic testing of new water mains must be completed in accordance of Section 10.3 of the most recent version of AWWA standard C605. Water must be used for all pressure testing of newly-installed water mains. Air testing, or any other type material, is prohibited.

PRESSURE TEST

All newly laid pipe or any valved section thereof shall be subject to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing. Before testing, sufficient backfill shall be provided to prevent pipe movement.

TEST PRESSURE REQUIREMENTS

Test pressure shall:

1. Not be less than 1.25 times the working pressure at the highest point along the test section.
2. Not exceed pipe or thrust-restraint design pressure.
3. Be of at least 2-hour duration.
4. Not vary by more than 5 psi (0.35 bar) for the duration of the test.
5. Not exceed twice the rated pressure of the valves or hydrants when the pressure boundary of the test section includes closed gate valves or hydrants. Note: Valves shall not be operated in either direction at differential pressure exceeding the rated pressure of the valves when the pressure boundary of the test section includes closed, resilient-seated gate valves or butterfly valves.

PRESSURIZATION. Each valved section of pipe shall be filled with water slowly and the specified test pressure, based on the elevation the lowest point of elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the City. Valves shall not be operated in either the opening or closing direction at differential pressures above the rated pressure. It is good practice to allow the system to stabilize at the test pressure before conducting the leakage test.

AIR REMOVAL. Before applying the specified test pressure, air shall be expelled completely from the pipe, valves, and hydrants. If permanent air vents are not located at all high points, the contractor shall install corporation cocks at such points so that the air can be expelled as the line fills with water. After all the air has been expelled, the corporation cocks shall be closed and the test pressure applied. At the conclusion of the pressure test, the corporation cocks shall be removed and plugged or left in place at the discretion of the City.

EXAMINATION. Any exposed pipe, fittings, valves, hydrants, and joints shall be examined carefully during the test. Any damaged or defective piping, fittings,

valves, or hydrants that are discovered following the pressure test shall be repaired or replaced with sound material. Visible leakage shall be repaired, regardless of the amount of leakage. The test shall be repeated until it is satisfactory to the City.

ACCEPTANCE OF INSTALLATION. Acceptance shall be determined on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than 5 PSI, the contractor shall, at his own expense, locate and make repairs as necessary until the leakage is within the specified allowance.

DISINFECTION OF NEW WATER MAINS

The most recent version of AWWA Standard C651 shall be followed. Contractor is responsible to complete disinfection and re-disinfection, if necessary.

Listed below is the City’s favored procedure for disinfection. Other methods will be considered, if it conforms to AWWA Standard C651.

All efforts shall be made to prevent contaminating materials from entering the water main during storage and construction. Any potential contamination at the construction site shall be noted and used as a basis for bolstering disinfection efforts. Section 4.8 of AWWA Standard C651 outlines the best practices for preventing contamination.

TABLET/GRANULE METHOD:

The tablet/granule method consists of placing calcium hypochlorite granules and tablets in the water main as it is being installed and filling the main with potable water when installation is completed.

Use of this method requires the pipes and appurtenances are protected during construction.

PLACING OF HYPOCHLORITE GRANULES. During construction, calcium hypochlorite granules shall be placed at the upstream end of the first section of pipe, at the upstream end of each branch main, and at 500 ft. intervals. Use dosages listed in Table 1 below.

WARNING: This procedure must not be used on solvent welded plastic or on screwed-joint steel pipe because of the reaction of the joint compounds with the calcium hypochlorite.

TABLE 1

Ounces of calcium hypochlorite granules to be placed at the beginning of main and at 500 ft. intervals.

Pipe Diameter (inches)	Calcium Hypochlorite Granules (ounces)
4	1.7
6	3.8
8	6.7
10	10.5
14 and larger	$D^2 \times 15.1$, where D-diameter in feet

PLACING OF CALCIUM HYPOCHLORITE TABLETS: During construction, 5-g calcium hypochlorite tablets shall be placed in each section of pipe and in each hydrant, hydrant branch, and other appurtenance. Table 2 shows the number of tablets required for commonly used sizes of pipe. The tablets shall be attached by an NSF/ANSI 61–approved adhesive. There shall be no adhesive on the tablet except on the broad side attached to the surface of the pipe. Attach all of the tablets inside and at the top of the

main, with approximately equal numbers of tablets at each end of a given pipe length. If the tablets are attached before the pipe section is placed in the trench, their position shall be marked on the section so it can be readily determined that the pipe is installed with the tablets at the top.

TABLE 2

Number of 5-g Calcium Hypochlorite tablets required for minimum dose of 25 mg/l*

Pipe Diameter (inches)	Length of Pipe Section (feet)				
	13 or less	18	20	30	40
	Number of 5-g Calcium Hypochlorite Tablets				
4	1	1	1	1	1
6	1	1	1	2	2
8	1	2	2	3	4
10	2	3	3	4	5
12	3	4	4	6	7
16	4	6	7	10	13

* Based on 3.25 g available chlorine per tablet.

FILLING AND CONTACT TIME. When installation has been completed, the main shall be filled with water at a rate such that the water within the main will flow at a velocity no greater than 1 ft/sec. Fill rate must be carefully controlled to ensure tablets do not come loose from pipe. Precautions shall be taken to assure that air pockets are eliminated. Valves shall be positioned so that the highly-chlorinated water won't flow into water mains in active service.

The highly-chlorinated water shall remain in the pipe for at least 24 hours. If the water temperature is less than 41 degrees F, the water shall remain in the pipe for at least 48 hours. A detectable free chlorine residual (≥ 0.2 mg/L) shall be found at each sampling point after the 24- or 48-hr period.

FINAL FLUSHING

CLEARING THE MAIN OF HEAVILY CHLORINATED WATER After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the system or is acceptable for domestic use.

DISPOSING OF HEAVILY CHLORINATED WATER. The environment to which the chlorinated water is to be discharged shall be inspected. If there is any question that the chlorinated discharge will cause damage to the environment, then a reducing agent shall be applied to the water to be wasted to neutralize the chlorine residual remaining in the water. AWWA Standard C655 details best practices for dechlorination.

BACTERIOLOGICAL TESTS

For new mains, the City has two options for the bacteriological testing for total coliform analysis. The City shall decide which option to use, in consultation with the contractor.

Option A: Before approving a main for use, take an initial set of samples and then resample again after a minimum of 16 hours using the sampling site procedures outlined below. Both sets of samples must pass for the main to be approved for use.

Option B: Before approving a main for use, let it sit for a minimum of 16 hours without any water use. Then collect, using the sampling site procedures outlined below and without flushing the main, two sets of samples a minimum of 15 minutes apart while the sampling taps are left running. Both sets of samples must pass for the main to be approved for use.

STANDARD CONDITIONS

Samples shall be collected from every 1,200 feet of the new water main, plus one set at the end of the line and one set from each branch greater than one pie length.. All samples shall be tested for bacteriological quality in accordance with “Standard Methods for the Examination of Water and Wastewater”, and shall show the absence of coliform organisms. The test will be performed and read by certified City personnel.

SPECIAL CONDITIONS

If trench water has entered the new main during construction or, if in the opinion of the City, excessive quantities of dirt or debris have entered the new main, bacteriological samples shall be taken at intervals of approximately 200 ft. and shall be identified by location. Samples shall be taken of water that has stood in the new main for at least 16 hours after final flushing has been completed.

SAMPLING PROCEDURES

Samples for bacteriological analysis shall be collected by City personnel in sterile bottles treated with sodium thiosulfate, in accordance with Section 9060—Samples of Standard Methods for the Examination of Water and Wastewater.

Hoses and fire hydrants are not recommended for the collection of samples that will be used to make decisions on the bacteriological quality of drinking water. However, if no sampling port is available, cleaned fire hydrants that have been cleared of standing water and/or other sanitized sampling apparatus (i.e., sanitized tubing, hose, gooseneck, spigot) may be used with the understanding that they do not represent optimum access to the water main for bacteriological sampling. There should be no water in the trench up to the connection for sampling. The sampling pipe must be dedicated, cleaned, disinfected and flushed prior to sampling. A corporation cock may be installed in the main with a gooseneck assembly. After samples have been collected, the gooseneck assembly may be

removed and retained for future use and the corporation cock should be capped or taped for future reuse.

RE-DISINFECTION

If the initial disinfection fails to produce satisfactory bacteriological results, or if other results indicate unacceptable water quality, the main may be re-flushed and shall be resampled. If check samples fail to produce acceptable results, the main shall be re-chlorinated by the continuous-feed or slug method (described in AWWA Standard C651) until satisfactory results are obtained.

