



TOWN OF GEORGETOWN CONSTRUCTION STANDARDS

Chapter 3 Water System

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CHAPTER 3

WATER SYSTEM

3.00.0 INTRODUCTION

All water distribution systems constructed within the Town shall comply with the requirements of these CONSTRUCTION STANDARDS and may include special criteria established by the Town for overall hydraulics of the water utility system. All work performed according to this section must comply with the general requirements contained within Chapter 1. Special criteria shall be outlined at pre-design meetings, as determined necessary by the Town. All work performed by the Responsible Party and subsequent ownership of facilities shall comply with Title 13 of the Georgetown Municipal Code and all associated ordinances.

3.01.0 INTERRUPTION OF SERVICE

The Town's Utility Department will operate all existing valves, hydrants, blow-offs and curb stops. NO VALVE OR OTHER CONTROL DEVICE ON THE EXISTING PUBLIC SYSTEM WILL BE OPERATED FOR ANY PURPOSE BY ANYONE OTHER THAN THE TOWN. Forty-eight (48) hours prior to the interruption of service, the Responsible Party shall notify all users whose service will be interrupted in order for them to make provisions for necessary water storage. For water mains servicing commercial areas (i.e., restaurants) work affecting the shutdown shall only be performed between the hours of 1:00 a.m. and 5:00 a.m. No line in service will be shutdown for more than a four-hour period at one time. Prior approval by the Town is required for all shutdowns. Wet taps shall be used unless unfeasible and be completed by a company specializing in this type of work.

3.02.0 WATER BREAKS

If notification prior to shutdown is impossible, the Responsible Party shall notify all users within one hour after the shutdown. Since prior notification was not possible, it will be the responsibility of the Responsible Party to supply potable water to the users affected. The Responsible Party shall also contact the Town's Utilities Department and Clear Creek County Fire Dispatch at (303) 679-2393 in reference to this emergency shutdown within one hour.

3.10.0 DESIGN CRITERIA

3.11.0 SCOPE

It is the intent of this "design criteria" section to provide sufficient detailed information to enable the Engineer for the Responsible Party to correctly and efficiently design the overall water system for a particular development. If the Town deems it appropriate to require the engineered design of a water system, criteria shall be made available to the Engineer to provide a design acceptable to the Town. Any deviation from these CONSTRUCTION STANDARDS must be approved in writing by the Town.

3.12.0 GENERAL

The water system shall be designed by a professional engineer registered in the State of Colorado utilizing the most current technical standards along with good, sound engineering judgment throughout the design process. The design process includes the submittal of construction drawings for review and approval by the Town.

Construction drawing submittals shall be in conformance with Section 1.30.0 of these CONSTRUCTION STANDARDS.

At the completion of the project, the engineer shall provide the Town with two (2) sets of wet stamped record drawings in conformance with Section 1.30.0 of these CONSTRUCTION STANDARDS.

3.13.0 DESIGN FLOW

The flows used to design the water system for a particular development vary depending on the type of development. A list of criteria to be used in the preparation of all water system analyses will be provided if the Town deems it appropriate for the design of the water system.

3.14.0 WATER SYSTEM DESIGN REPORT

If the Town requires, a water system design report shall be submitted according to the form provided by the Town.

3.15.0 OPERATING PRESSURES WITHIN THE DISTRIBUTION SYSTEM

Pressure within the distribution system shall be a minimum of 40 pounds per square inch during the maximum hour demand and a maximum of 110 pounds per square inch static pressure at the main. The maximum pressure fluctuation at any location in the distribution system between maximum hour demand and minimum hour demand shall not exceed 30 pounds per square inch.

3.16.0 PRESSURE REGULATING STATIONS

Pressure-regulating valve (PRV) installations are used to control pressure between distribution zones. When main extension plans are submitted for review, the need for a pressure-regulating valve installation shall be determined by the Responsible Party's engineer and shall be based on existing zones and the existing distribution system. Plans shall be submitted to confirm the utility study indicating size, type, and location of the PRV installation. All calculations shall be submitted to the Town for review. A PRV may be required at the direction of the Town.

3.17.0 SIZING OF MAINS

3.17.1 Distribution Mains

All mains shall be sized large enough to provide for domestic, irrigation and fire protection flows to the area serviced according to the water system design report submitted to the Town by the Responsible Party's Engineer. The maximum allowable headloss for six, eight, and 12 inch mains is two feet per thousand lineal feet of main. The minimum diameter for water mains in residential areas including cul-de-sacs, shall be 6 inches. All schools, commercial developments, industrial areas, and high density multi-family areas shall be looped with mains at least 8 inches in diameter. All water mains shall be looped and dead end lines will not be permitted unless provided with blowoffs or hydrants and approved by the Town representative.

3.17.2 Transmission Mains

All transmission mains shall be sized according to these CONSTRUCTION STANDARDS.

3.18.0

SYSTEM LAYOUT

3.18.1 General

All mains shall be installed in dedicated rights-of-way or public easements. Water main installation in easements between single-family residential lots will only be allowed for the purpose of looping a water main at the end of a cul-de-sac. Under no circumstances should waterlines be installed parallel to and directly below any concrete such as sidewalks, curbs, or gutters. Lines shall normally be located 5 feet north or east of street centerline or 5 feet north or east of a raised median, unless otherwise approved by the Town.

The minimum depth of cover for water mains from the final approved grade of the surface to the top of the water main, shall be 5 feet. Where final grades have not been established, mains shall be installed to a depth great enough to insure 5 feet of cover below the approved future grade. The maximum depth of cover for water mains shall be 9 feet below the final approved grade of the surface unless approved otherwise by the Town.

Water mains shall be laid a minimum of ten feet horizontally from any existing or proposed utility. Upon written approval by the Town, a water main may be laid closer than ten feet to a parallel sewer main if it is laid in a separate trench and if the elevation of the invert of the water main is at least 18 inches above the crown of the sewer main and, in addition, Sections 3.18.02- 3.18.07 are met. Water mains shall be designed such that they extend the entire frontage of the property to be served or as approved by the Town.

When the water main passes under a highway, railroad, or waterway, there shall be a minimum of seven feet of cover and a steel casing shall be installed in accordance with the STANDARD DETAILS in this chapter. The steel casing shall extend the entire width of the right-of-way or easement of the crossing structure or as directed by the Town. In all cases, valves shall be located such that the water main at such crossings can be completely isolated without interruption of any services.

3.18.2 Water Main Crossing Over or Under A Sanitary Sewer Line

When there is less than 18 inches of vertical clearance between the water main and the sanitary sewer, the water main shall be depressed utilizing Detail 3-10 in the STANDARD DETAILS of this chapter. The sanitary sewer shall be encased in concrete a minimum of ten (10) feet on each side of the centerline of the crossing. Alternatively, one 20 ft. length of C900 PVC or Class 150 DIP may be used for the sewer, centered on the crossing with each transition joint concrete encased.

3.18.3 Water Main Crossing Over or Under A Storm Sewer Line

When there is less than 18 inches of vertical clearance between the water main and the storm sewer, the water main shall be depressed utilizing Detail 3-10 in the STANDARD DETAILS of this chapter. Each joint of the storm sewer within ten (10) feet of the centerline of the crossing shall be encased in concrete. 3 inches of rigid EPS insulation shall be placed 6 inches above the water main extending the full width of the trench, 3 feet either side of the crossing.

3.18.4 Water Main Crossing Over Another Water Main

When there is less than 18 inches of vertical clearance, the smaller main shall be depressed utilizing Detail 3-10 in the STANDARD DETAILS of this chapter.

3.18.5 Limits On Vertical Separation

Under no circumstances shall the vertical clearance between any lines involving a waterline, sanitary sewerline, or storm sewer be less than 12 inches without written approval from the Town.

3.18.6 Water Mains Hung From Bridges or Structures

When a water main is hung from a bridge or similar above grade structure, the main shall be installed within a casing as shown in the STANDARD DETAILS in this chapter and shall be provided with adequate forms of insulation and supplemental heating as to prevent winter season main freezing.

3.19.0

EASEMENTS

All water mains not in public right-of way shall be in an easement that has a width of at least two times the depth to the pipe invert. The minimum easement shall be 20 feet. Site-specific circumstances may dictate the need for wider easements. The centerline of the main shall be located a minimum of 10 feet from and parallel to the edge of the easement. Meters and fire hydrants not installed within the right-of-way will require an easement dedication ten feet wide and extending three feet behind the meter or fire hydrant. If the meter or fire hydrant easement is longer than ten feet, then the width of the easement shall be a minimum of 20 feet. The fire hydrant shall be centered in such easements. Neither landscaping (except grass and private irrigation systems) nor permanent structures (sheds, buildings, etc.) shall be placed in the easement.

The easement agreement, provided by the Town, shall state that any temporary structures (including paving and fencing) placed in the easement shall be removed and replaced by the owner of the land, at their expense, when requested by the Town so that maintenance can be performed. The owner of the land shall agree to hold the Town harmless for any replacement of structures removed from the easement.

3.20.0

FUTURE CONNECTIONS

A fire hydrant, in accordance with the STANDARD DETAILS in this chapter, is required at the end of any water main that terminates and is anticipated to be extended in the future, unless otherwise approved. When a future main extension is anticipated, the main shall be valved so that only one valve will have to be closed when the main is extended. The valve shall be placed in order that no disruption to existing water service will be experienced by any water customers. The valve shall be restrained so when the one valve is closed and the line to be extended is exposed, the valve will not blow off. Restraint shall be made by the use of a mechanical joint anchoring tee (swivel tee), cross, or by installing a minimum of two full lengths of pipe on the extension side of the valve, restrained to the valve. No service taps shall be allowed on a main that can be extended in the future between the single valve to be closed and the dead end.

3.21.0

SERVICES

Each structure shall be served by a separate service line and meter. No pressure booster facility of any kind shall be allowed on any service line between the public main and the meter. All service line pressure booster facilities shall be privately owned and maintained. Water service lines shall be located a minimum of 10 feet away from all sewer services, measured horizontally.

3.22.0

TRANSMISSION MAINS

All water mains 12 inches and larger in diameter shall be classified as "transmission mains."

All transmission mains shall have air and vacuum release valves installed at all high points on the line, and on each side of gate valves in accordance with the STANDARD DETAILS in this chapter.

All transmission mains shall have blow-off assemblies installed at all low points on the line, constructed in accordance with the STANDARD DETAILS in this chapter.

No service line taps or any taps less than six inches in diameter shall be made to transmission mains. Exceptions to this will be for air and vacuum release valves only.

