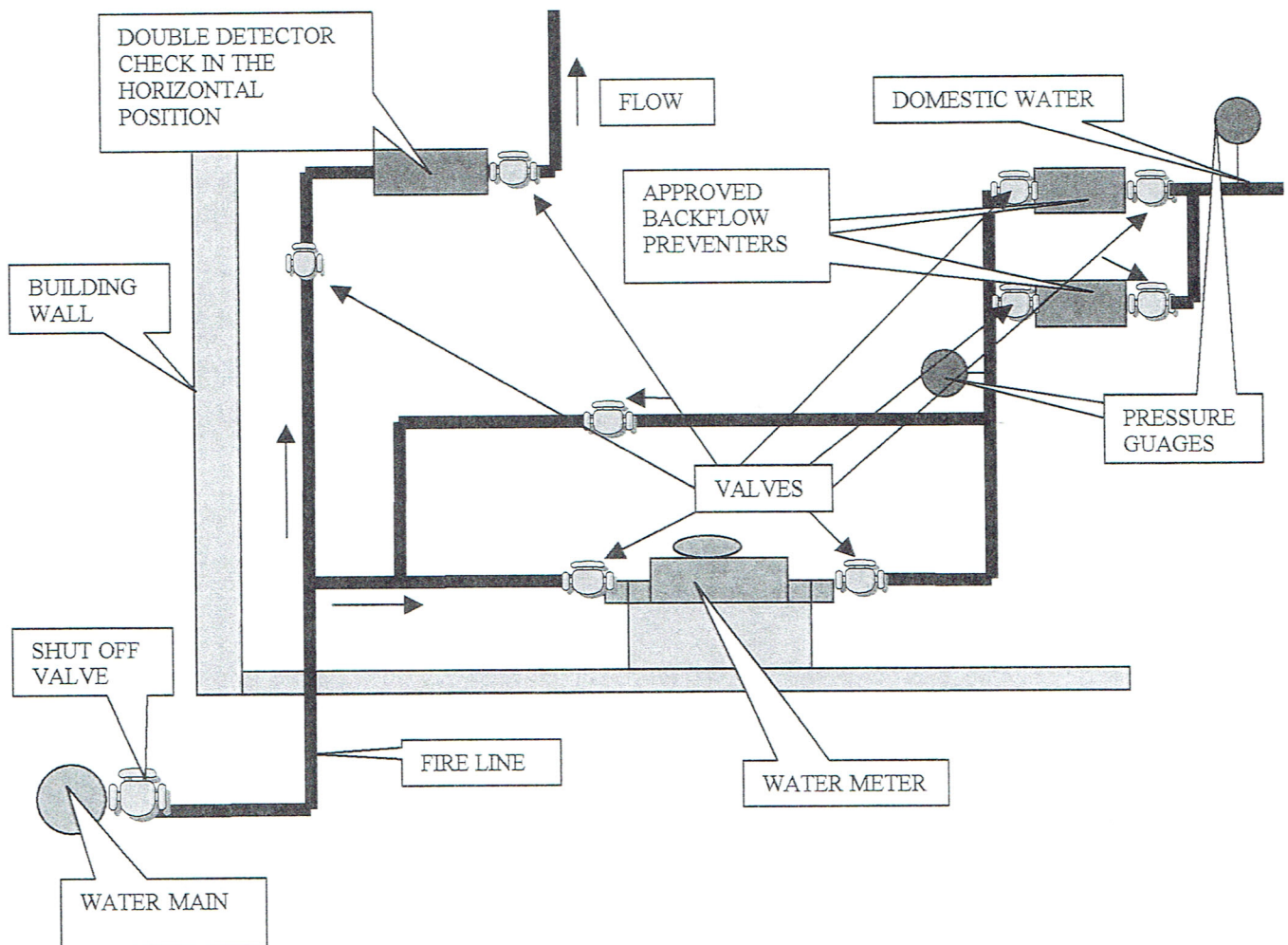
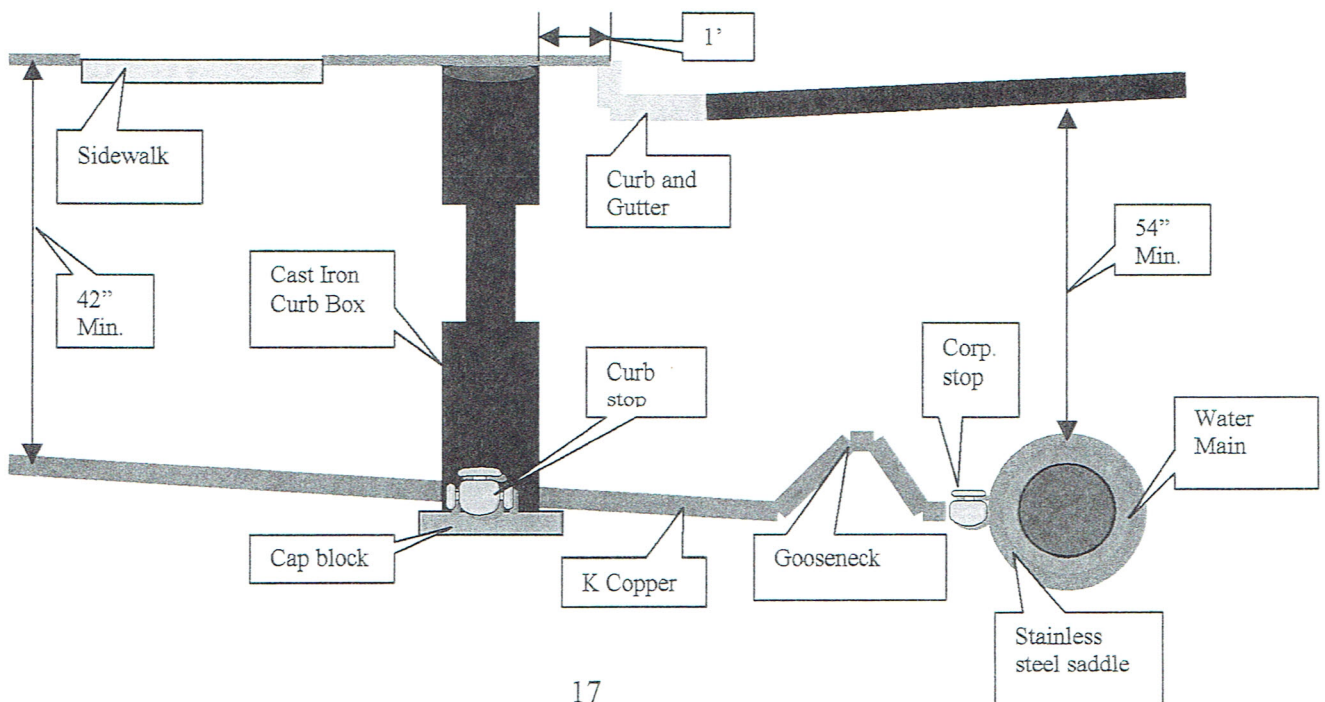