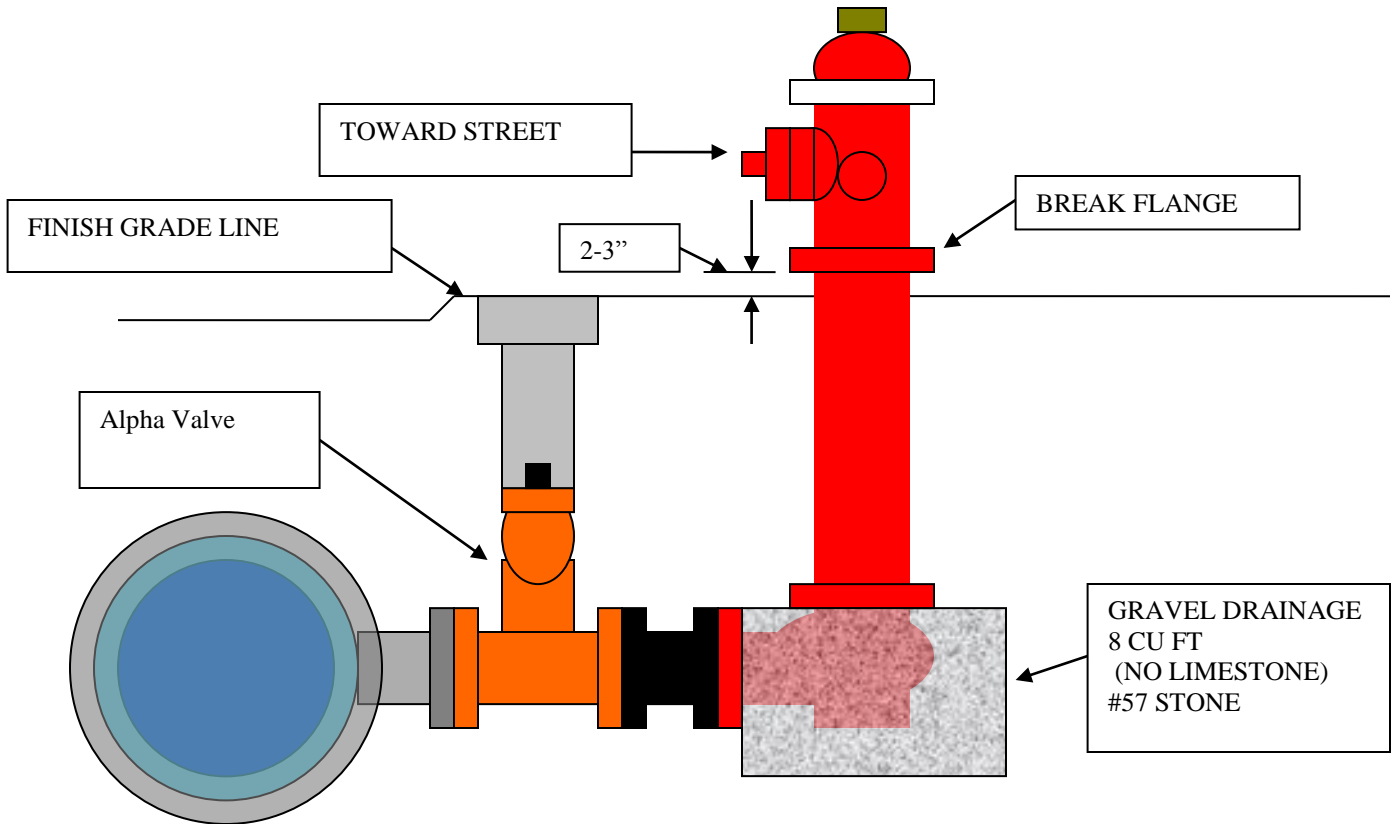
FIRE HYDRANT SPECIFICATIONS AND INSTALLATION

Hydrants shall be the AMERICAN Flow Control American-Darling 5-1/4" B-84-B-5 with ALPHA base, or equivalent.

- 1) Traffic break feature to be designed for 360° rotation of nozzle section and incorporate the use of a 2-piece square rod and single cast-iron rod coupling secured with stainless steel coupling pins.
- 2) The hydrant shall have a travel stop nut in the top of the hydrant to limit the travel of the hydrant rod. Hydrant designs that allow the valve bottom to stop against the shoe or employ a stop in the drain mechanism resulting in a bending moment in the rod assembly are not allowed.
- 3) Hydrant upper and lower barrels and base shall be made of ductile iron.
- 4) Hydrant to be certified to NSF/ANSI Standard 61 and NSF/ANSI 372.
- 5) The hydrant shall incorporate a draining system constructed entirely of bronze and positively activated by the compression of an e-coated stainless steel spring.
- 6) Hydrant drains shall close completely after no more than 3 turns of the operating nut.
- 7) There shall be a minimum of two internal drain ports in the hydrant seat and four outlets in the hydrant drain ring directing water to the exterior of the hydrant.
- 8) Hydrants employing sliding-style drains are not permitted.
- 9) All pumper and hose nozzles shall be retained by a single-piece threaded ductile iron retaining collar. Threaded-in nozzles and nozzles using set screws or wedge pins are not allowed.
- 10) Fire Hydrants shall have 2ea. 2 1/2" hose nozzles with NST threads and 1ea. 4 1/2" pumper nozzle with NST thread. The Operation Nut and Nozzle Cap Nuts shall be 1 1/2" NST Pentagon, and shall open in the counter clockwise direction. Hydrant Operation Nut shall be supplied with a grease zerk for lubrication purposes. Hydrants shall be draining and Federal Spec Red #1664 in color. All bolting ABOVE and BELOW grade shall be Type 304 Stainless Steel.

11) Fire Hydrant Inlet shall incorporate a stab-fit design requiring the use of only one Type 304 stainless steel fastener. The assembly of flange or mechanical joint restrainers using multiple fasteners or wedge bolts is not permitted.

- Restraint accessories shall be factory installed.
- All hydrant inlets shall be the ALPHA design.



Hydrant Installation:

Examination of material. Prior to installation, all hydrants shall be inspected for direction of opening, nozzle threading, operating-nut and cap-nut dimensions, tightness of pressure-containing bolting, cleanliness of inlet elbow, handling damage, and cracks. Defective hydrants shall be marked and held for final disposition.

Placement. All hydrants shall stand plumb and shall have their nozzles parallel with or at right angles to the curb, with pumper nozzles facing the curb.

Hydrants shall be set at established grade, with the lowest nozzle at least 12 inches above ground or as required by project specifications. The lowest nozzle shall be installed away from the curb line at a sufficient distance to avoid damage from or to vehicles. Traffic model hydrants shall be installed so that the breakaway flange is not less than 2 inches, nor no more than 4 inches above established grade.

Each hydrant shall be connected to the main with a 6 inch or larger diameter branch controlled by an independent valve. The valve shall be a resilient seat gate valve

restrained to allow shut off when the hydrant is to be removed. Gate valve must meet specifications listed elsewhere in this document.

When a dry-barrel hydrant is set in soil that is impervious, drainage shall be provided at the base of the hydrant by placing coarse gravel or crushed stone from the bottom of the trench to at least 6 inches above the drain-port opening in the hydrant and to a distance of 1 foot around the elbow. Where ground water rises above the drain port or when the hydrant is located within 8 foot of a sanitary sewer main, or where drainage is not permitted, the drain port shall be plugged and water pumped from the hydrant where freezing may occur.

When a dry-barrel hydrant with an open drain port is set in clay or other impervious soil, a drainage pit 2 ft. x 2 ft. x 2 ft. shall be excavated below each hydrant. The drainage pit shall be filled with coarse gravel or stone under and around the elbow of the hydrant and to a level of 6 inches above the drain port. To prevent possible contamination of the water supply, do not connect hydrant drains to a sanitary sewer or storm sewer.