Valves on transmission mains shall be placed no more than 1,200 feet apart. Where there are connections to transmission mains, all connecting mains shall be valved at the connection. If the connection main is 126 inches or greater in diameter, there shall be a minimum of two valves at a tee connection and three valves at a cross connection.

3.23.0

UNLAWFUL CONNECTIONS

No installation of potable water supply piping or part thereof shall be made in such a manner that it will be possible for used, unclean, polluted, or contaminated water, mixtures, or substances to enter any portion of such piping from any tank, receptacle, equipment, or plumbing fixture by reason of back siphonage, suction, back pressure, or any other cause, either during normal use and operation, or when any such tank receptacle, equipment, or plumbing fixture is flooded, or subject to pressure in excess of the main line operating pressure. No person shall make a connection or allow one to exist between pipes or conduits carrying domestic water supplied by the Town and any pipes, conduits, or fixtures containing or carrying water, chemicals, liquids, gases, or any other substances from any other source.

3.24.0

APPURTENANCES

3.24.1 Valves

Residential distribution systems shall be valved to ensure that no more than 1,000 feet of main or 18 residential units and 1 fire hydrant will be out of service in the event of a single water main break. Valve placement shall be such that there are at least two valves at every tee and three valves at every cross.

Valves larger than 12 inches shall be resilient wedge gate valves with bevel gearing. Main line valves shall be located at a point on the main that is intersected by an extension of the side property line of lots. Valves shall not be located in concrete areas such as sidewalks, crosswalks, aprons, curbs, or gutters, unless approved prior to placement by the Town. Valves located on water mains in easements shall be located at the connecting tee, cross, or elbow. Butterfly valve operators shall be located on the north or east side of the water main. Any valve located in a greenbelt area shall have an 18-inch square by 6-inch thick concrete collar around the valve box.

3.24.2 Fire Hydrants

The maximum distance, as measured along the centerline of the street, between fire hydrants shall be 400 feet unless approved otherwise by the Town. The number and location of fire hydrants in a given area shall be approved by the Town. Where the portion of the facility or building hereafter constructed or moved into or within the Town is more than 400 feet from a hydrant, on-site fire hydrants and mains may be required by the Town. In no case shall a hydrant be located closer than 5 feet to obstructions, driveways, etc. Fire hydrants shall be planned and installed in such a manner as to be visibly discernible for the life of the water system. The fire hydrant shall be located within the right-of-way or easements created for utility purposes and on the same side of the street or fire apparatus access road as the water main unless otherwise approved by the Town. The fire hydrant shall be installed so that the pumper nozzle faces the street and the shutoff valve. Fences, landscaping, etc., shall in no way hinder the operation of the fire hydrant. In addition, clear distances to the fire hydrant shall be in accordance with Section 3.19.0 of these CONSTRUCTION STANDARDS.

The fire hydrant lateral lines shall be set at 90 degrees to mains and shall be a minimum of 66" diameter. The fire hydrant lateral line shall be no more than 750 feet in length from the main. No horizontal bends or offsets shall be used in fire hydrant lateral lines. Under no circumstances shall any tap be made on a fire hydrant lateral line.

3.24.3 Thrust Blocks

All bends, tees, plugs, dead-ends, wet taps (in certain cases), hydrants, and blow-offs shall be designed and constructed with concrete thrust blocks. If the soil-bearing strength is unknown, the soil-bearing capacity used in design shall be 1,500 pounds/square foot. Refer to the STANDARD DETAILS in this chapter. Special care shall be taken with fire hydrant thrust blocks so as to not hinder drainage of the fire hydrant barrel via the weep holes.

3.24.4 Meters

All meter installations shall be performed by the Town. Public water meter installations inside any buildings are prohibited unless otherwise approved, in writing, by the Town. Meters shall be located at property line within easements. The Town encourages the installation of a valve shut off on the up-stream side of the meter in order to allow for the shut off of water during water break emergencies.

All water meters connected to the Town's utility system shall be the property of the Owner. Under no circumstances shall anyone other than Town Utility personnel remove a water meter once the pit or vault has been inspected and approved. No connections shall be made in the meter pit other than those related to the meter and bypass. Irrigation system connections shall be made downstream from the meter and a minimum of five feet from the meter pit or vault.

For any installation where special or unusual conditions might exist, detailed drawings, accompanied by a letter of explanation, shall be submitted to the Town for review and approval.

There shall be no electrical wiring allowed in any water meter pit or vault unless authorized, in writing, by the Town.

Inspections of all residential pits and commercial pits or vaults shall be conducted by the Town. Locations and details for commercial pits or vaults shall be reviewed and approved by the Town.

All meter sizes for residential, commercial or industrial use shall be determined by a Professional Engineer registered in the State of Colorado and calculations submitted to the Town for review and approval.

3.24.5 Fire Protection Service Line

Valves on newly constructed fire lines shall be located on the tee at the main line. The Owner shall maintain all private fire lines beginning at, and including this valve. All fire sprinkler taps shall be installed with an approved cross-connection protection device as specified in Section 3.24.8. A property requiring a domestic service line and a fire protection service line will have separate taps for each. The Town does not charge a "tapping fee" for fire sprinkler lines, but Owner is responsible and shall pay all installation costs of the required taps.

3.24.6 Valve Vaults

All valves larger than 12 inches shall be installed in a vault. All valve vaults shall be concrete, capable of withstanding AASHTO H-20 highway loading. The vault shall also have lifting hooks in the roof for valve removal inside the vault.

Vaults shall be made waterproof after construction by use of sealants, epoxies or other approved method. All vaults shall be designed with wall sleeves and link seals and be capable of handling thrusts caused by removing valves.

The vault shall also be provided with a high/low gravity vent system. Responsible Party's Engineer shall submit valve vault design for Town approval.

3.24.7 Manholes

Manholes shall be installed at all pressure regulating valves, permanent blow-offs, and air release valve locations in accordance with the STANDARD DETAILS in this chapter.

3.24.8 Cross-Connection Prevention Device

To protect the Town's potable water supply mains against cross-connection contamination (backflow and backsiphonage), an approved cross-connection control device shall be installed at any point where the possibility of contamination due to cross-connection exists. An "approved device" is one which meets the standards of the American Water Works Association (AWWA). Any cross-connection control device required by the Town shall be installed, maintained and tested annually as required by the Colorado Department of Public Health and Environment (CDPHE) Cross-Connection Control Program, and such installation shall conform to International Plumbing Code standards.

Authority to implement and maintain this cross-connection control program is contained in, but not limited to the following:

- 1) Colorado Primary Drinking Water Regulations. Article 12, Hazardous Cross-Connection
- 2) 2002 Edition of the International Plumbing Code (or more recently adopted version)
- 3) Colorado Cross-Connection Control Manual. CDPHE
- 4) Georgetown Municipal Code Section 13.70

3.30.0 CONSTRUCTION SPECIFICATIONS

3.31.0 EXCAVATION, TRENCHING AND BACKFILLING

Excavation, trenching and backfilling shall be done in accordance with Chapter 8 of these CONSTRUCTION STANDARDS.

3.32.0 BEDDING

Granular bedding material used shall meet the requirements of Chapter 8 of these CONSTRUCTION STANDARDS. Bedding shall be placed to six inches below the bottom of the pipe and shall be placed around the sides of the pipe and to a minimum of 12 inches above the top of the pipe and in accordance with the STANDARD DETAILS in this chapter.

3.33.0 PIPELINE INSTALLATION

3.33.1 General

The Town shall be notified at least 48 hours in advance of any pipe installation. The Responsible Party shall notify and arrange for all utility locates prior to excavation. No pipes shall be backfilled until they have been inspected and approved by the Town. Alignment and grade of the pipe and the location of fittings, valves, and hydrants shall be staked under the supervision of a professional surveyor registered in the State of Colorado.

Proper implements, tools, and facilities shall be provided and used by the Responsible Party for the safe and convenient execution of the work. All pipe fillings, valves, and hydrants shall be carefully lowered into the trench by means of straps, ropes, or other suitable tools or equipment to prevent damage to water main materials and protective coatings and linings. Chains or cables shall not be used for handling pipe with protective coatings. Under no circumstances shall water main materials be dropped or dumped into the trench.

All pipe and fittings shall be carefully examined for cracks and other defects immediately before installation. The groove in the bells of the pipe shall be full and continuous or the pipe will be rejected. Defective pipe or fittings shall be removed from the job site within 24 hours of notification by the Town. All foreign matter or dirt shall be removed from the interior and ends of pipe and accessories before they are lowered into position in the trench and prior to connection.

Every precaution shall be taken to prevent foreign material and trench water from entering the pipe and fittings. During construction, the Responsible Party shall provide and maintain adequate equipment to properly remove and dispose of all water entering the trench and any other part of the work.

3.33.2 Pipe

Immediately before joining two lengths of pipe, the inside of the bell and the outside of the spigot end, the gasket shall be thoroughly cleaned, and, if performing disinfection by tablet method, as described in Section 3.40.3, dry chlorinating tablets providing 65% hypochlorite shall be attached to the top end of the pipe with water-soluble permatex or an adhesive appropriate for potable water. A thin film of gasket lubricant shall be applied to the inside face of the gasket and the spigot end of the pipe. The spigot end of the pipe shall be placed in the bell with care to prevent the joint from contacting the ground. The joint shall be completed by pushing the pipe home by hand with a slow steady pressure, without jerky or jolting movements. Pipe furnished without a depth mark shall be marked before assembly to ensure insertion to the full depth of the joint. The pipe shall then be properly set and brought to correct line and grade. After installation of the polyethylene protective wrap, the pipe shall be secured in place by installation of bedding material and backfill, in accordance with Chapter 8 and the STANDARD DETAILS in this chapter.

Deflection from a straight line or grade, as required by horizontal or vertical alignments or offsets, shall not exceed the maximum allowable limits set by the manufacturer's specifications. If the alignment requires deflection in excess of the allowable deflection per joint, special bends, or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limits set forth, as approved, in writing, by the Town.

All ductile iron pipe fittings and appurtenances shall be protected with a minimum 8 mil polyethylene film wrap. Miscellaneous steel or other ferrous pipe for temporary blow-offs, etc., shall be similarly protected. Methods for applying the wrap shall conform to the STANDARD DETAILS in this chapter.

At times when installation is not in progress, the open ends of the pipe shall be closed with a watertight plug. Cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe or lining, leaving a smooth end at right angles to the axis of the pipe. Pipe ends shall be smooth and beveled according to the pipe manufacturer's recommendations.