**FIRE LINE AND DOMESTIC WATER
SETUP INCLUDING BACKFLOW PREVENTERS**



WATER SERVICE INSTALLATION

1. Water service lines shall be seamless copper tubing, either "L" copper, "K" copper, or plastic line with the same outside diameter as copper and a minimum rating of 200 psi.
2. Service line from the water main to the curb box shall be "K" copper only.
3. Any plastic line shall have a tracer wire installed with the line from the meter to the curb box and shall be fixed to the outside of the curb box, enter the curb box 6 inches below the cap and able to coiling out of the curb box, 3 feet. Tracer wire shall be (10 awg copper insulated wire).
4. Any water line which will be 120 feet or more from the main shall be 1 inch or larger.
5. Water lines shall be a minimum of 42 inches and a maximum of 48 inches in depth.
6. Underground joints shall be flare or compression. No welded, soldered, or glue joints will be accepted.
7. Water lines shall be a minimum of 10 feet horizontally from any sewer line and 18 inches vertically.
8. No electrical wires shall be installed in the same ditch with the water service line.
9. 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.
10. **All work shall be inspected prior to back filling** by the City of Wilmington.
11. All work and materials shall conform to the City Specs.
12. Tapping saddles on the water main shall be full circle, all stainless steel, including the bolts.
13. Curb boxes shall be screw-type, 2 ½ inch opening on top, adjustable, cast iron only Tyler/Union 6500 series 93E or equivalent. Do not install them in driveways or sidewalks.
14. Curb stops shall turn 90 degrees on or off.
15. 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.
16. Water service lines shall be installed in the center of the building lots.

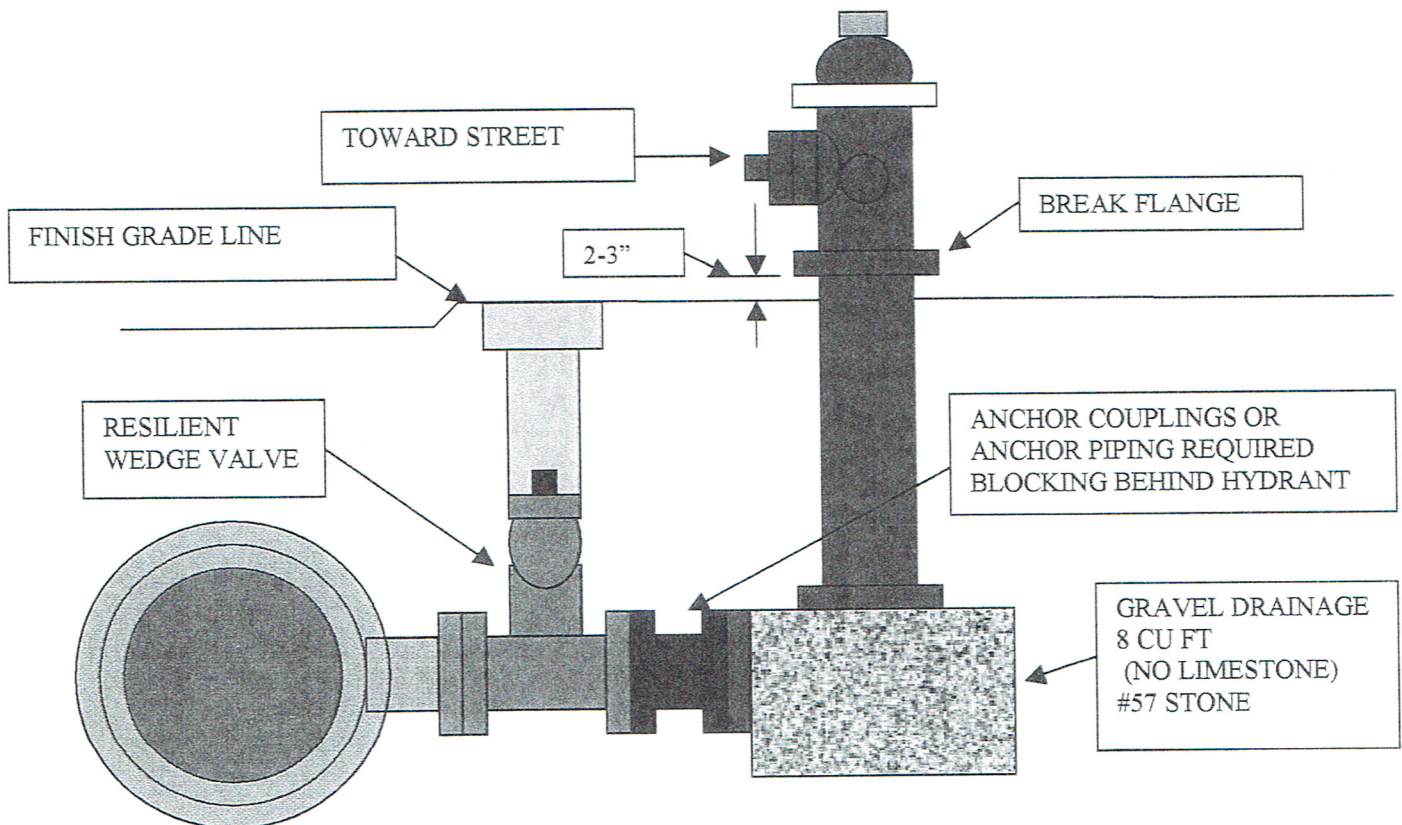


FIRE HYDRANT SPECIFICATIONS AND INSTALLATION

Accepted Hydrants-

Mueller Centurion
M&H Regent Style 129 Imp.
Kennedy- K81A

1. Hydrant Barrels shall be 5-1/4".
2. Shall have a 4-1/2" pumper nozzles.
3. Shall have two 2-1/2" hose nozzles.
4. Pentagon nuts on top and all caps shall be 1-1/2".
5. All hydrants shall open counter clockwise and be red in color.
6. Hydrants shall have national standard thread.
7. Hydrants shall be mechanical joint
8. Depth shall be determined by water main depth.
9. Hydrants shall be drain back type.
10. The pumper nozzle shall face the street or road.
11. Resilient seat gate valve to be installed between main and hydrant.
12. See further installation in these specifications.