Location. Hydrants shall be located as shown on the:

- One hydrant shall be located at each street intersection with intermediate hydrants located so that spacing between hydrants does not exceed 500-feet and no point is over 300-feet from a hydrant.
- One hydrant shall be located not more than 100-feet from each Fire Department Connection for sprinkler or standpipe systems. Said hydrant shall be placed such that the fire department apparatus can connect to and support the sprinkler or standpipe in a timely manner.
- Additional fire hydrants may be required by the Fire Department.
- Hydrants shall be located adjacent to paved roadways suitable for fire apparatus.
- Hydrants shall be set within a distance of 10 feet of the curb line.
- Caps on yard hydrants supported by fire pumps shall be painted yellow.
- All fire hydrants and fire mains shall be installed in compliance with the Ohio Fire Code including but not limited to Section FM-500.0 Certification and Section FM-516.0 Water Tanks and Fire Service Mains.
- Hydrant must be installed a minimum of 50 feet from any building.
- Hydrant must be installed away from any obstruction.

Protection. Hydrants that are intended to fail at the ground line joint on vehicle impact (traffic hydrants), specific care must be taken to provide adequate soil resistance to avoid transmitting shock movement to the lower barrel and inlet connection.

Thrust Restraint:

Hydrants. The bowl of each hydrant shall be well braced against a sufficient area of unexcavated earth at the end of the trench with thrust blocks of concrete or other specified blocking materials, or it shall be tied to the pipe with suitable metal tie rods, clamps, or restrained joints, as shown on the plans or as specified.

Fittings. All plugs, caps, tees, reducers, and bends, unless otherwise specified, shall be provided with thrust blocks or suitable restrained joints as specified.

Design. The design pressure is the maximum pressure to which the pipe line will be subjected, with consideration given to the vulnerability of the pipe-soil system when the pressure is expected to be applied. In most cases, this will be the test pressure of the pipe, applied shortly after installation, when the pipe-soil system is normally most vulnerable.

WATER METER INSTALLATION

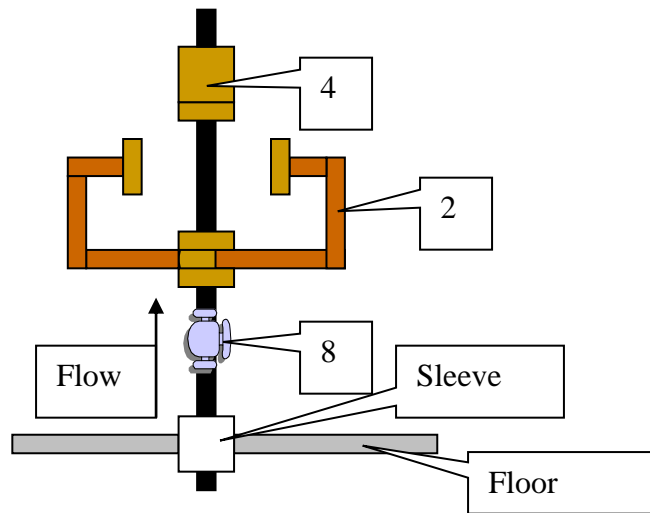
To ensure that the meter is compatible with the City’s read system, it must be purchased from the water department, and paid for at the same time as other access and tapping fees.

City personnel will install meter, only after the following plumbing requirements are met.

INSIDE METER SETTING

1. Install in accordance with drawing below.
2. Kornerhorn meter setting.
3. Locking ball valve.
4. Dual Check Valve, unless backflow preventer is required.
5. Meter cannot be over 4 feet off the floor.
6. Glue joint plastic pipe ahead of water meter is not acceptable.
7. We recommend installing an expansion tank between the water heater and check valve, this will allow for expansion of the water after it is heated.
8. Grounding electric to Water service is prohibited due to increased corrosion of line and fittings.

FORD	KORNERHORN SETTING
METER -5/8"	CH88-133-B11-333W-HHC11-333
METER-3/4"	CH88-333-B11-333W-HHC11-333
METER-1"	CH-88-444-B11-444W-HHC11-444
MCDONALD	KORNERHORN SETTING
METER-5/8"	40-1MM33-6101W 3/4-11-3FE33
METER-3/4"	40-3MM33-6101W 3/4-11-3FE33
METER-1"	40-4MM44-6101W 1-11-3FE33

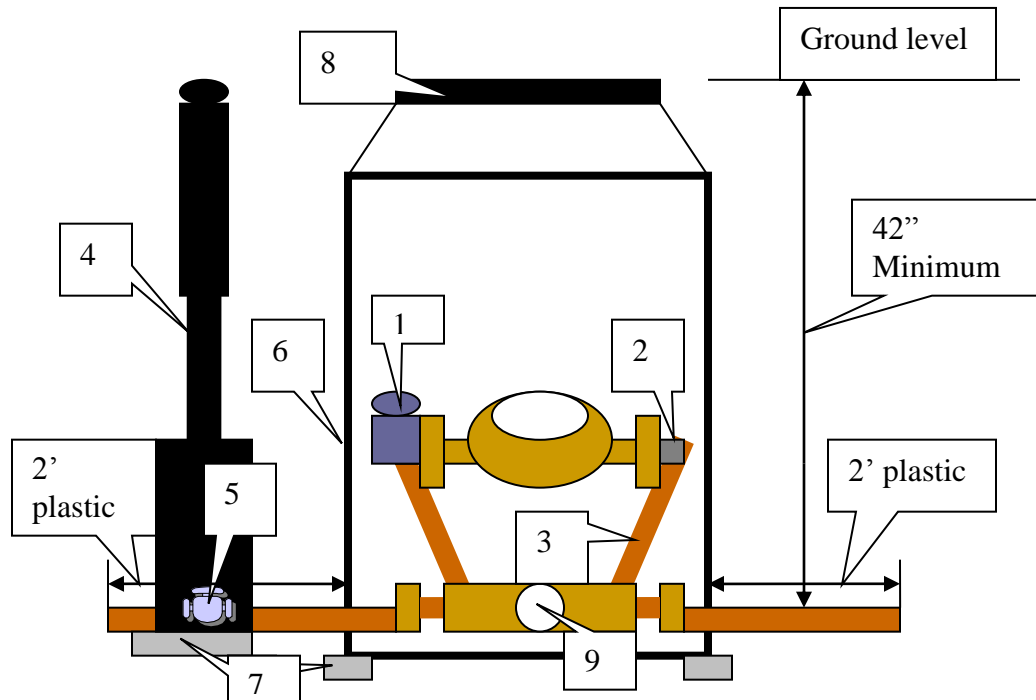


OUTSIDE METER SETTING

1. Locking valve on the inlet side of the copper setter.
2. Dual check valve on the outlet side of copper setter, unless backflow preventer is required.
3. Ford copper setter or equal. (See drawing).
4. Cast Iron, 2-½ inch, adjustable, screw-type curb box.
5. Curb stop turns 90 degrees on/off and set on cap block.
6. Meter tile plastic.
7. Brick or stone blocking.
8. Lid and cover plastic Ford Type C or equal.
9. Insert ½ inch pipe into hole for stability. Pipe should not interfere with meter tile.
10. The City prior to backfilling shall inspect all piping from water main to building.
11. We recommend installing an expansion tank on the water line right before the water heater.
12. Grounding electric to Water service is prohibited due to increased corrosion of line and fittings.

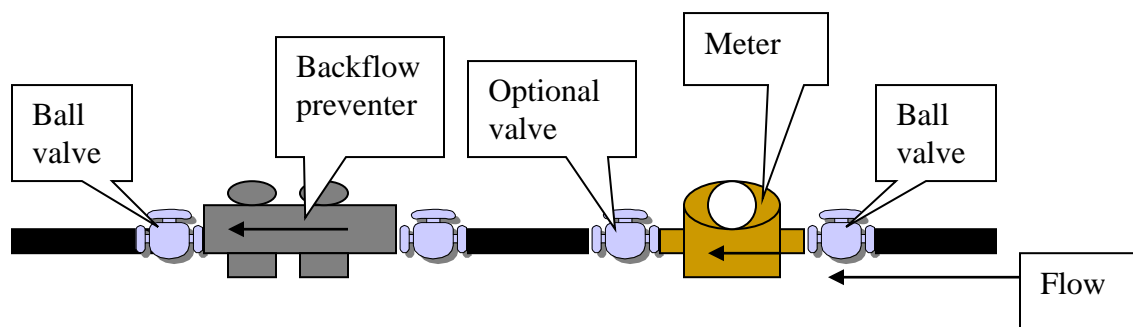
FORD COPPERSETTER SETTING	
5/8" - METER	VBHH71-21W-44-83-G
3/4" - METER	VBHH73-21W-44-33-G
1" - METER	VBHH74-21W-44-44-G