Extra care should be used in handling PVC pipe during cold weather due to the reduced flexibility and impact resistance as temperatures approach and drop below freezing. PVC pipe to be stored outside and exposed to sunlight for more than 30 days shall be covered with an opaque material such as canvas. Clear plastic sheets shall not be used to cover the pipe. Air circulation shall be provided under the covering. Any over-exposed pipe, as determined by the Town, will not be permitted for installation.

During the backfilling of all water main trenches, a 2-inch-wide tape labeled "Waterline Buried Below" shall be placed in the trench backfill 1 foot above at the top of the select fill and directly over the pipe.

In addition to the tape mentioned above, all PVC waterline installations shall include the installation of a single, 14 or 16-gauge, insulated copper tracing wire taped to the top of the pipe. The tracing wire shall be one piece and installed in a continuous run between valves. Tracer wire shall terminate up at the base of a fire hydrant, unless otherwise approved.

3.33.3 Fittings

Pipes shall be connected to valves and fittings by mechanical joints unless specified differently in the approved drawings. For approved slip-on joints, the joint shall be assembled with a ratchet jack or other approved method in a manner that does not cause any damage to the pipe. Both the spigot and bell must be thoroughly clean and free from tar or other coatings and use.

For mechanical joint pipe, the last 8 inches of the outside of the spigot end of the pipe and the inside of the bell of all fittings and gate valves shall be thoroughly cleaned to remove oil, grit, tar (other than standard coating), and other foreign matter from the joint and then a thin film of gasket lubricant shall be applied. The cast iron gland shall then be slipped on the spigot end of the pipe with the lip extension of the gland toward the bell of the fitting. Gasket lubricant shall be applied to the rubber gasket and placed on the spigot end of the pipe with the thick edge towards the gland.

After the spigot end of the pipe is placed into the bell and fully inserted the gasket shall be pressed into place within the bell so it is even around the entire joint. After the gland is positioned behind the gasket, the Responsible Party shall install all bolts and nuts and tighten them with a torque wrench. Nuts spaced 180 degrees apart shall be tightened alternately to produce equal pressure on all parts of the gland.

Jointing shall be done, unless specifically excepted above, in accordance with AWWA Specification C-111 for a mechanical joint for cast iron pressure pipe and fittings.

3.34.0 VALVE AND VALVE BOX INSTALLATIONS

In addition to the jointing requirements mentioned in Section 3.33.3 of these CONSTRUCTION STANDARDS, the additional requirements of this section shall apply. Valves and valve boxes shall be installed where shown on the approved drawings and as directed by the Town. Valve boxes shall be firmly supported, centered, and plumbed over the wrench nut of the valve with the box cover at or minus 1/2-inch within the surface of the finished pavement or at such other elevation as may be directed by the Town. Extensions to within 4 feet of the finished grade shall be provided for valves installed with more than 4 feet of cover. Earth fill shall be carefully tamped around each valve box to a minimum distance of 4 feet on all sides of the box, or to the undisturbed trench face if less than 4 feet. Valves shall have the interiors cleaned of all foreign matter before and after installation.

Gear cases shall be tightened and the valve shall be inspected in opened and closed positions to insure that all parts are in working condition prior to installation. The cases shall be supported by bricks or other means to prevent any shock or stress being transmitted to the valve.

3.35.0 THRUST BLOCKS

The Responsible Party shall excavate as required to ensure that the thrust blocks are placed against undisturbed soil and shall form the sides of the thrust block to provide the size and shape required. When it is impossible, because of over excavation or other causes, to pour a thrust block against undisturbed earth, harness rods shall be used to anchor the fittings to the main in addition to the thrust block and as required by the Town. After the concrete has been placed and has set, the Responsible Party shall remove all forming materials prior to backfilling around the thrust block. Concrete for the thrust blocks shall comply with provisions set forth in Chapter 7 of these CONSTRUCTION STANDARDS.

The blocking shall be placed so that the pipe and fitting joints will be accessible for repair. A bond breaker shall be placed between the fillings and the thrust block. Extra care for fire hydrant thrust blocks should be taken so as to not block proper drainage of the fire hydrant barrel from the weep holes. Backfill may be placed over the thrust blocks once the surface has set sufficiently to resist the weight of the backfill. However, no tamping or compacting shall be allowed above the thrust block for a minimum of 24 hours after placement. Concrete must set a minimum of 48 hours prior to the initial filling of the line.

3.36.0 CONNECTION TO EXISTING MAINS

At locations where connections to existing water mains are to be installed, the Responsible Party shall locate the existing mains, both vertically and horizontally, and shall verify their exact size in advance of the time scheduled for making the connections. The Responsible Party shall notify and schedule the connection with the Town.

Wet tap connections are preferable so as to minimize disruption of service to the system. Wet taps shall be completed by a company specializing in this type of connection. In the event a wet tap is not feasible, then every step should be taken to minimize system downtime. Prior to connecting to existing water mains, the Responsible Party shall have all men, materials, and equipment ready to connect the filling to the existing main to keep the shut-off time to a minimum. As soon as possible after making the connections, the Responsible Party shall flush the connection to prevent any contamination of the existing facilities. The Responsible Party shall take every precaution necessary to prevent dirt or debris from entering the main.

3.37.0 FIRE HYDRANT INSTALLATION

Immediately before installation of a hydrant, the following operations shall be performed:

- (A) The hydrant shall be thoroughly inspected for any defects or damage.
- (B) The hydrant interior shall be thoroughly cleaned.
- (C) The hydrant shall be opened and closed as many times as necessary to determine that all parts are in proper working order, valves are seating properly and the drain valve is operating freely.

Hydrants shall be set so that a minimum of 4 feet of cover is provided for the lateral line and the nozzles are a minimum of 18 inches above finished grade. Each hydrant shall be set on a concrete foundation at least 18 inches by 18 inches and 6 inches thick. Each hydrant shall be blocked against the end of the trench with a concrete thrust block. If the trench is unstable then the hydrant shall be mechanically restrained from the tee at the main to the hydrant in addition to the thrust block. Hydrants shall be oriented such that the pumper nozzle shall face the street/fire access/parking area to which it serves.

Each hydrant shall have drain holes with a minimum 18-inch-thick layer of 1-1/2-inch (minimum) washed rock beneath them. A sheet of 8-mil polyethylene shall be placed over the washed rock to prevent dirt from filling the rock. All hydrants shall stand plumb and shall be connected to the street main by a minimum 6-inch lateral line. The fire hydrant base shall be adjusted to not more than 3 inches nor less than 2 inches above the approved finished grade. The maximum allowable height of extensions on hydrants is 12 inches. No hydrant lateral shall be installed any deeper than 6 feet from the top of the approved finished grade.

Hydrants shall have a traffic break-away feature in the barrel at the ground line. Depending upon hydrant location, the use of steel posts filled with concrete may be required for protection, as specified by the Town. In areas where the hydrant bottom is installed below ground water, a larger area, 2 times, of 1-1/2-inch (minimum) washed rock enclosed with 8-mil polyethylene shall be installed to insure proper drainage. All other requirements shall be as shown on the STANDARD DETAILS in this chapter.

3.38.0 TAPS

The size of tap shall be approved and/or determined by the Town. All service taps shall be made by the Town and the cost associated will be determined by the Town's Representative. Taps will not be made on a water main until the Town has performed and the main has passed the pressure tests and clear water tests. Tapping mains may require digging out bedding material and cutting or removing part of the corrosion protective wrapping. After the taps are made, the wrap shall be repaired or replaced by the Responsible Party to protect both the service line and the main. No service tap shall be located closer than 2 ft from any water main pipe joint.

3.39.0 METER INSTALLATION

All meter installations shall be performed by the Town.

No connections shall be made in the meter pit other than those related to the meter and bypass. Irrigation system connections shall either have an individual irrigation tap or be made no closer than five (5) feet from the meter pit or vault on the downstream/customer side of the meter.

3.40.0 TESTS

3.40.1 General

The Responsible Party shall disinfect and test all mains and fire lines regardless of existing conditions. This may include repairing existing facilities that must be included in the test and are not capable of holding test pressures. All thrust blocks or other bracing facilities shall be in place at least 48 hours before the initial filling of the line. All tests shall be administered by the Town.

3.40.2 Filling and Venting Lines

All existing valves shall be operated by the Town. The line shall be slowly filled with water and all air expelled from the pipe. Care shall be taken so that all available hydrants (including hydrant gate valves), air valves, and other vents are open during the filling of the line. Where hydrants or other vents are not available in the line, the Responsible Party shall make whatever taps are required for venting purposes. These taps shall be abandoned after testing, the taps removed and the main repaired by the use of a stainless steel repair clamp. The rate of filling the line shall not exceed the venting capacity of the vent. Except when disinfecting the line as indicated below with the chlorination tablet method.

3.40.3 Disinfection

The Responsible Party will be required to chlorinate every new water main installed. This shall be accomplished by one of two methods. In general, the tablet method shall be used. If approved by the Town, the continuous feed method may be used.

The tablet method shall not be used if trench water or foreign material has entered the line. Since preliminary flushing cannot be used with this method, the tablet method shall only be used when scrupulous cleanliness has been executed. Attach dry chlorinating tablets that provide 65% hypochlorite to the top end of each pipe joint with water-soluble permatrix or an adhesive appropriate for potable water during installation as per Section 3.33.2 of these CONSTRUCTION STANDARDS. The number of tablets shall be sufficient to produce a dose of 50 mg/l of chlorine. Refer to Table 2 of AWWA C651-92 for the required minimum number of tablets. This table shows the number of tablets for 25 mg/l so the number of tablets needs to be adjusted accordingly. Tablets must also be placed on all hydrants. Introduce water into the pipeline at a rate no greater than 1 ft./sec. and retain the water in the pipeline for a period of 24 hours. The minimum residual chlorine shall be 5 mg/l throughout the entire length.

The continuous feed method is accomplished by introducing water into the line at a constant rate while adding chlorine to maintain a minimum concentration of 50 mg/l. The chlorine must remain in the main for a contact period of no less than 24 hours after which the treated water shall contain no less than 25 mg/l of chlorine throughout the entire length.

This procedure will continue until the minimum requirements of this section are met.

3.40.4 Flushing the Main

The entire line shall be flushed after the specified contact time, and after passing the disinfection test. Such flushing shall continue until the water is clear and meets the chlorine content of the existing line. The entire line, including hydrant leads, branch lines, and dead-end mains shall be flushed. The discharge of flushed water shall be accomplished such that no erosion will occur and with no harm to fish, animals, or plants. Procedures for discharge will be subject to the review of the Town.