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 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 6 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.

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 plans or by the Fire Department requirements:

- 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. In the case of 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.

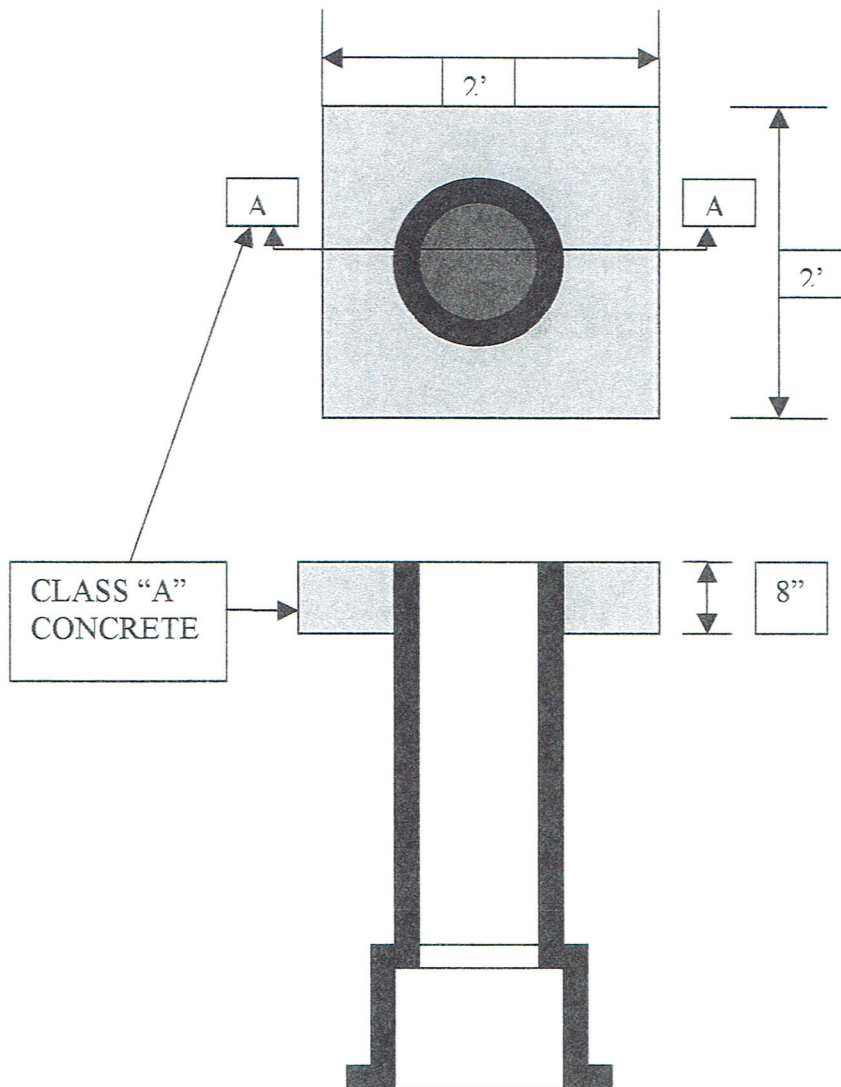
Design. The design pressure is the maximum pressure to which the pipeline will be subjected, with consideration given to the vulnerability of the pipe-soil system when the pressure is expected to be applied. In most cases this will be the test pressure of the pipe, applied shortly after installation,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

Flushing:

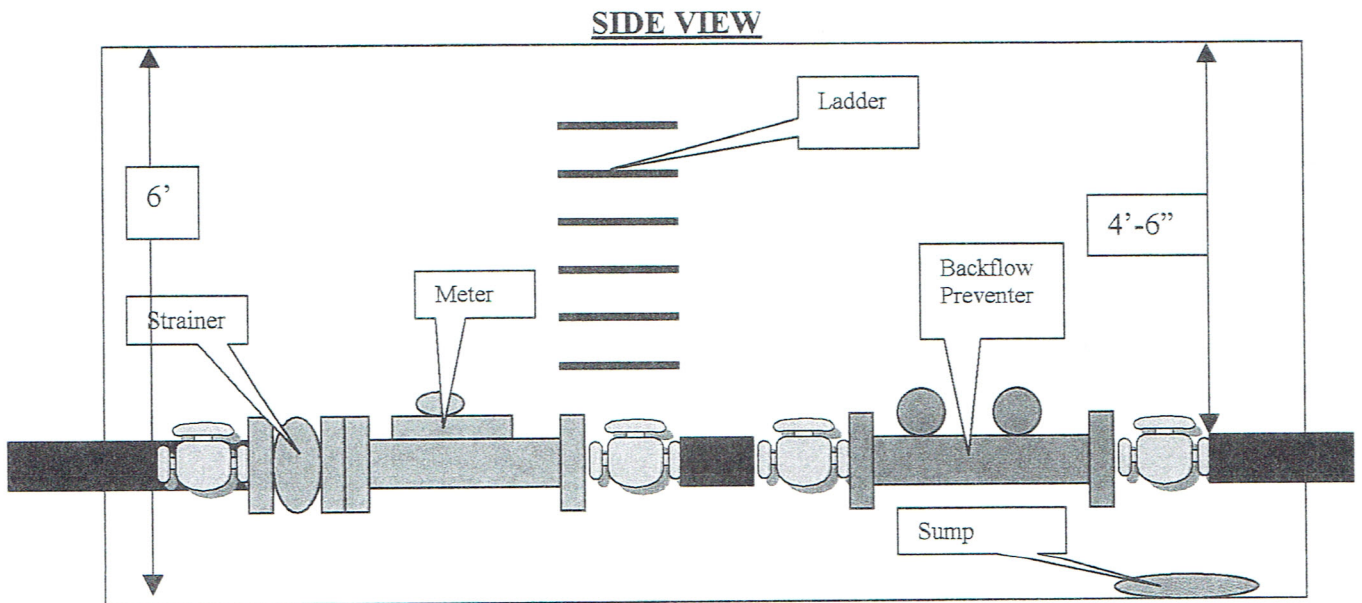
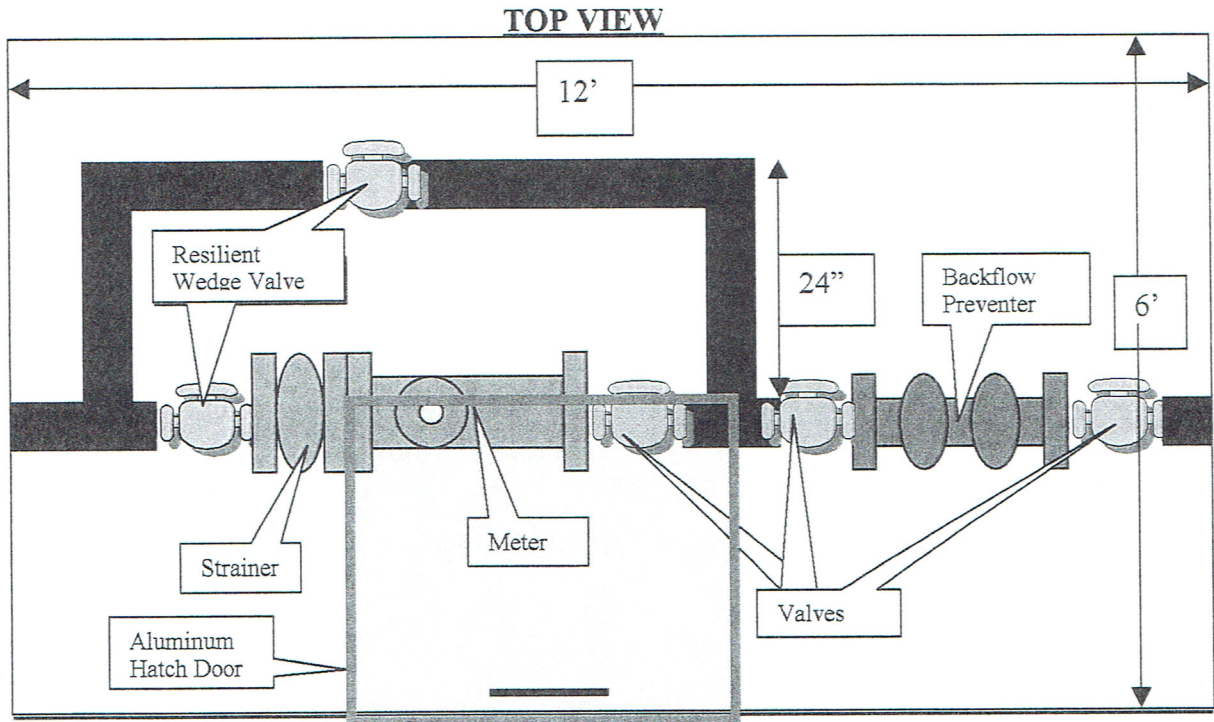
Foreign material left in pipelines during installation often results in valve or hydrant-seat leakage during pressure tests. Every effort shall be made to keep lines clean during installation. Thorough flushing is recommended prior to a pressure test. Flushing should be accomplished by partially opening 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.