MCDONALD COPPERSETTER SETTING	
5/8" METER	21-121WDTT33
3/4" METER	21-321WDTT33
1" METER	21-421WDTT33



Backflow Preventer Setting

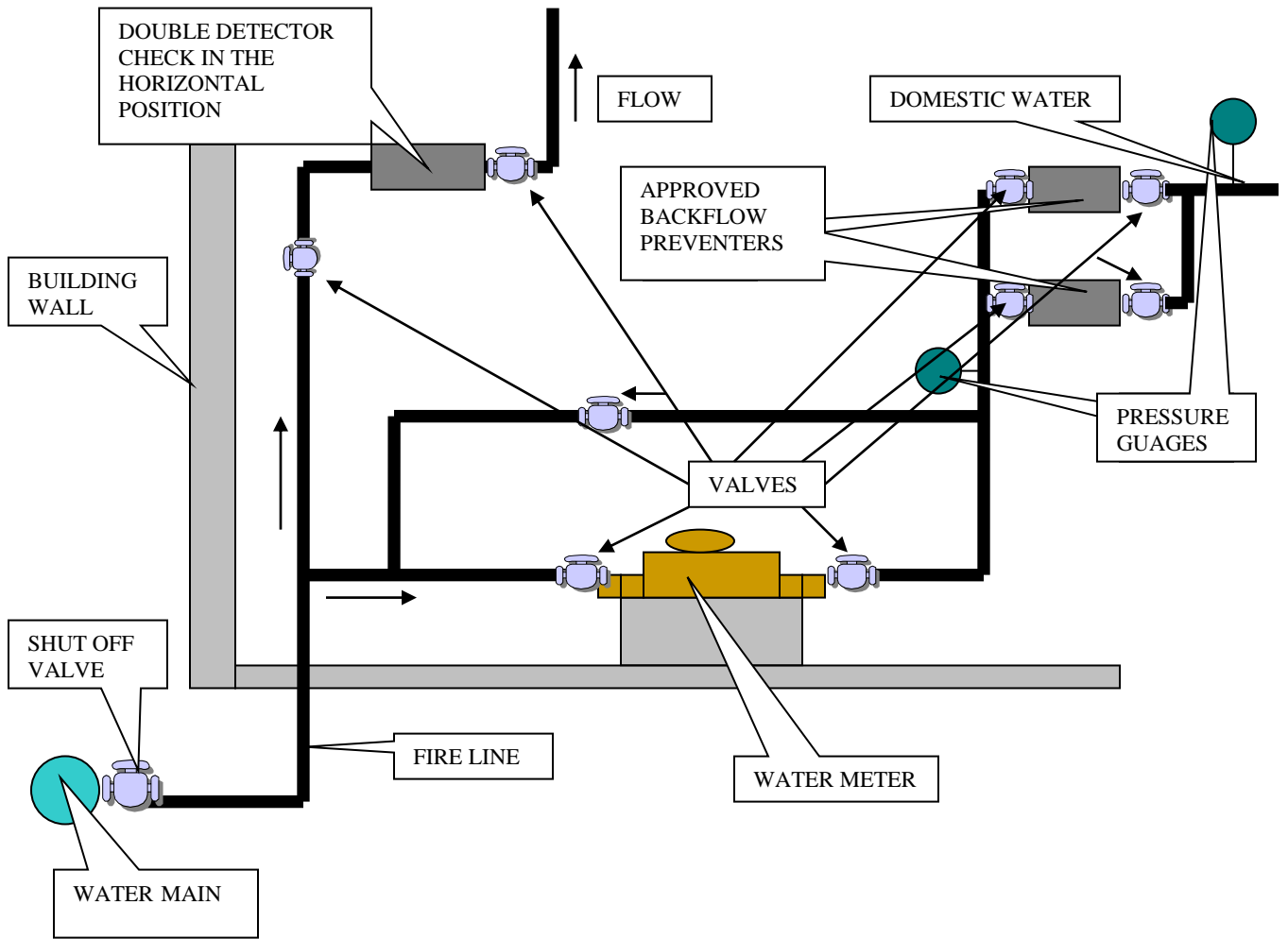
1. Wilmington City Ordinance 927.19 gives the Water Department Superintendent authority to determine which connections to the City mains need backflow and cross connection protection.
2. All installations of new taps and water services will be assessed by the City, using Ohio EPA guidelines, for the need of a backflow preventer. The City will specify the type of preventer required based on specific application. All backflow preventers shall be approved by the City of Wilmington Water Department prior to installation. The model installed must meet applicable AWWA standards.
3. A backflow preventer shall be installed on all fire lines. In most cases, a double-check, detector-check type device will be required.
4. The City shall have access to devices at all times.
5. Devices shall be installed so they are accessible for testing and inspection.
6. The device cannot be more than four feet off the floor.
7. All devices will be tested at the time of installation and every twelve months thereafter.
8. All tests will be performed by professionals certified by the Ohio Department of Commerce.
9. There shall be expansion tanks for thermal expansion on all systems where there are backflow preventers installed.
10. Any bypasses installed around any backflow preventer devices must also be equipped with an approved backflow preventer device. Both devices must be tested annually.
11. No galvanized fittings are to be used; only copper or brass are acceptable.
12. If a reduced pressure backflow preventer is required, it must be installed inside a heated building. (Note: Ohio EPA standards requires reduced pressure backflow devices is nearly all commercial, medical and industrial applications.)
13. All backflow preventer devices shall be installed in the horizontal position.



**FIRE LINE AND DOMESTIC WATER
SETUP INCLUDING BACKFLOW PREVENTERS**

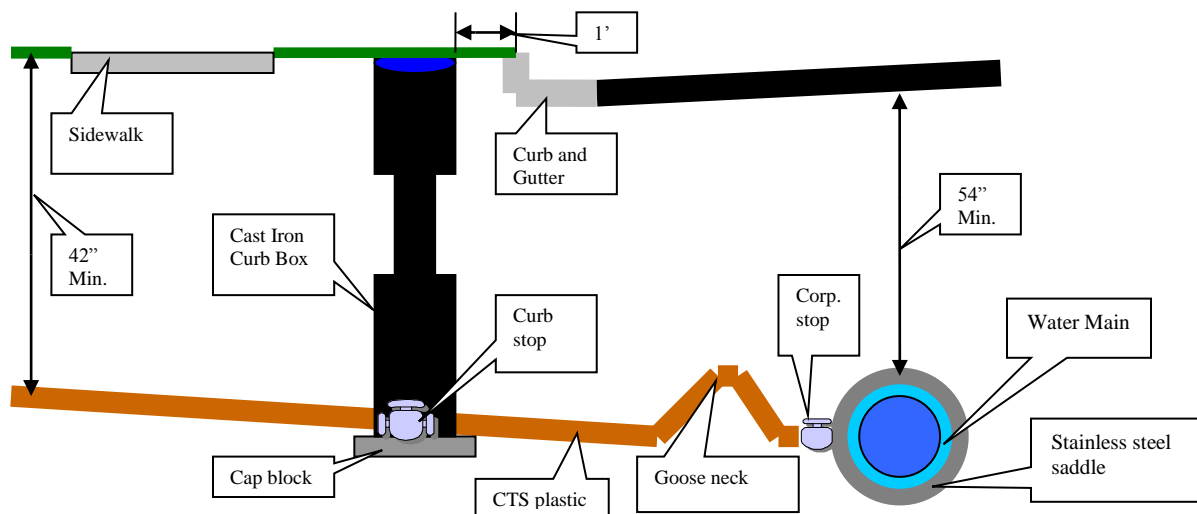
Domestic water lines may only be tapped off of fire lines that are 4" in diameter or smaller. Because of the potential for water degradation, if the fire line is larger than 4", separate fire and domestic lines must be tapped off the main.

The diagram below is only to be used in situations where the tap off the main is 4" in diameter or smaller.