3.40.5 Pressure Tests

After the pipe and appurtenances have been laid, the line has been backfilled, and all field-placed concrete has cured in accordance with Section 3.35.0 of these CONSTRUCTION STANDARDS, each valved section, unless otherwise directed by the Town, shall be subjected to a hydrostatic pressure of not less than 150 PSI or 1.5 times the normal working pressure of the lines, whichever is greater. The test duration shall be not less than one (1) hour. However, in all cases the test pressure shall be 50 percent over existing main pressure in the test area. Water added to maintain the pressure shall be per AWWA C-600. Allowable leakage shall be calculated according to the following formulas:

Ductile Iron Pipe:
$$L = \frac{N D^3 P}{7400}$$

and
Polyvinyl Chlorine Pipe:

L = Allowable Leakage in gallons per hour

N = Total number of joints

D = Nominal diameter of pipe in inches

P = The square root of the average test pressure in PSI

When testing against existing closed valves, an additional leakage per closed valve of 0.0078 gal/hr/in. of nominal valve size may be allowed at the discretion of the Town.

Each valved section of pipe shall be slowly filled with water and the specified test pressure (measured at the highest point of elevation) shall be applied by means of a pump connected to the pipe in a satisfactory manner. The pump, pipe connection, gauges, and all necessary apparatus and labor shall be furnished by the Responsible Party. Gauges and measuring devices shall be approved by the Town. Before applying the specified test pressure, all air shall be expelled from the pipe. Any cracked or defective pipes, fittings, valves, or hydrants discovered in the pressure test shall be removed and replaced by the Responsible Party with sound material. After all visible leaks have been repaired, the pressure test shall be conducted again. Should testing show a leakage rate in excess of the rates above, the pipeline shall not be accepted. The pipeline shall be repaired, re-chlorinated to meet the criteria in Section 3.40.03 of these STANDARDS AND SPECIFICATIONS and retested as described in this section until it meets the test requirements and is accepted by the Town.

3.50.0 MATERIALS

3.51.0 GENERAL

Only Ductile Iron Pipe (DIP) or polyvinyl chloride (PVC) pipe is approved for water main installations. Specific application of DIP versus PVC pipe, or both will require approval from the Town's Representative. Any other material proposed must be approved by the Town, in writing, prior to construction. All materials furnished shall be new and undamaged.

Acceptance of materials or the waiving of inspection thereof shall in no way relieve the Responsible Party of the responsibility for furnishing materials meeting the requirements of these CONSTRUCTION STANDARDS. The Town reserves the right to direct or deny the use of certain types of materials in specific circumstances. All materials delivered to the job site shall be adequately housed and protected to ensure the preservation of their quality for the work. The presence of any defects in any materials may constitute sufficient cause for rejection of the pipe or appurtenances. Rejected materials shall be removed from the project site.

PIPE

3.52.0

3.52.1 Polyvinyl Chloride Pipe (PVC)

All PVC pipe 8" diameter or greater shall meet the requirements of AWWA Specification C-900, and shall be Class 235 (DR 18).

All pipe shall be suitable for use as a pressure conduit. Provisions must be made for expansion and contraction at each joint with a rubber ring. The bell shall consist of an integral wall section with a solid cross-section rubber ring that meets the requirements of AWWA Specification C-900.

Standard laying lengths shall be twenty feet (20') for all sizes. Random lengths shall not be acceptable. Each length of pipe shall bear the date manufactured, type, grade, length, manufacturer's name, and NSF seal of approval.

Pipe joints shall be made using an integral bell with an elastomeric gasket push-on type joint or using machined couplings of a sleeve type with rubber ring gaskets and machined pipe ends to form a push-on type joint.

Solvent cement joints are strictly prohibited.

The manufacturer shall furnish a certified statement that all of the specified tests and inspections have been made and the results thereof comply with the requirements of the applicable standard(s) herein specified. A copy of the certification shall be sent to the Town upon request.

3.52.2 Ductile Iron Pipe (DIP)

All DIP 6" thru 12" shall meet the requirements of AWWA C150 and C151, and shall be 0.25 in. wall thickness minimum. Joints shall be rubber gasketed meeting AWWA C111 requirements. Exterior coating shall be a 1 mil asphaltic coating and interior coating shall be cement mortar lined per AWWA C104.

3.53.00 FITTINGS

All fittings shall be manufactured in accordance with the following AWWA Standards:

C-104, "Cement Mortar Lining for Cast-Iron and Ductile Iron Pipe and Fittings for Water"

C-153, "Gray Iron and Ductile Iron Fittings"

C-111, "Rubber Gasket Joints for Cast-Iron and Ductile Iron Pressure for Pipe and Fillings"

The following are additional requirements or exceptions to the standards mentioned above:

All fittings shall be furnished with a cement mortar lining of standard thickness as defined in the referenced specifications and given a seal coat of bituminous material. All fittings shall be furnished with mechanical joints conforming to the referenced specifications and, in addition, the tee-head mechanical joint bolts and hexagon nuts shall be fabricated from a high strength, low alloy steel known in the industry as "Cor-Ten" or approved equal. Mechanical joint anchoring fittings (swivel) as approved by the Town, in writing, may also be used.

All fittings shall be 150 PSI pressure rating and shall conform to the dimensions and weights shown in the tables of the referenced specifications. All fittings shall be made from gray iron or ductile iron. The manufacturer shall prepare a certified statement that the inspection and all of the specified tests have been made and the results thereof comply with the requirements of the applicable standard(s) herein specified. A copy of the certification shall be sent to the Town upon request.

3.54.0

VALVES

3.54.1 General

All valves shall open left (counterclockwise). All valves shall have a 2-inch-square operating nut. The extension stem shall be mechanically connected to the operating nut. All valves shall have a mechanical joint end and shall be delivered complete with bolts, glands and rubber gaskets.

End connections shall be furnished with am necessary joint materials and shall have full opening flow way of equal diameter to the nominal size of the connecting pipe.

3.54.2 Gate Valves

Gate valves shall be Mueller 2360 Series Resilient Wedge #509. Valves 12" and greater shall be Mueller 2361 Series Resilient Wedge with bevel gearing. Valves shall be iron body. resilient-seated, gate valves with non-rising bronze stems with design, construction, and pressure rating conforming to AWWA Specifications C-500, with modifications specified herein. Stem seals shall be double "O" ring seals designed so that the seal above the stem collar can be replaced with the valve under pressure and in full open position.

All ferrous internal and external surfaces of the valves shall be coated to a minimum thickness of four mils. The coating shall be a two-part thermosetting epoxy suitable for field overcoating and for touch-up with the same coating material without special surface preparation. The supplier shall furnish detailed performance tests of adhesion, hardness and abrasion resistance of the furnished coatings when requested by the Town. The coating shall have a successful record of performance in valves, pipe or other fittings for a minimum of ten years. The double-disk gate valves shall have all bronze internal mechanisms. The resilient seat gate valves shall have external break-off capabilities for over-torquing and positive stop to prevent over compression.

All bolts and nuts used in conjunction with valves shall be stainless steel. "Cor-Ten." or approved equal. All gate valves shall be installed with a valve box meeting the material specifications of Section 3.54.3 of these CONSTRUCTION STANDARDS.

3.54.3 Valve Boxes

Valve box parts shall be Tyler type or approved equal and made of gray cast-iron. buffalo-type with No. 160 large, oval base. A 5-1/4-inch slip-type shaft is required with two (2) or three (3) pieces. Valve boxes shall be considered integral units and shall have at least 6 inches adjustment above and below the specified depth of cover over the pipe. Valve box lids shall be marked with the word "WATER," and shall have a lip or flange extending into the valve box shaft. The valve box shall be of a design that will not transmit shock or stress to the valve.

3.55.0

FIRE HYDRANTS

Hydrants shall be Mueller Super Centurion 250 or Kennedy or approved equal.

3.56.0

BLOW-OFFS

Temporary blow-offs shall be fabricated from a 2" gate valve with drain hole in pipe a minimum of 3' below ground level. The valve shall be iron-bodied bronze mounted with a 2-inch square operating nut complete with valve box. The freeze-proof riser pipe shall be provided with drain pit and well greased plug. The standard required blow-off for 12-inch and larger mains shall be a 6-inch or larger pipe with a gate valve meeting the material requirements of Section 3.54.2 of these CONSTRUCTION STANDARDS and a manhole meeting the material requirements of Section 4.64.0 of these STANDARDS . This blow-off shall also conform to the STANDARD DETAILS in this chapter.

3.57.0 MANHOLES

See Section 4.64.0 of these Standards and Specifications.

3.58.0 AIR VACS

Above-ground air vacs may be required by the Town. If deemed appropriate to install air vacs information shall be provided by the Town or submitted to and approved by the Town.

3.59.0 ENCASEMENT

3.59.1 Concrete

All concrete shall be a minimum of Class A and shall conform to Town standards for Portland cement concrete work as specified in Chapter 7 of these CONSTRUCTION STANDARDS. All concrete encasements shall be a minimum of 6 inches thick from outside of pipe to outside of encasement.

3.59.2 Polyethylene Wrap

Polyethylene encasement material shall be a minimum of 8 mils thick and shall be Scotchrap No. 50 (polyvinyl), or approved equal. All polyethylene encasement material shall be manufactured in accordance with AWWA Standard C-105. The raw materials used to manufacture polyethylene film shall be Type I, Class A, Grade E-1 in accordance with ASTM Standard Designations D-1250.

3.60.0 METERS

All water meters shall be provided by the Town, installed by the Owner and approved by the Town. The Owner shall also be responsible for all associated trench excavation work including backfill.

3.61.0 PRESSURE-REGULATING VALVE

All pressure-regulating valves (PRVs) shall be Clay-val or approved equal. The valve shall be designed to reduce a high upstream pressure to a constant downstream pressure by way of a pilot control system. The pilot system shall control the main valve that shall be single-seated, hydraulically-operated, diaphragm, and globe-valve type. The valve seats shall be bronze except when subjected to sustained high velocities through the valve, the manufacturer recommends stainless steel seats. An indicator rod or flow tube shall be furnished as an integral part of the valve to show the position of the valve.