WATER MAIN VALVE BOXES IN GRASSY AREA

1. All valve boxes located in grassy areas will be set in concrete.
2. Concrete pads shall be 2 feet square with an 8-inch depth.
3. If there are multiple 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.



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

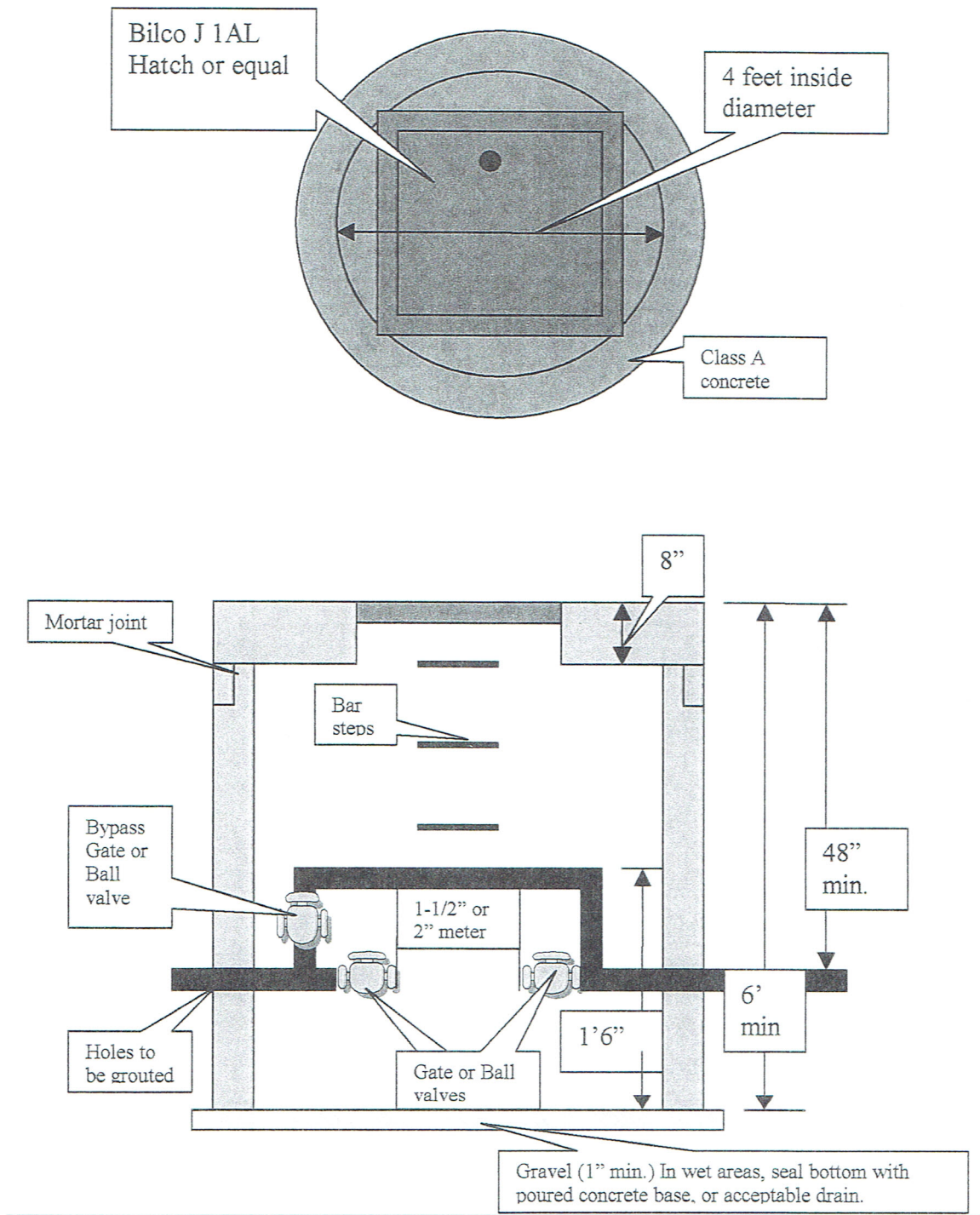


See notes on next page.