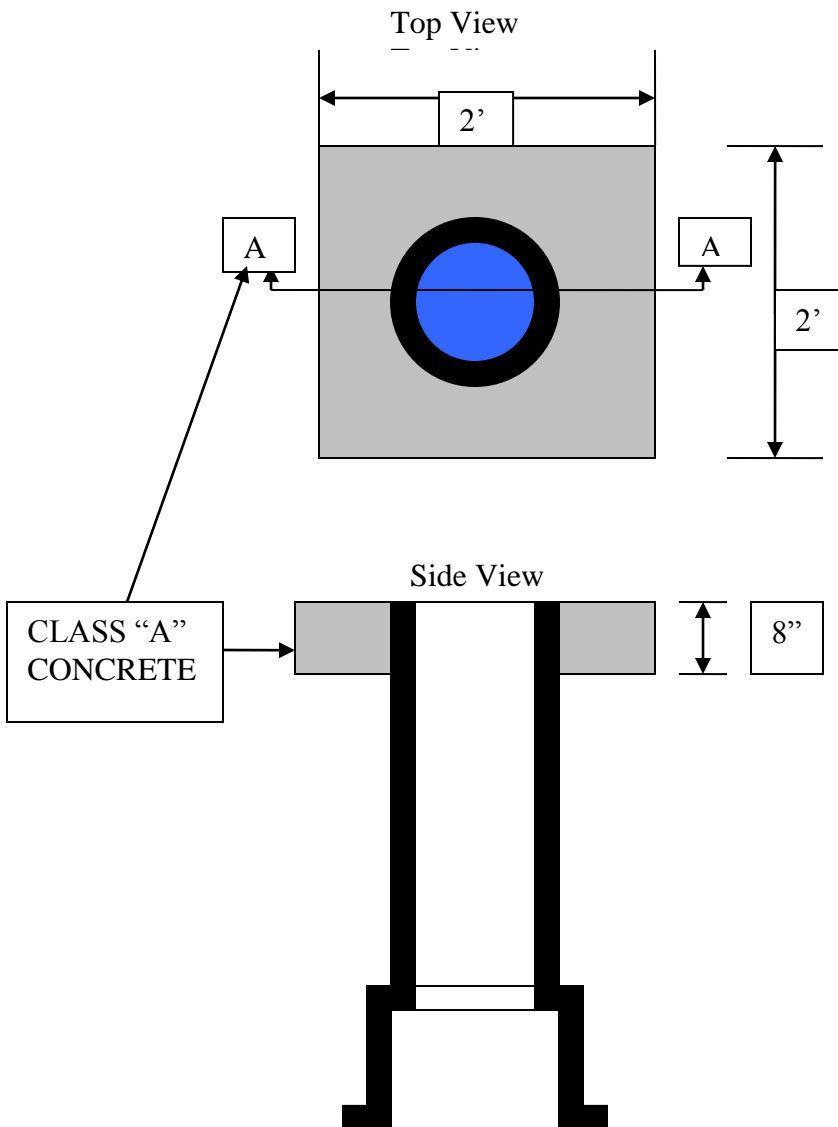
WATER SERVICE INSTALLATION

1. All water service lines, on both sides of the service shut-off (curb stop) shall be seamless copper-tube size CPVC plastic line with the same outside diameter as copper and a minimum rating of 250 psi.
2. All service lines shall have tracer wire installed. See separate section of this document for details.
3. Any water line with a length of 120 feet or more from the main shall be 1 inch or larger.
4. Water lines shall be a minimum of 42 inches and a maximum of 48 inches below grade.
5. All underground joints shall be compression. No flare, welded, soldered, or glue joints will be accepted.
6. Water lines shall be a minimum of 10 feet horizontally from any sewer line and 18 inches vertically.
7. No electrical wires shall be installed in the same trench with the water service line.
8. Service lines under driveways shall be sleeved, bedded in sand, and 12 inches of sand compacted above line. Trench shall be compacted and back-filled with 411.02.
9. **All work shall be inspected** by the City of Wilmington **prior to backfilling**.
10. All work and materials shall conform to the City Specs.
11. Tapping saddles on the water main shall be full circle, fully rubber lined, and all stainless steel, including the bolts.
12. Curb boxes shall be screw-type, 2 ½ inch opening on top, adjustable, cast iron only Tyler/Union 6500 series 93E or equivalent. Curb stops shall not be installed in driveways or sidewalks.
13. Curb stops shall turn 90 degrees on or off.
14. Curb stop valves and boxes shall be placed on a 2" thick cap block and compacted with 12 inches of dirt around the base of the curb box.
15. Water service lines shall be installed near the center of the building lots.



WATER MAIN VALVE BOXES IN GRASSY AREA

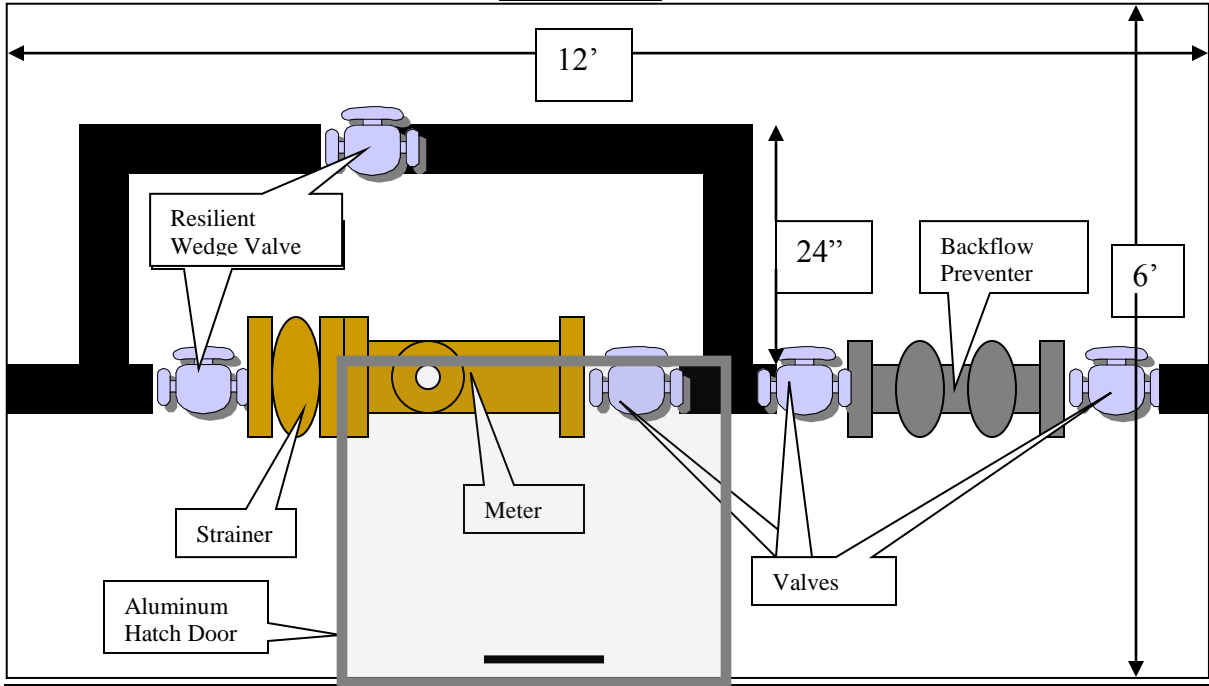
1. All valve boxes located in grassy areas shall be set in concrete.
2. Concrete pads shall be 2 feet square with an 8-inch depth.
3. If there are multiple valve boxes, they may be installed in one large cement pad, with prior approval by the City.
4. Valve boxes and concrete pads shall be flush with the ground at final grade.



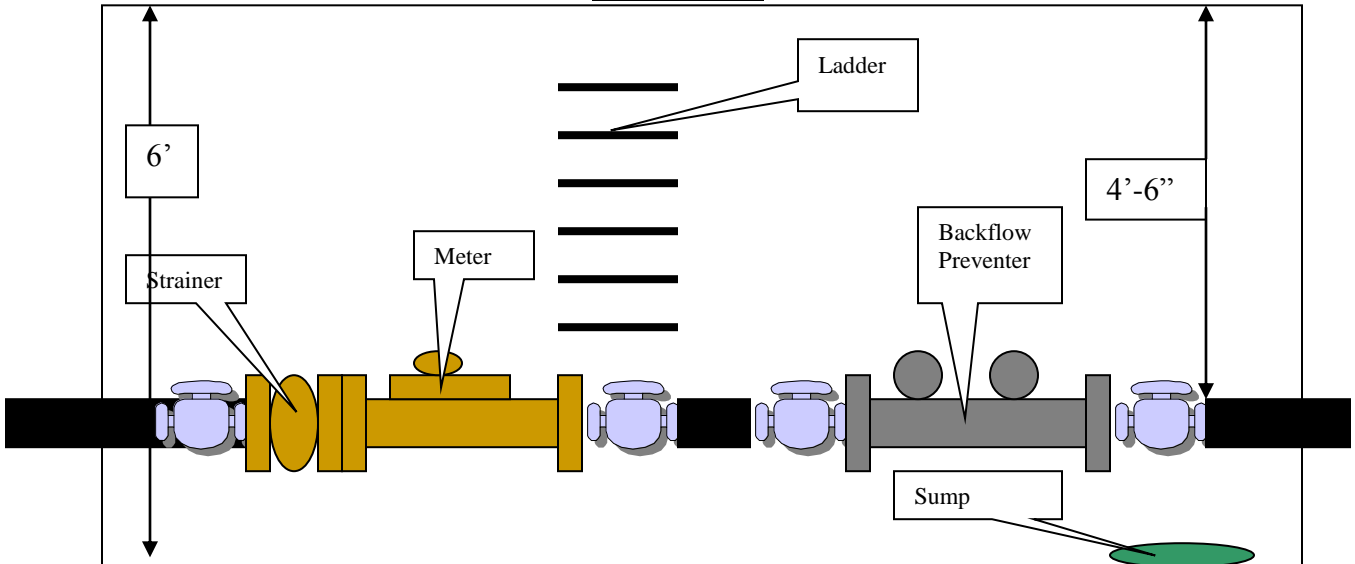
TYPICAL 3", 4", & 6" METER PIT INSTALLATION