The valve shall be cast-iron body. Flanges and covers shall conform to ASTM Standard Designation A-50. Bronze castings or parts of internal trim shall conform to ASTM Standard B-61. All valves shall be furnished with flanged ends and drilled in accordance with ANSI B-16.1 Class 125 specifications. Flanges shall be machined to a flat surface with a serrated finish in accordance with AWWA Standard C-207. The pilot valve for controlling operation of the main valve shall be single-seated, diaphragm-operated, and spring-loaded type. The pilot valve shall be attached to the main valve with piping and isolation valves arranged for easy access in making adjustments and also for its removal from the main valve while the main valve is under pressure. The pilot control system shall be case bronzed ASTM B-62 with 303 stainless steel trim. The needle valve shall be all bronze and included with the main valve to control the speed of piston travel.

3.62.0 COMBINATION AIR/VACUUM VALVES

At high points in water mains where air can accumulate, provisions shall be made to remove air by means of air relief valves or other means approved by the Town. Air valves shall be APCO or Valmatic automatic valves. Air relief valves shall be placed in vaults which allow convenient service of the valve and provide for adequate drainage. Valves shall be cast iron body, 3/4 inch minimum or as sized by air flow requirements, 12" above ground, pointed downward, and covered by #24 mesh.

3.63.0 RESTRAINING SYSTEM

3.63.1 Harness Rods

Harness rods shall be mild steel, ASTM Standard Designation A-36. Hex nuts shall be ASTM Standard Designation A-307, Grade A or B, hexagon heavy series.

3.63.2 Megalug

Mechanical joint restraint can be accomplished by the use of a Megalug restraining system, JCM restraint, or approved equal. Glands shall be manufactured of ductile iron conforming to ASTM A 536. Dimensions of the gland shall be such that it can be used with the standardized mechanical joint bell and tee-head bolts conforming to ANSI/AWWA A21.11 and ANSI/AWWA C153/A21.53, latest revision. Twist-off nuts, sized the same as the tee-head bolts, shall be used to insure that the proper torque is applied to the bolts. In no case shall the twist-off bolts be torqued beyond 30 ft. lbs. The mechanical joint restraint device shall have a working pressure of at least 250 PSI, with a minimum safety factor of 2:1.

3.64.0 CONCRETE REINFORCEMENT

All deformed reinforcing bars shall conform to ASTM Standards A-615, Grade 40 or 60, or ASTM Standard A-671, Grade 40 or 60. All welded wire steel fabric shall conform to ASTM Standard A-185.

3.65.0 BACKFLOW PREVENTION DEVICE

All backflow prevention devices shall be AWWA approved for the intended application, shall comply with Town Code 13.70, Cross Connection Control, and shall be installed according to International Plumbing Code standards. For all devices intended for Town ownership, the Town establishes the following standards of quality, depending upon the application:

- A) Febco Model #765 Pressure Vacuum Breaker
- B) Febco Model #82SY Y-Pattern Design Reduced Pressure Zone Assembly
- C) Febco Model #880V Configurable Design Reduced Pressure Zone Assembly

3.66.0 REPAIR CLAMPS

Repair clamps shall be made of stainless steel bands with approved bolts. Gaskets shall be gridded virgin GPR compounded for water service and meeting the requirements of ASTM D 2000-90M 4AA607. Repair clamp design and make shall be submitted to the Town for written approval prior to the installation.



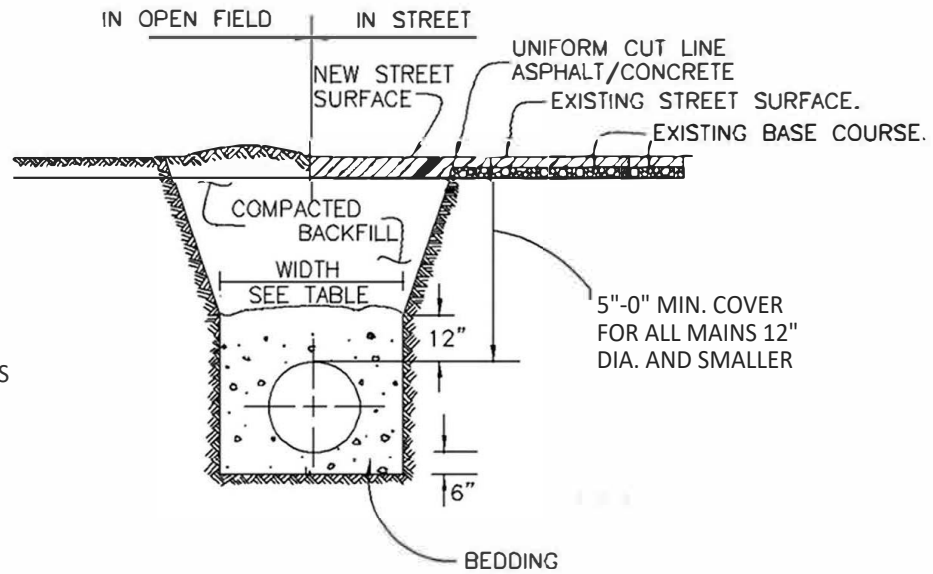
TOWN OF GEORGETOWN CONSTRUCTION STANDARDS

Chapter 3 - Water System Standard Details

NOTE:
MINIMUM COVER TO BE
BELOW OFFICIAL
STREET GRADE.

TRENCH TO BE BRACED OR
SHEETED AS NECESSARY
FOR THE SAFETY OF THE
WORKERS AND THE PRO-
TECTION OF OTHER UTILITIES.

COMPLY WITH ALL REQUIREMENTS
OF CHAPTER 8 OF THE
CONSTRUCTION STANDARDS FOR
TRENCHING, BACKFILL, AND
COMPACTION REQUIREMENTS



TYPICAL TRENCH SECTION

FOR PATCHING IN STREET SURFACE
USE FULL DEPTH ASPHALT AS NOTED
BELOW OR MATCH EXISTING PLUS
ONE (1) INCH, WHICH EVER IS GREATER

PIPE DIAMETER	MINIMUM WIDTH
4"	1'-8"
6"	1'-10"
8"	2'-0"
12"	2'-4"

STREET CLASSIFICATION	DEPTH ASPHALT
ARTERIAL	9"
COLLECTOR	7"
LOCAL	6"

TOWN of GEORGETOWN
404 Sixth Street
Georgetown, CO 80444

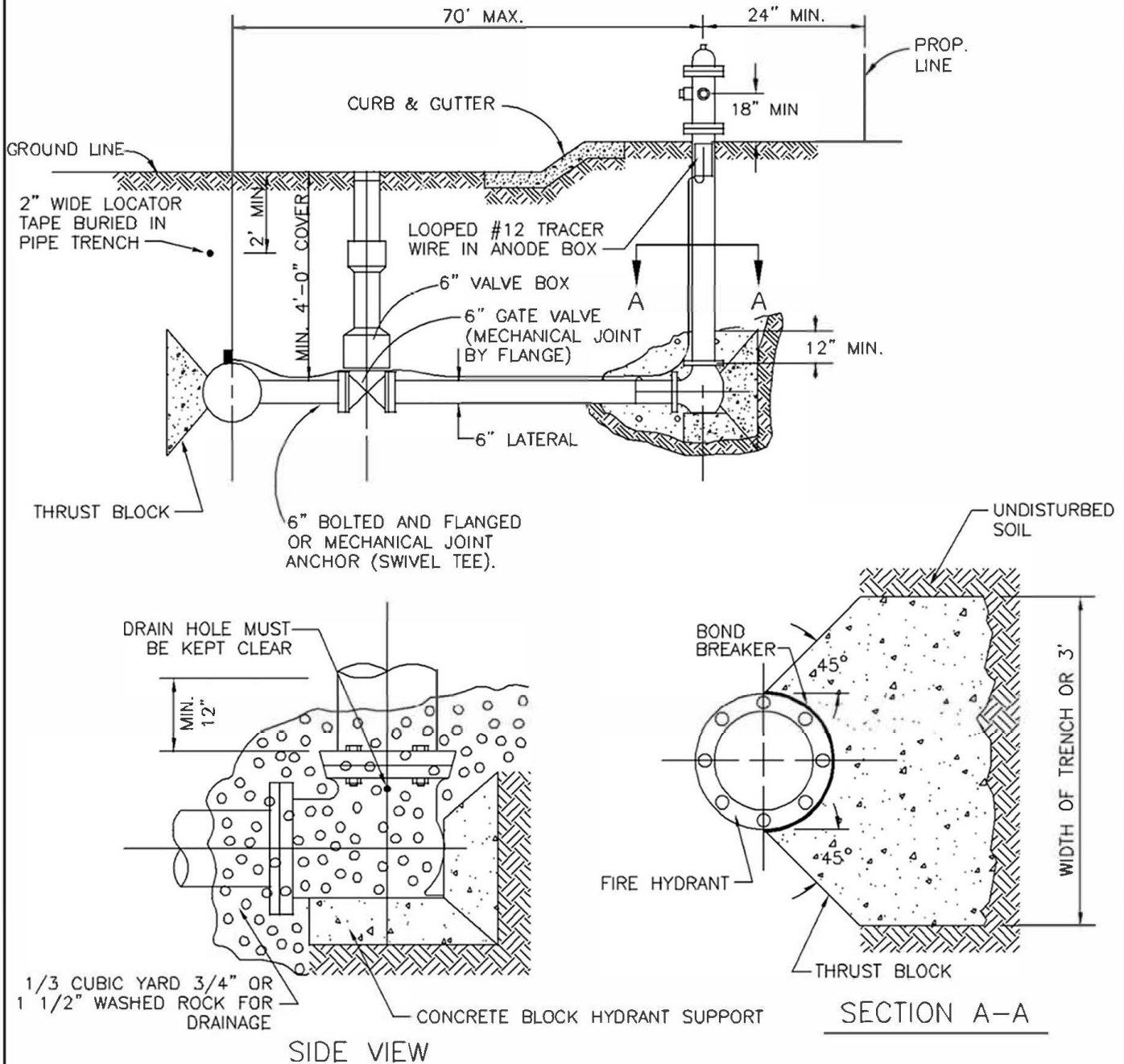
TYPICAL WATER LINE
TRENCH SECTION

DATE: JULY, 2017

SHEET 3-1 of 13

GENERAL NOTES:

1. DRAWING NOT TO SCALE.
2. ALL FITTINGS AND D.I. PIPE TO BE WRAPPED IN POLYETHYLENE.
3. IN UNSTABLE GROUND THE FIRE HYDRANT SHALL BE RODDED FROM THE TEE TO THE HYDRANT.
4. 5' UNOBSTRUCTED AREA IN FRONT AND ON SIDES WITH A 3' UNOBSTRUCTED AREA BEHIND. AREAS SHALL BE CONSTANTLY MAINTAINED.
5. VALVE NUT SHALL BE AT A DEPTH OPERABLE BY A 6' KEY.
6. THREADS ON HOSE FITTINGS TO BE GREASED.