Notes:

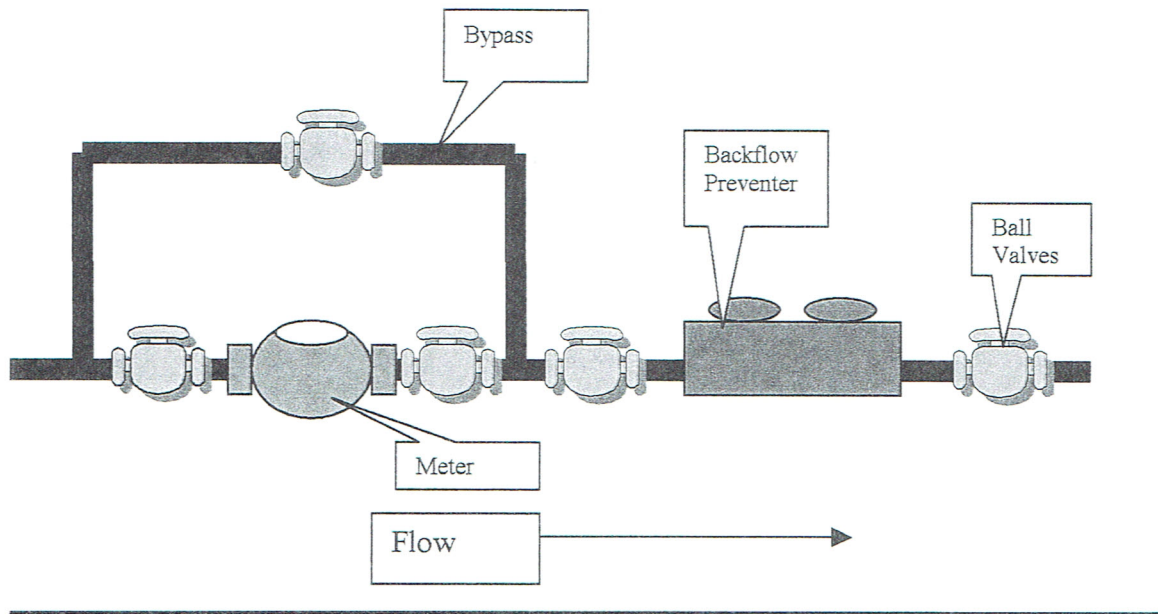
- Dimensions shown are inside measurements of the pit.
- All pipes shall be ductile iron class 53.
- All valves shall be hand operated open left.
- Pits shall have inside height of 6 feet minimum.
- All concrete pits shall be pre-cast concrete.
- Sealed cement floors with sump or drain to sewer.
- All 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.
5. No plastic or galvanize 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.



POSITIVE DISPLACEMENT METER SPECS

5/8"

Length – 7-1/2"

Width – 3-7/8"

Height – 7"

Weight – 4.3 lbs.

Normal Operating Range – 1 – 20 gpm.

Maximum Pressure Loss – 7.0 psi @ 20 gpm.

Maximum Operating Pressure – 150 psi

Maximum Continuous Flow – 10 gpm

3/4"

Length – 9"

Width – 4-1/2"

Height – 7-1/2"

Weight – 6.4 lbs.

Normal Operating Range – 2 – 30 gpm.

Maximum Pressure Loss – 9.0 psi @ 30 gpm.

Maximum Operating Pressure – 150 psi

Maximum Continuous Flow – 15 gpm

1"

Length – 10-3/4"

Width – 6-13/16"

Height – 7-3/4"

Weight – 12 lbs.

Normal Operating Range – 3 – 50 gpm.

Maximum Pressure Loss – 10.9 psi @ 50 gpm.

Maximum Operating Pressure – 150 psi

Maximum Continuous Flow – 25 gpm

1-1/2"

Length – 17-3/4"

Width – 8-3/4"

Height – 8-7/8"

Weight – 26 lbs.

Normal Operating Range – 5 – 100 gpm.

Maximum Pressure Loss – 11.4 psi @ 100 gpm.

Maximum Operating Pressure – 150 psi

Maximum Continuous Flow – 50 gpm

2"

Length – 20-1/4"

Width – 9-11/16"

Height – 9-17/32"

Weight – 37 lbs.

Normal Operating Range – 8 – 160 gpm.

Maximum Pressure Loss – 12.1 psi @ 160 gpm.

Maximum Operating Pressure – 150 psi

Maximum Continuous Flow – 80 gpm

TURBO METER SPECIFICATIONS

W-120 DR 1-1/2"

Length – 13-1/4"

Width – 6"

Height – 6-3/4"

Weight – 29 lbs.

Normal Operating Range – 4 – 120 gpm.

Maximum Pressure Loss – 13.5 psi @ 120 gpm.

Maximum Operating Pressure – 150 psi

Low Flow Accuracy – 95% @ 3 gpm

W-160 DR 2"

Length – 12"

Width – 6"

Height – 6-3/4"

Weight – 29 lbs.

Normal Operating Range – 4 – 160 gpm.

Maximum Pressure Loss – 5.6 psi @ 160 gpm.

Maximum Operating Pressure – 150 psi

Low Flow Accuracy – 95% @ 3 gpm

W-350 DR 3"

Length – 12"

Width – 7-1/2"

Height – 8-3/4"

Weight – 48 lbs.

Normal Operating Range – 5 – 350 gpm.

Maximum Pressure Loss – 5.9 psi @ 350 gpm.

Maximum Operating Pressure – 150 psi

Low Flow Accuracy – 95% @ 4 gpm

W-1000 DR 4"

Length – 14"

Width – 8"

Height – 10-7/8"

Weight – 68 lbs.

Normal Operating Range – 15 – 1000 gpm.

Maximum Pressure Loss – 5.0 psi @ 1000 gpm.

Maximum Operating Pressure – 150 psi

Low Flow Accuracy – 95% @ 10 gpm

W-2000 DR 6"

Length – 18"

Width – 11"

Height – 13"

Weight – 104 lbs.

Normal Operating Range – 30 – 2000 gpm.

Maximum Pressure Loss – 6.5 psi @ 2000 gpm.

Maximum Operating Pressure – 150 psi

Low Flow Accuracy – 95% @ 20 gpm

W-3500 DR 8"

Length – 20"

Width – 13.5"

Height – 15"

Weight – 185 lbs.