Consult with City for specific applications

TOP VIEW



SIDE VIEW

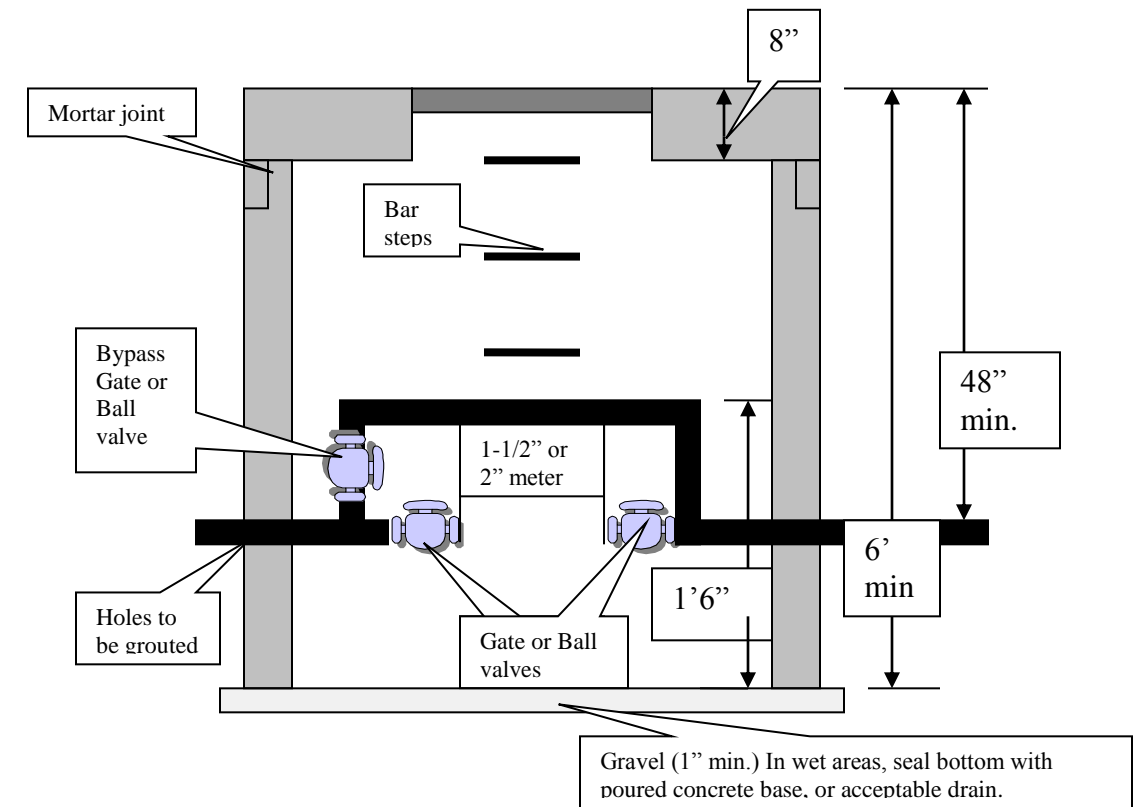
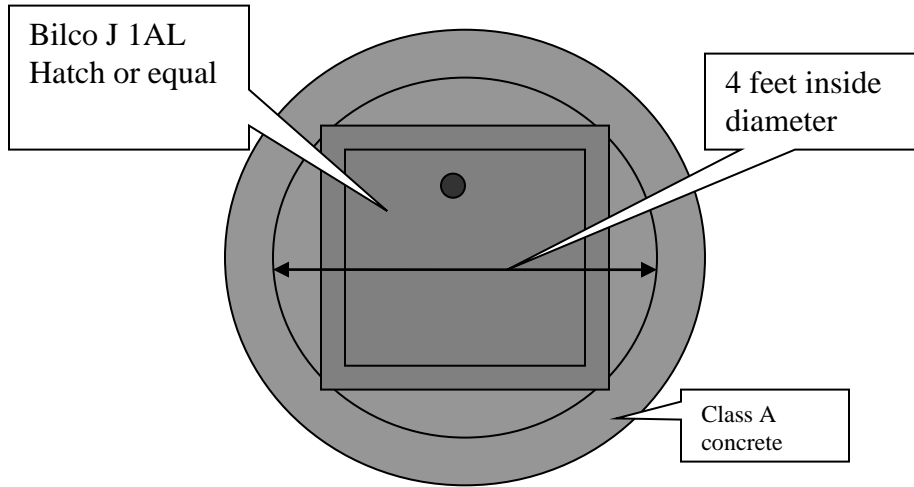


See notes on next page.

Notes:

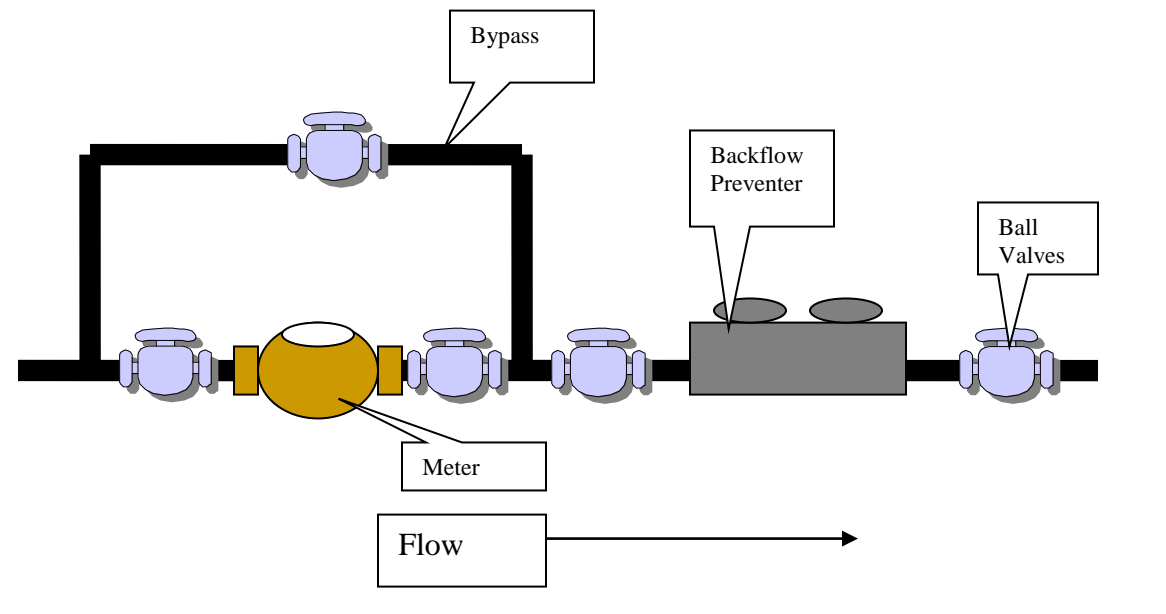
- Dimensions shown are inside measurements of the pit.
- All pipes shall be ductile iron class 53.
- All valves shall be hand operated open left.
- Pits shall have inside height of 6 feet minimum.
- All concrete pits shall be pre-cast concrete.
- Sealed cement floors with sump or drain to sewer.
- All piping, meters, backflow preventers shall be supported.
- Ladder or steps may be cast iron, aluminum, or polypropylene.
- Doors shall be Bilco Aluminum doors or equal. J4AL 36" x 36".
- Piping shall be grouted through walls.