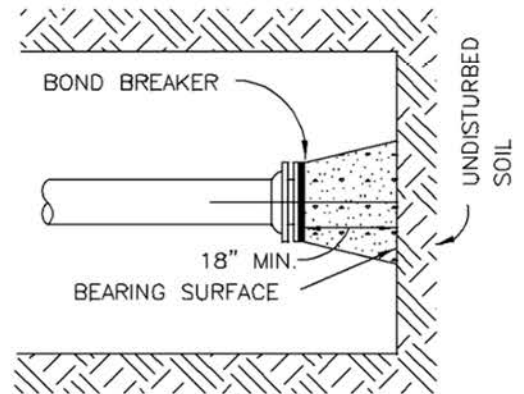
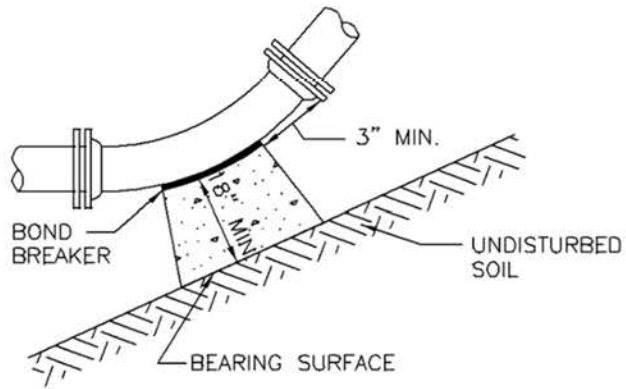


TOWN of GEORGETOWN
404 Sixth Street
Georgetown, CO 80444

FIRE HYDRANT INSTALLATION DETAIL

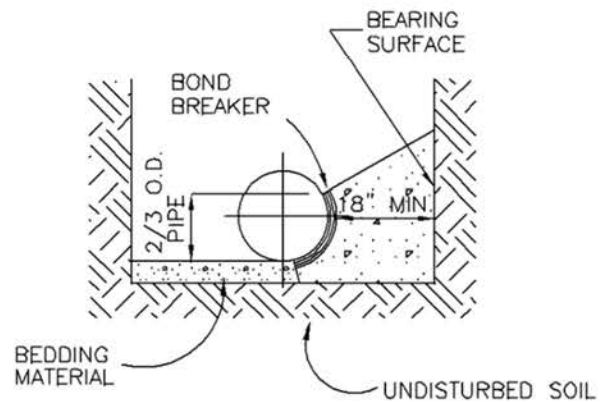
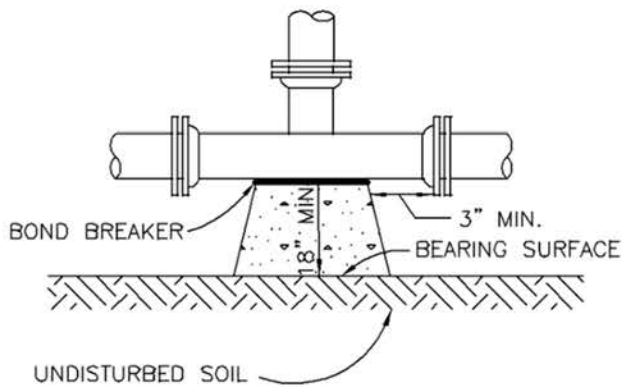
DATE: JULY, 2017

SHEET 3-2 of 13



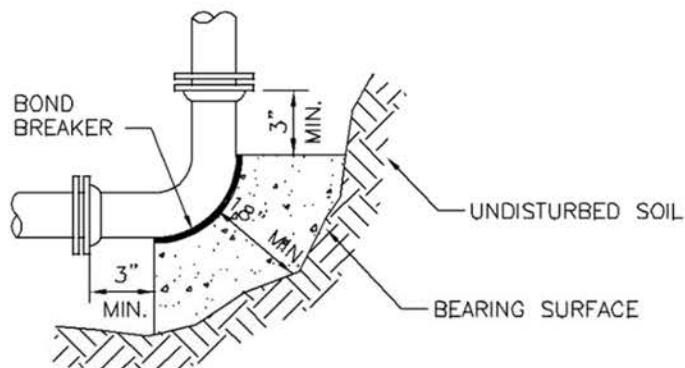
$\frac{11}{4} \frac{1^\circ}{2}$, $\frac{22}{2} \frac{1^\circ}{2}$ AND 45° BENDS

DEAD END



TEE

TYPICAL CROSS SECTION



90° BEND

TOWN of GEORGETOWN
404 Sixth Street
Georgetown, CO 80444

THRUST BLOCK DETAILS

DATE: JULY, 2017

SHEET 3-3A of 13

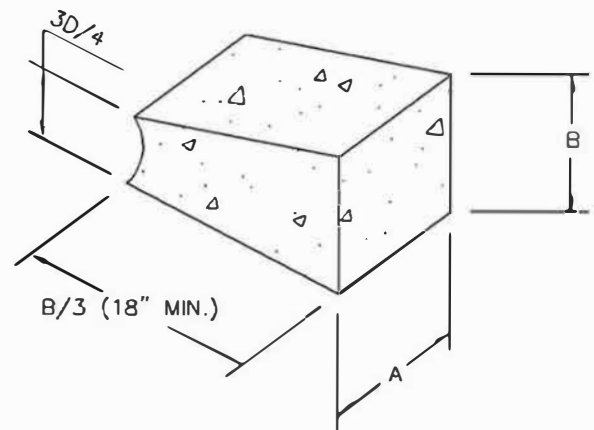
MINIMUM DIMENSIONS FOR THRUST BLOCKS

FITTING SIZE	TEES & PLUGS		90° BEND		45° BENDS & WYES	
	A	B	A	B	A	B
4"	1'-7"	1'-2"	1'-9"	1'-6"	1'-8"	0'-10"
6"	2'-0"	1'-11"	2'-5"	2'-2"	1'-10"	1'-7"
8"	2'-8"	2'-6"	3'-2"	3'-0"	2'-5"	2'-1"
10"	3'-4"	3'-3"	4'-0"	3'-10"	3'-0"	2'-9"
12"	4'-0"	3'-10"	4'-8"	4'-8"	3'-8"	3'-3"
14"	5'-5"	3'-10"	6'-6"	4'-11"	4'-9"	3'-5"
20"	5'-0"	5'-0"	6'-0"	6'-0"	5'-0"	4'-0"
24"	6'-0"	6'-0"	7'-0"	7'-0"	5'-0"	5'-0"
30"	7'-6"	7'-6"	8'-0"	8'-0"	6'-3"	6'-3"

FITTING SIZE	REDUCERS & 22 1/2° BENDS		11 1/4° BENDS	
	A	B	A	B
4"	1'-7"	0'-6"	0'-6"	0'-6"
6"	1'-9"	0'-10"	1'-0"	0'-6"
8"	1'-9"	1'-6"	1'-0"	1'-0"
10"	2'-2"	1'-11"	1'-6"	1'-0"
12"	2'-7"	2'-3"	2'-0"	1'-0"
14"	3'-5"	2'-5"	2'-0"	1'-6"
20"	3'-6"	3'-0"	3'-0"	2'-0"
24"	4'-6"	3'-0"	3'-0"	3'-0"
30"	4'-9"	4'-6"	3'-3"	3'-3"

GENERAL NOTES:

1. BEARING SURFACE AREAS SHOWN IN CHART ARE MINIMUM.
2. BASED ON 150 P.S.I. INTERNAL PIPE PRESSURE.
3. SOIL BEARING CAPACITY = 2000 LB./SQ. FT.
4. ALL FITTINGS TO BE WRAPPED WITH POLYETHYLENE (MINIMUM 8 MIL.).