Normal Operating Range – 35 – 3500 gpm.

Maximum Pressure Loss – 8.4 psi @ 3500 gpm.

Maximum Operating Pressure – 150 psi

Low Flow Accuracy – 95% @ 30 gpm

COMPOUND METER SPECIFICATIONS

2" SRM

Length – 15-1/4"

Width – 6-7/8"

Height – 14"

Weight – 60 lbs.

Normal Operating Range – 2 – 160 gpm.

Maximum Operating Pressure – 150 psi.

Low Flow Accuracy – 95% @ 1/4 gpm.

Accuracy At Crossover – 95%

3" SRM

Length – 17"

Width – 8-1/8"

Height – 15-5/16"

Weight – 89 lbs.

Normal Operating Range – 4 – 320 gpm.

Maximum Operating Pressure – 150 psi.

Low Flow Accuracy – 95% @ 1/2 gpm.

4" SRM

Length – 20"

Width – 10-5/8"

Height – 17-3/4"

Weight – 193 lbs.

Normal Operating Range – 6 – 500 gpm.

Maximum Operating Pressure – 150 psi.

Low Flow Accuracy – 95% @ 3/4 gpm.

6" SRM

Length – 24"

Width – 11"

Height – 18-3/4"

Weight – 233 lbs.

Normal Operating Range – 10 – 1000 gpm.

Maximum Operating Pressure – 150 psi.

Low Flow Accuracy – 95% @ 1-1/2 gpm.

BRONZE STRAINER FOR COMPOUND METERS

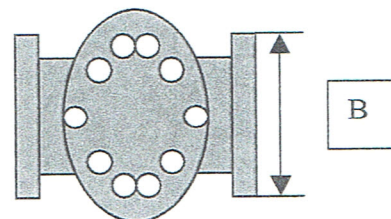
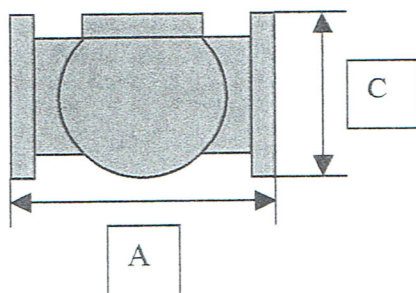
Sizes 2", 3", 4", 6", 8", 10", and 16" AWWA Type

Dimensions and Weights

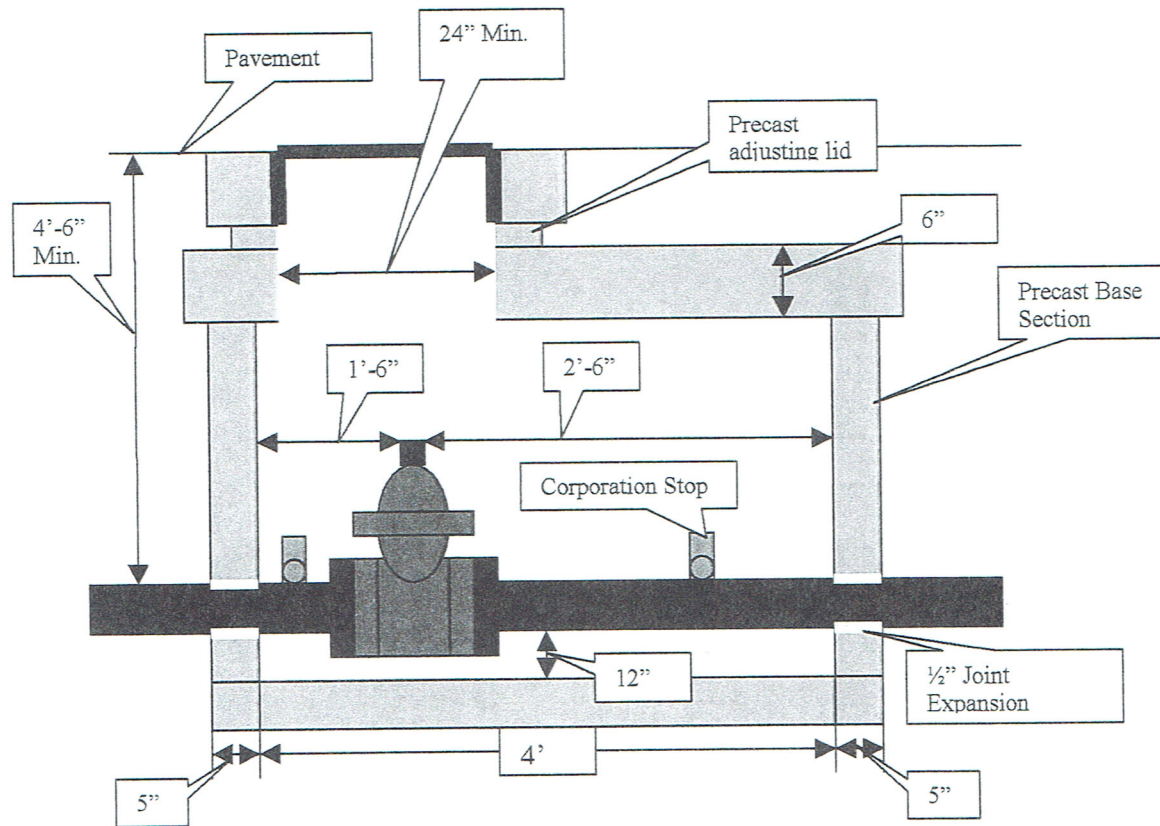
| SIZE | A LENGTH | B WIDTH | C HEIGHT | WEIGHT |
|-----------|---------------|-------------------|-------------------|------------------------|
| 2" Bronze | 7" 178 mm | 6-5/16" 159 mm | 4-3/4" 121 mm | 12.2 lb. 5.5 kg. |
| 3" Bronze | 7" 178 mm | 7-7/16" 190 mm | 7-9/16" 192 mm | 27.0 lb. 13.0 kg. |
| 4" Bronze | 9" 230 mm | 9-1/2" 241 mm | 9" 230 mm | 50.0 lb. 23.0 kg. |
| 6" Bronze | 9" 230 mm | 13-1/2" 343 mm | 11-1/4" 286 mm | 84.0 lb. 38.0 kg. |
| 6" Iron | 9" 230 mm | 13-1/2" 343 mm | 11-1/4" 286 mm | 70.0 lb. 35.0 kg. |
| 8" Iron | 10" 254 mm | 17" 432 mm | 13-1/2" 343 mm | 118.0 lb. 54.0 kg. |
| 10" Iron | 15" 381 mm | 17-1/2" 445 mm | 19" 482 mm | 260.0 lb. 118.0 kg. |
| 16" Iron | 18" 457 mm | 29" 737 mm | 25" 635 mm | 775.0 lb. 353.0 kg. |