WATER METER PIT
1-1/2" AND 2"

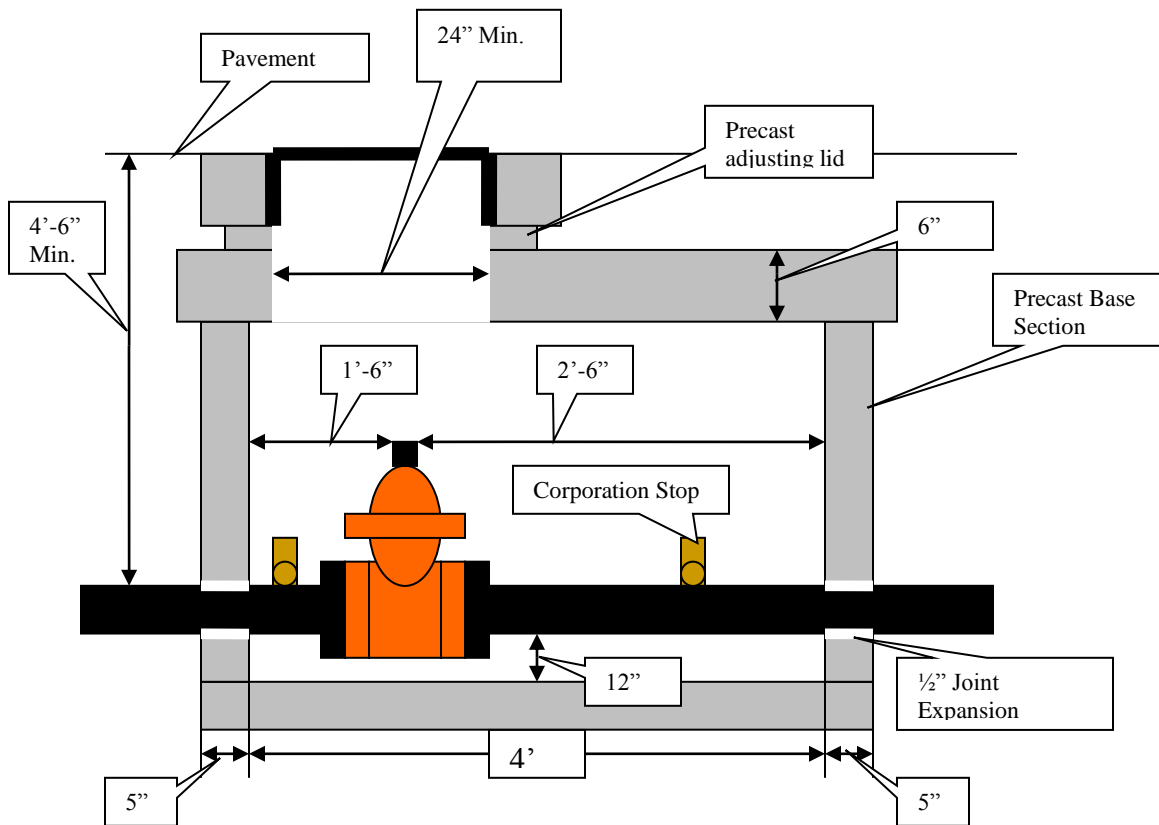


METER SETTING WITH BY-PASS 1-1/2" OR LARGER

1. Install ball valves on the inlet and outlet of the meter.
2. Install valves on inlet and outlet of backflow preventer.
3. Install a by-pass line around the meter, with a valve.
4. The backflow preventer cannot be bypassed unless an approved backflow preventer is also installed on the bypass line.
5. No plastic or galvanized fittings and pipe are to be used in meter settings.
6. If a reduced pressure backflow preventer is required then a pit setting cannot be used, it must be installed inside a heated building.

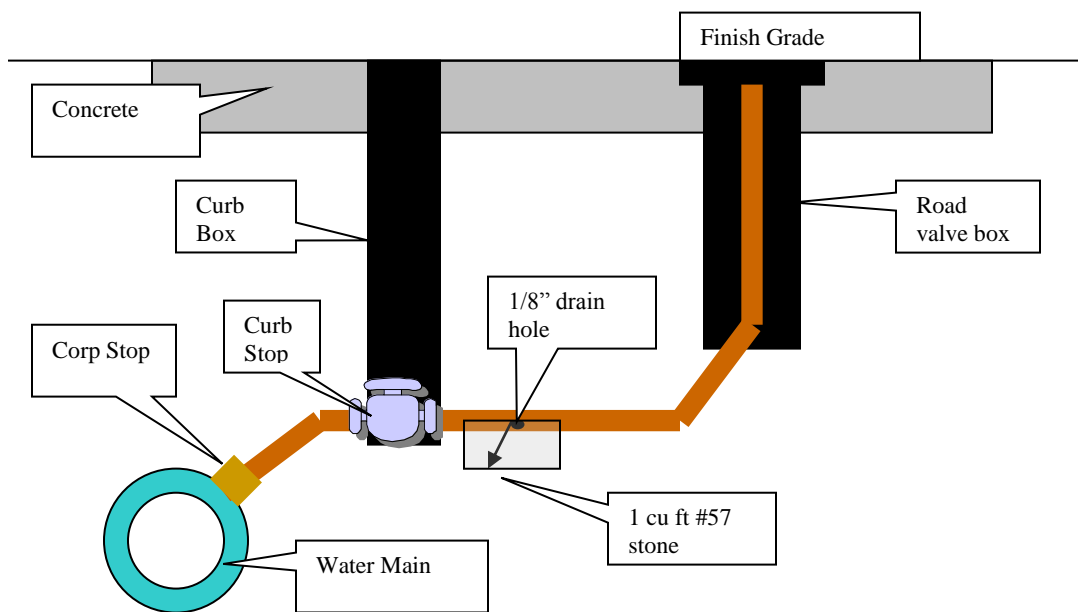


WATER VALVE CHAMBER

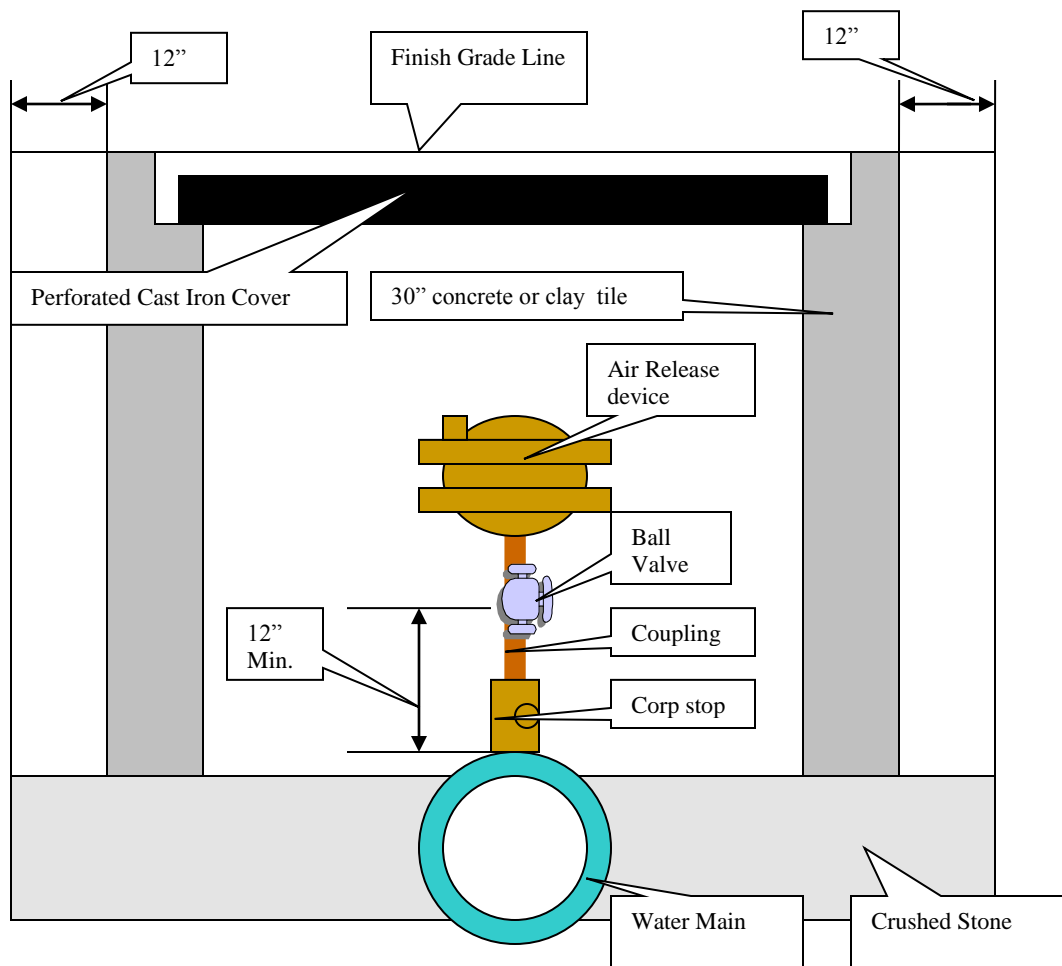


TYPICAL BLOW OFF

1. All saddles shall be full circle, fully rubber lined, and all stainless steel, including the bolts.
2. Curb stops shall turn 90 degree on/off.
3. Curb boxes shall be cast iron, Tyler /Union 6500 series 93E or equivalent.
4. Concrete pad shall be 2' x 3' x 8" depth.
5. Blow off line on both sides of the curb stop shall be seamless copper-tube size CPVC plastic line with the same outside diameter as copper and a minimum rating of 250 psi.