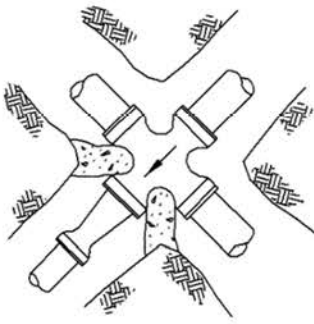
NOT TO SCALE

TOWN of GEORGETOWN
404 Sixth Street
Georgetown, CO 80444

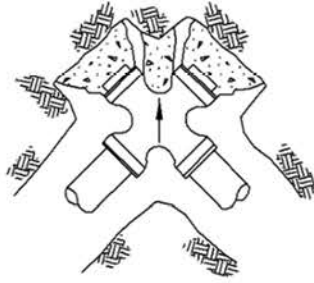
TYPICAL THRUST BLOCK
DIMENSIONS

DATE: JULY, 2017

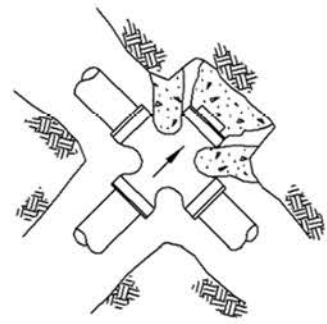
SHEET 3-3B OF 13



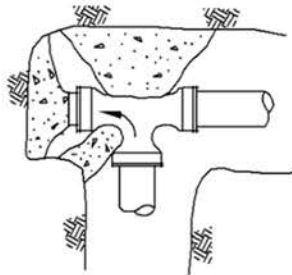
UNBALANCED CROSS



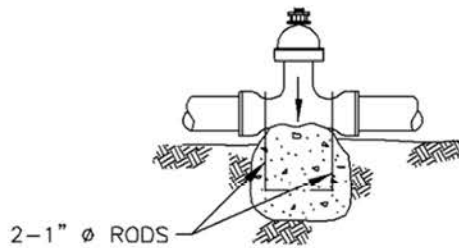
PLUGGED CROSS



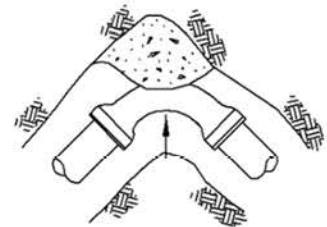
PLUGGED CROSS



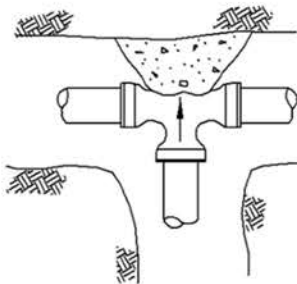
PLUGGED TEE



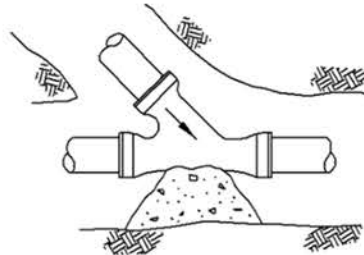
VALVE



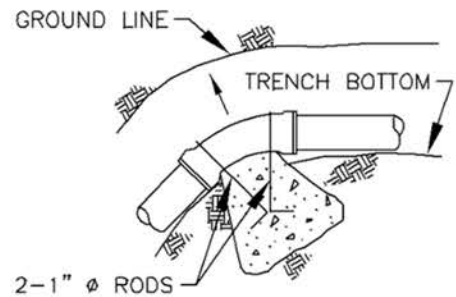
HORIZONTAL BEND



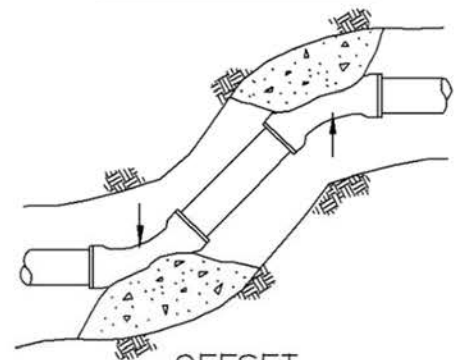
TEE



\"Y\" BRANCH



VERTICAL BEND



OFFSET

NOTES:

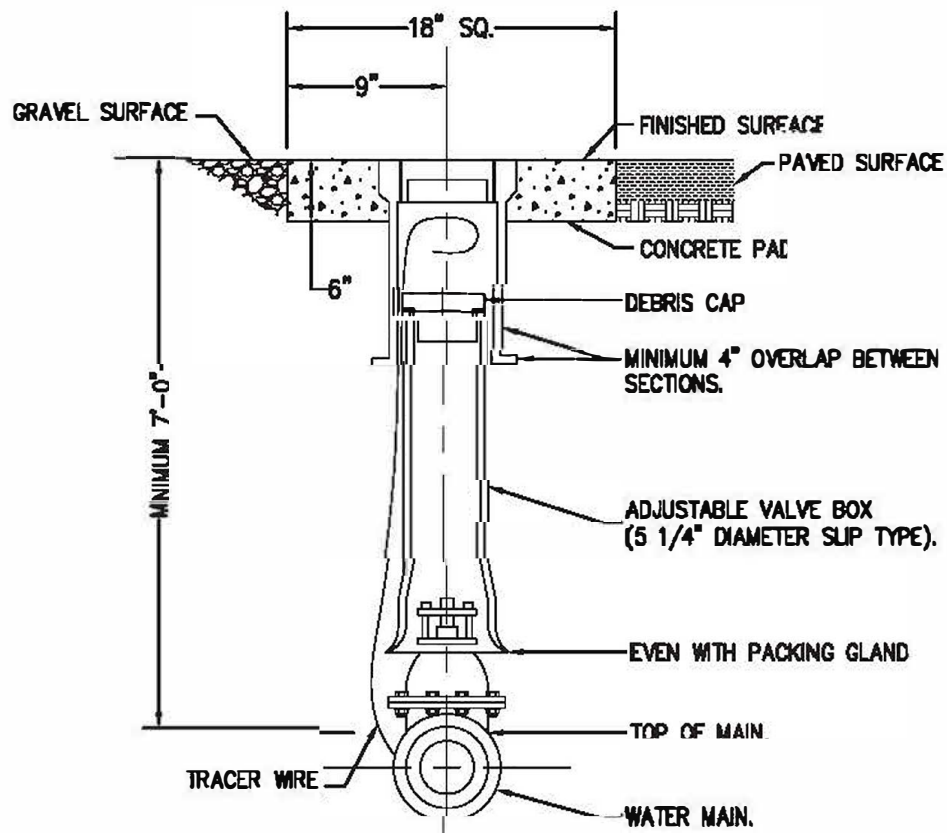
1. SIZE OF BLOCK TO BE A MINIMUM OF 18" THICK.
2. ALL BLOCKING TO BE ON UNDISTURBED MATERIAL.

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THRUST BLOCK CONFIGURATION
DETAILS

DATE: JULY, 2017

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TYPICAL VALVE BOX SETTING

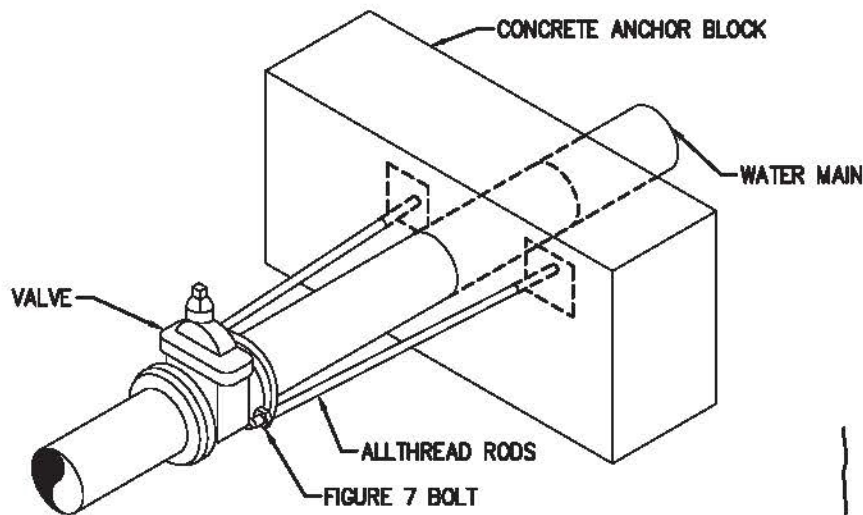
- NOTE: 1. FOR GRAVEL SURFACE, VALVE BOX COVER AND CONCRETE PAD COLLAR SHALL BE LOCATED FLUSH WITH FINISHED GRADE.
2. FOR PAVED SURFACE, VALVE BOX COVER AND CONCRETE PAD COLLAR SHALL BE LOCATED FLUSH WITH FINISHED PAVED SURFACE.
3. FOR EASEMENTS NOT TRAVELED NOR MAINTAINED FOR VEHICULAR TRAFFIC, VALVE BOX COVER SHALL BE LOCATED EVEN WITH FINISHED GRADE.
4. REFER TO DETAIL 3.7 FOR TRACER WIRE DETAIL.
5. CONCRETE SHALL BE PER CHAPTER 7.

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TYPICAL VALVE BOX DETAIL

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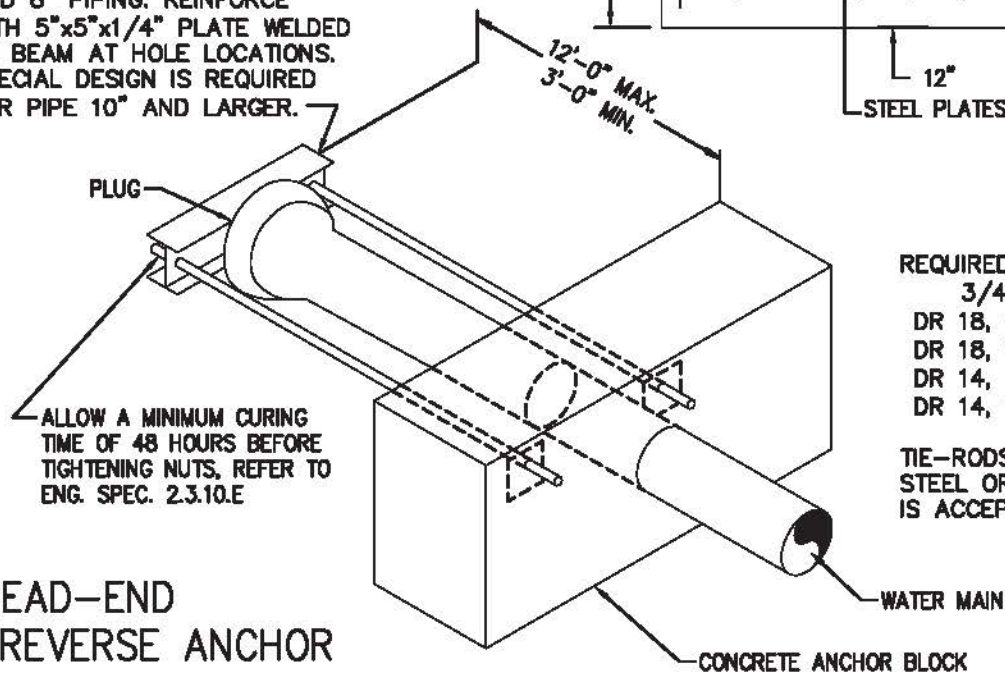
SHEET 3-4 of 13



VALVE OR TEE ANCHOR

DIMENSIONS:
 T=24" FOR PIPE 12" AND UNDER
 T=36" FOR PIPE OVER 12"
 H=PIPE OD. +24"

USE W6x20. BEAM FOR 6" AND 8" PIPING. REINFORCE WITH 5"x5"x1/4" PLATE WELDED TO BEAM AT HOLE LOCATIONS. SPECIAL DESIGN IS REQUIRED FOR PIPE 10" AND LARGER.

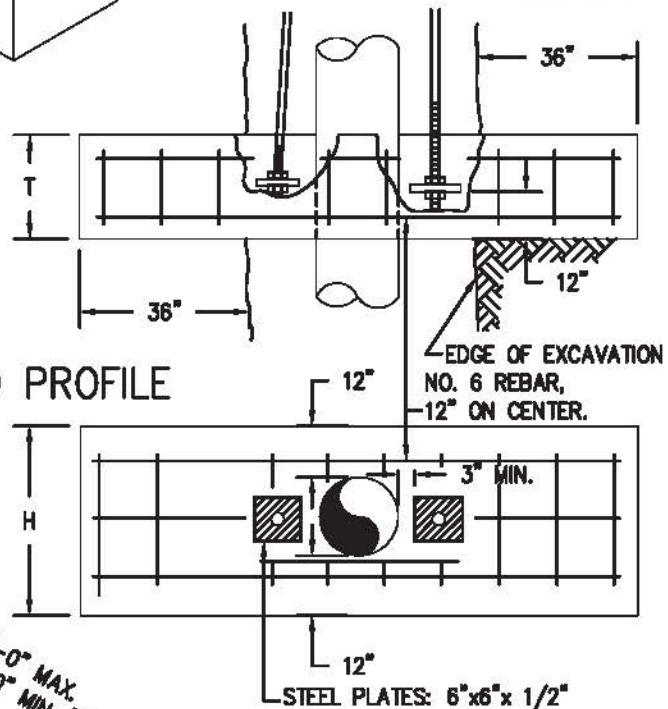


DEAD-END REVERSE ANCHOR

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PLAN

POUR A MINIMUM OF 36" BACK INTO NATIVE GROUND.