PRESSURE DROP

| 2" | 3" | 4" | 6" | 8" | 10" | 16" |
|----------------------|----------------------|------------------------|------------------------|------------------------|------------------------|----------------------------|
| .9 psi at 160 gpm | .9 psi at 350 gpm | 2.5 psi at 1000 gpm | 2.7 psi at 2000 gpm | 2.5 psi at 3500 gpm | 2.1 psi at 5500 gpm | 1.8 psi at 10000 gpm |
| Bolt holes | | | | | | |
| 2 | 4 | 8 | 8 | 8 | 12 | 16 |

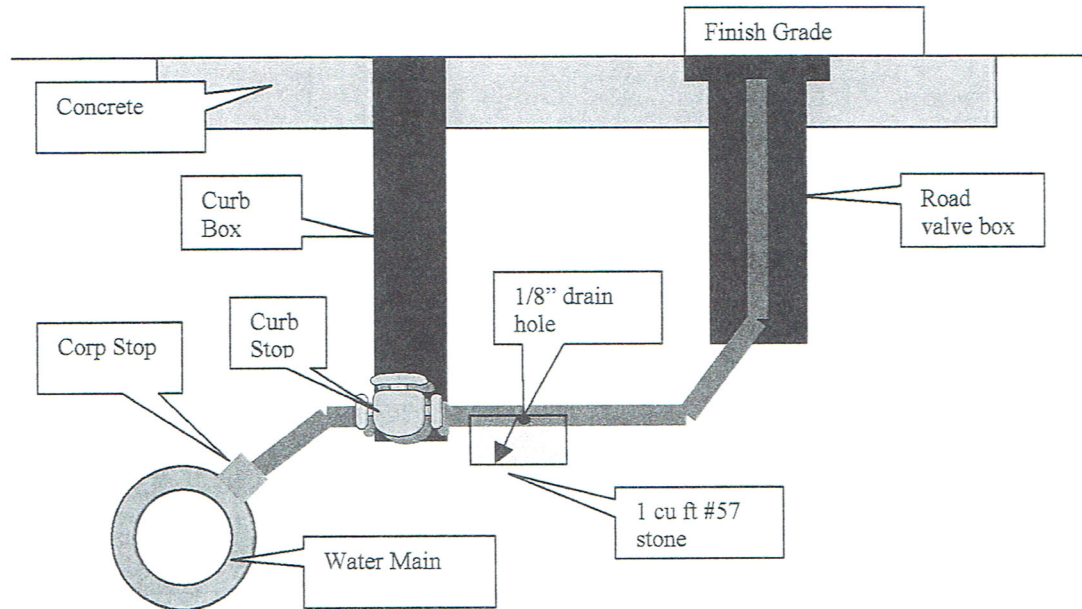


WATER VALVE CHAMBER

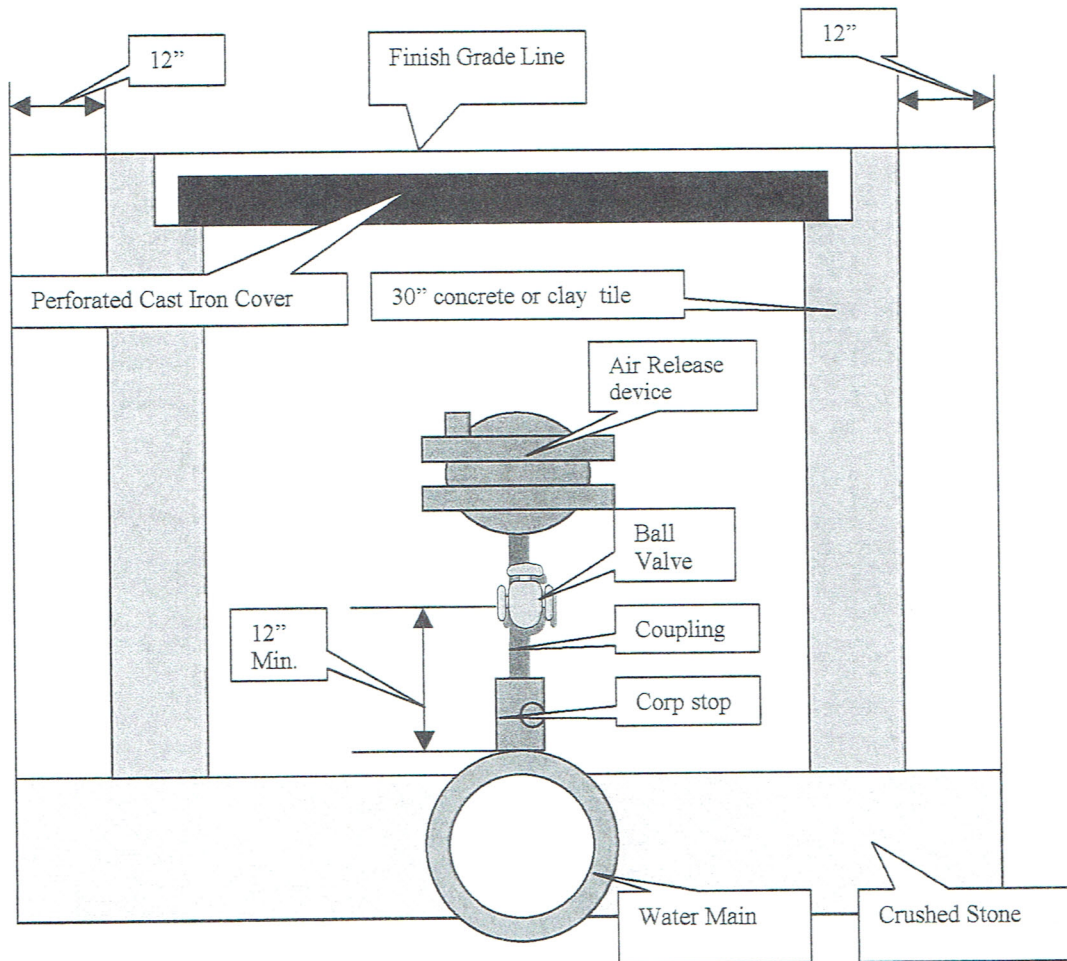


TYPICAL BLOW OFF

1. All saddles shall be stainless steel.
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. Copper shall be "K" copper.