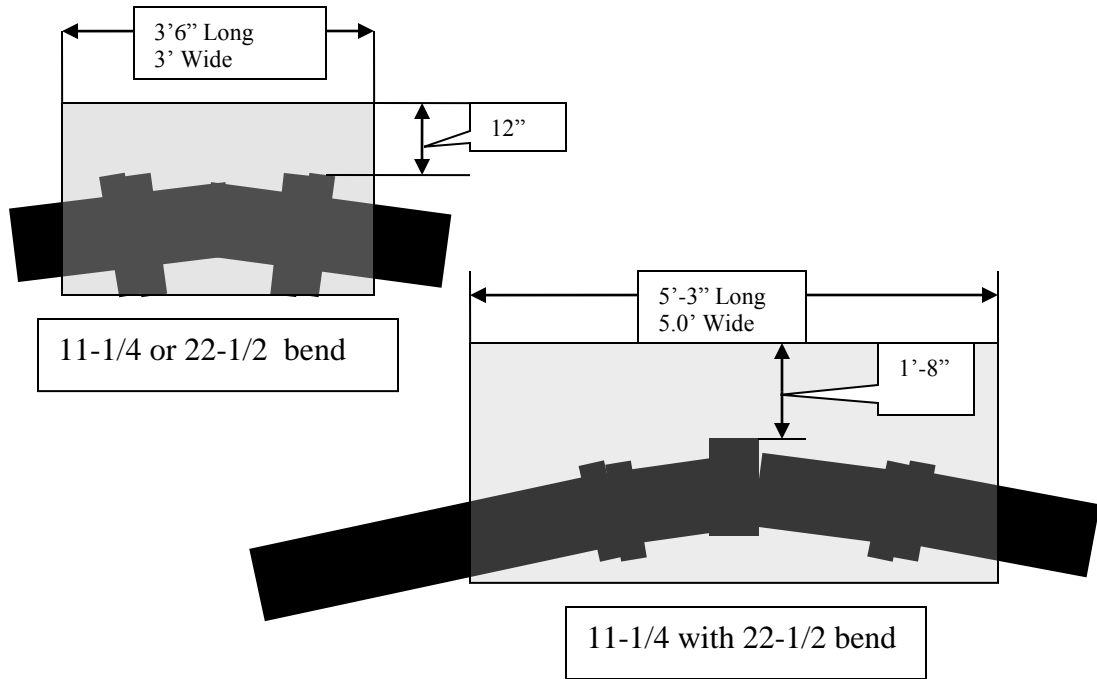
TYPICAL AIR RELEASE



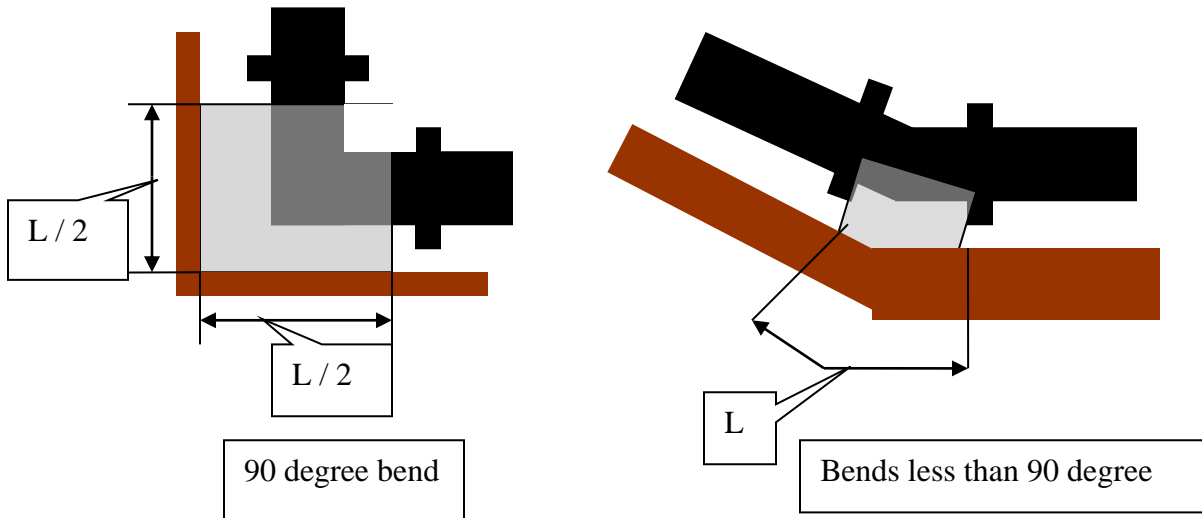
CONCRETE BLOCKING FOR FITTINGS ON WATER MAINS

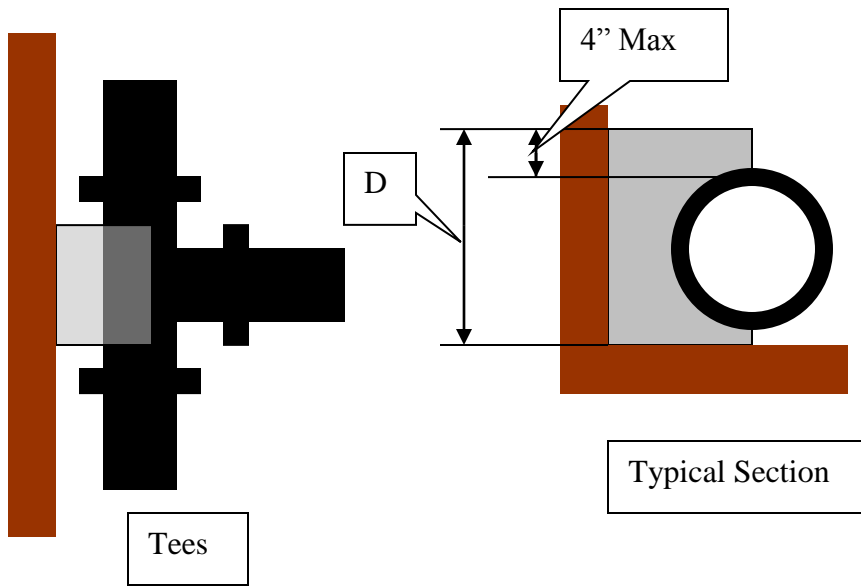
NOTE: Class “A” concrete to be used for all blocking. Tied or restrained joints may be used in lieu of concrete blocking at the direction of the engineer.

CONCRETE BLOCKING FOR VERTICAL BENDS



CONCRETE BLOCKING FOR HORIZONTAL BENDS





BENDS								
SIZE OF PIPE	DEGREE OF BEND							
	11-1/4		22-1/2		45		90	
	L	D	L	D	L	D	L	D
3, 4, & 6	6"	6"	10"	6"	20"	6"	36"	6"
8	9"	6"	14"	6"	24"	9"	50"	9"
12	14"	12"	22"	12"	30"	16"	60"	16"
16	18"	6"	24"	18"	33"	30"	70"	22"

TEES								
RUN	BRANCH							
	3", 4", & 6"		8"		12"		16"	
	L	D	L	D	L	D	L	D
3", 4", & 6"	16"	7"						
8"	14"	8"	16"	12"				
12"	9"	12"	16"	12"	24"	18"		
16"	8"	16"	14"	16"	28"	16"	30"	26"