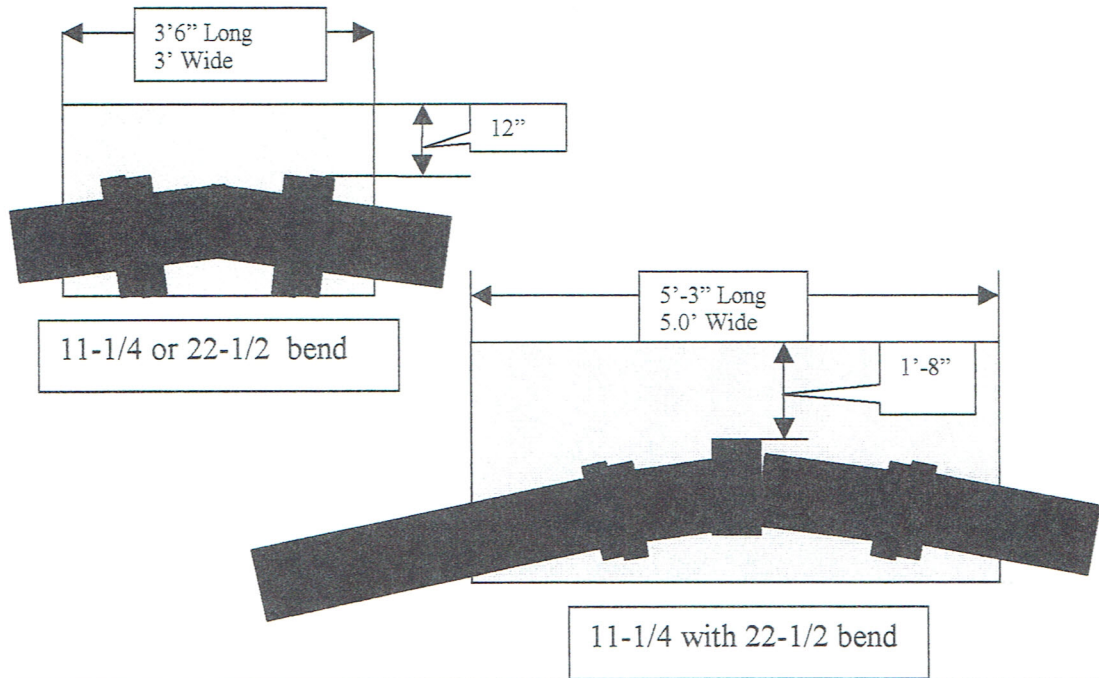
TYPICAL AIR RELEASE



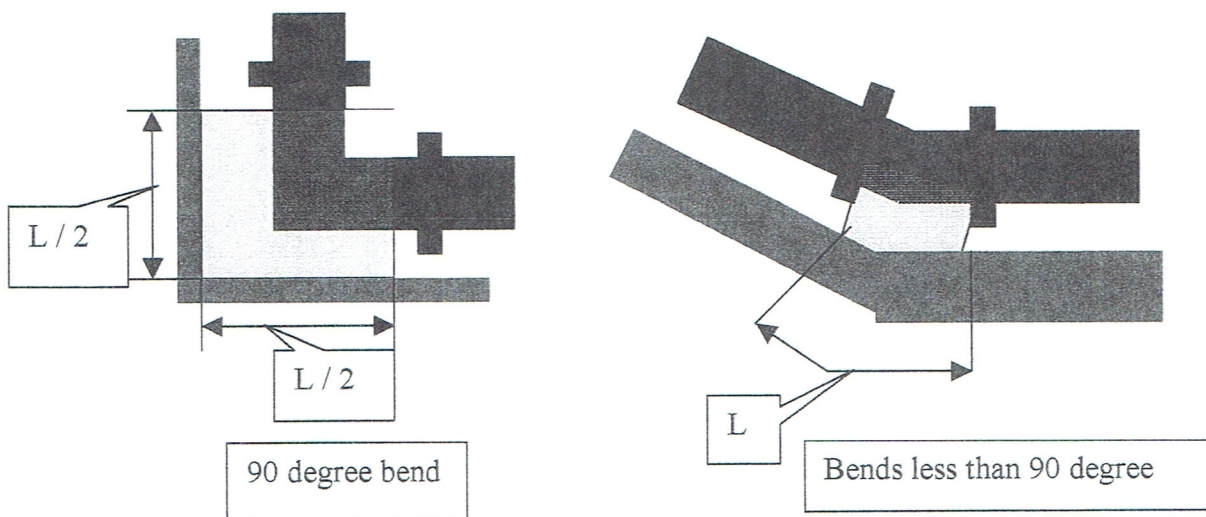
CONCRETE BLOCKING FOR FITTINGS ON WATER MAINS

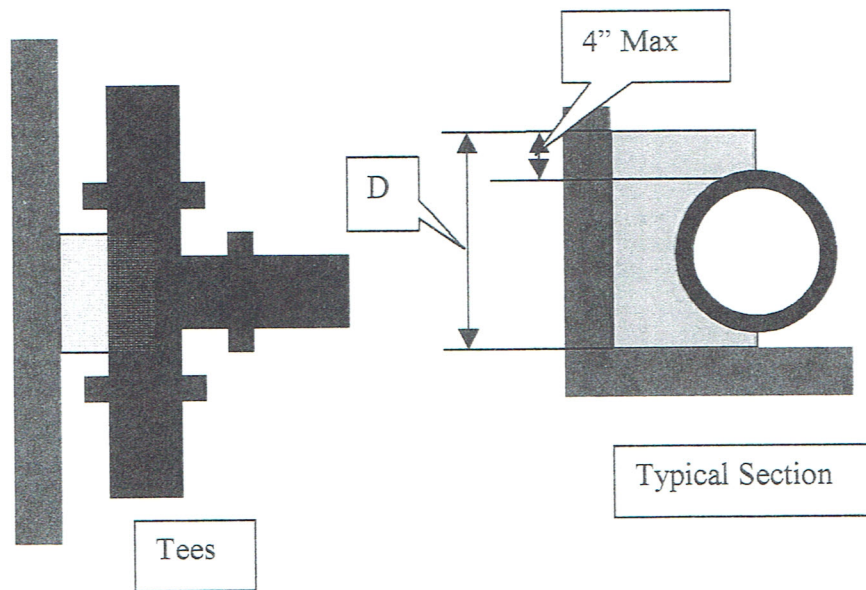
NOTE: Class "A" concrete to be used for all blocking. Tied or restrained joints may be used in lieu of concrete blocking at the direction of the engineer.

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" |