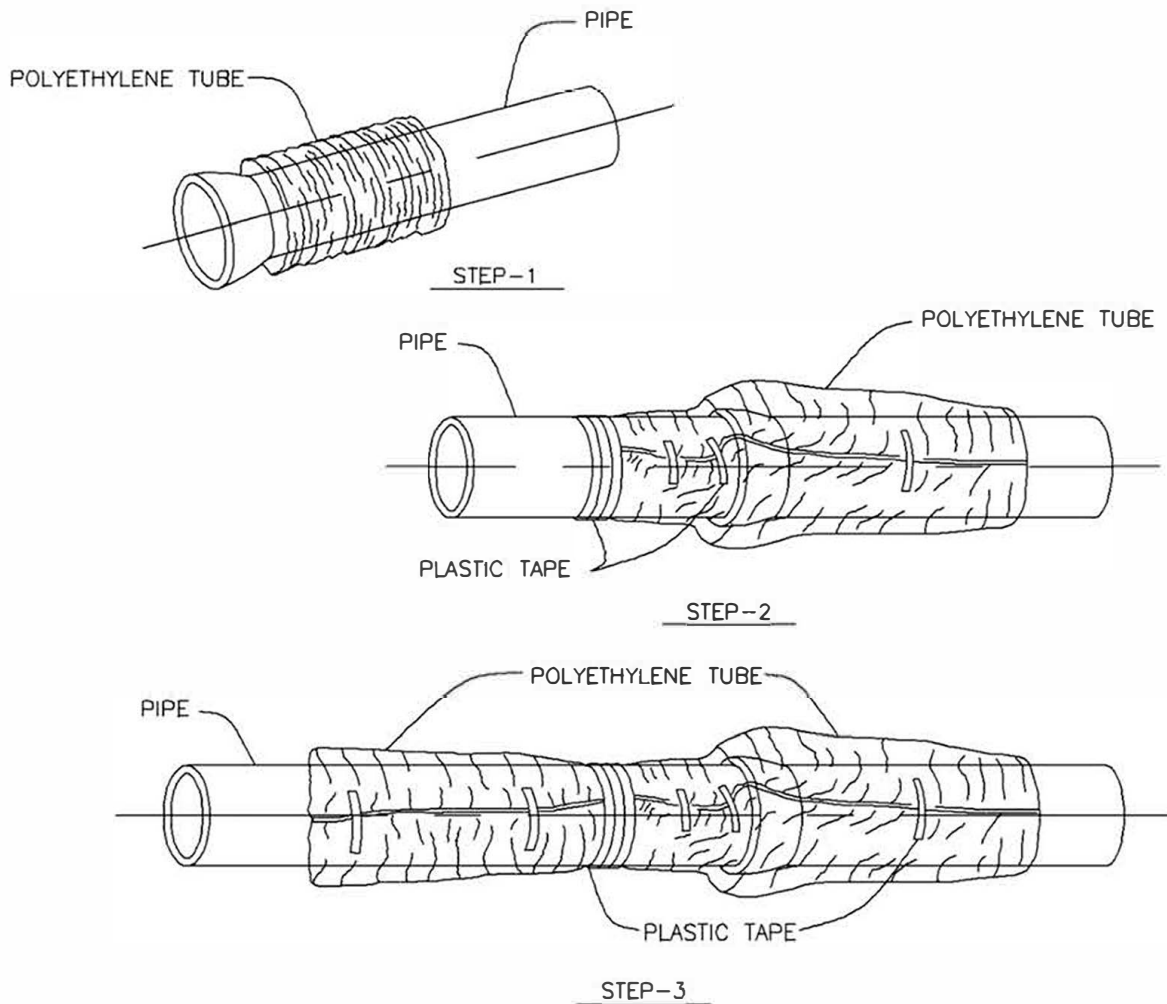
REQUIRED NUMBER OF 3/4" TIE-RODS:

DR 18, 10" AND UNDER: 2
 DR 18, 12" AND OVER: 4
 DR 14, 8" AND UNDER: 2
 DR 14, 10" AND OVER: 4

TIE-RODS SHALL BE STAINLESS STEEL OR PLATED. ALLTHREAD IS ACCEPTABLE.

REVERSE ANCHOR DETAIL

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FIELD INSTALLATION-POLYETHYLENE WRAP

- STEP-1** PLACE TUBE OF POLYETHYLENE MATERIAL AROUND PIPE PRIOR TO LOWERING PIPE INTO TRENCH.
- STEP-2** PULL THE TUBE OVER THE LENGTH OF THE PIPE. TAPE TUBE TO PIPE AT JOINT. FOLD MATERIAL AROUND THE ADJACENT SPIGOT END AND WRAP WITH TAPE TO HOLD THE PLASTIC TUBE IN PLACE.
- STEP-3** OVERLAP FIRST TUBE WITH ADJACENT TUBE AND SECURE WITH PLASTIC ADHESIVE TAPE. THE POLYETHYLENE TUBE MATERIAL COVERING THE PIPE SHALL BE LOOSE. EXCESS MATERIAL SHALL BE NEATLY DRAWN UP AROUND THE PIPE BARREL, FOLDED ON TOP OF THE PIPE AND TAPED IN PLACE.

NOTE: POLYETHYLENE SHALL BE MINIMUM 8-MIL THICKNESS

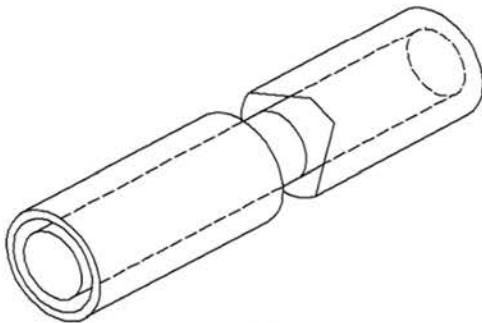
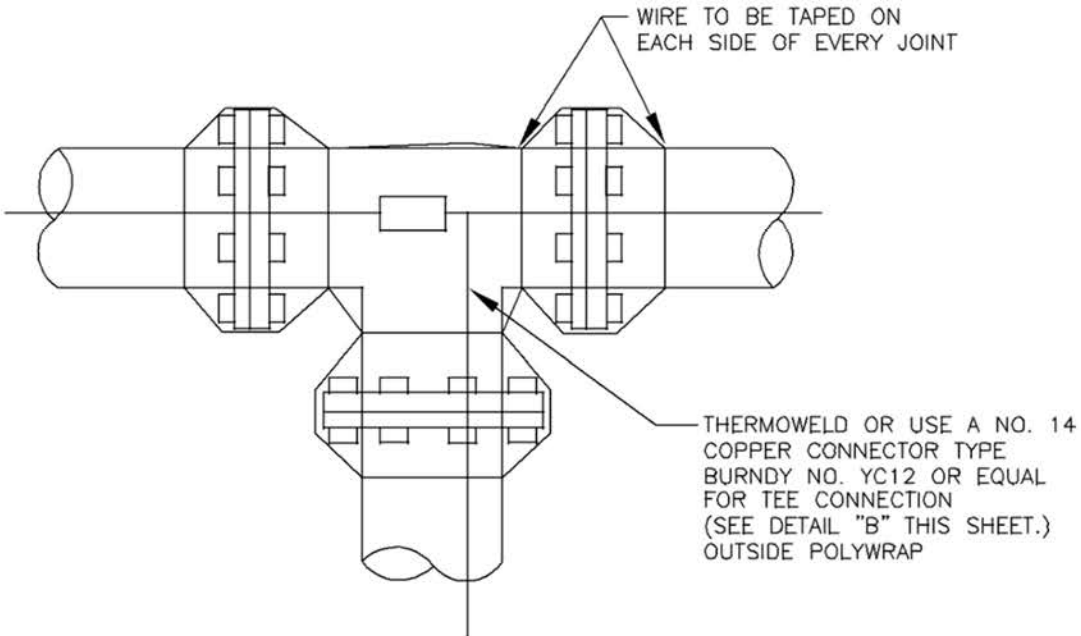
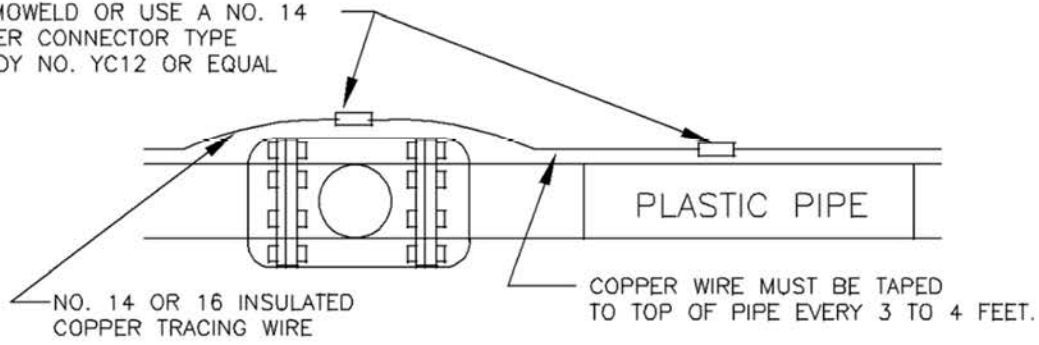
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DIP POLYETHYLENE WRAP
DETAIL

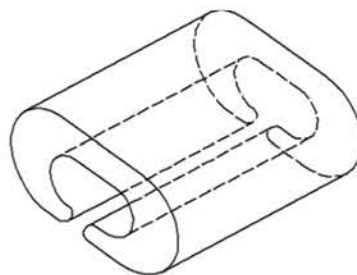
DATE: JULY, 2017

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THERMOWELD OR USE A NO. 14
COPPER CONNECTOR TYPE
BURNDY NO. YC12 OR EQUAL



DETAIL A



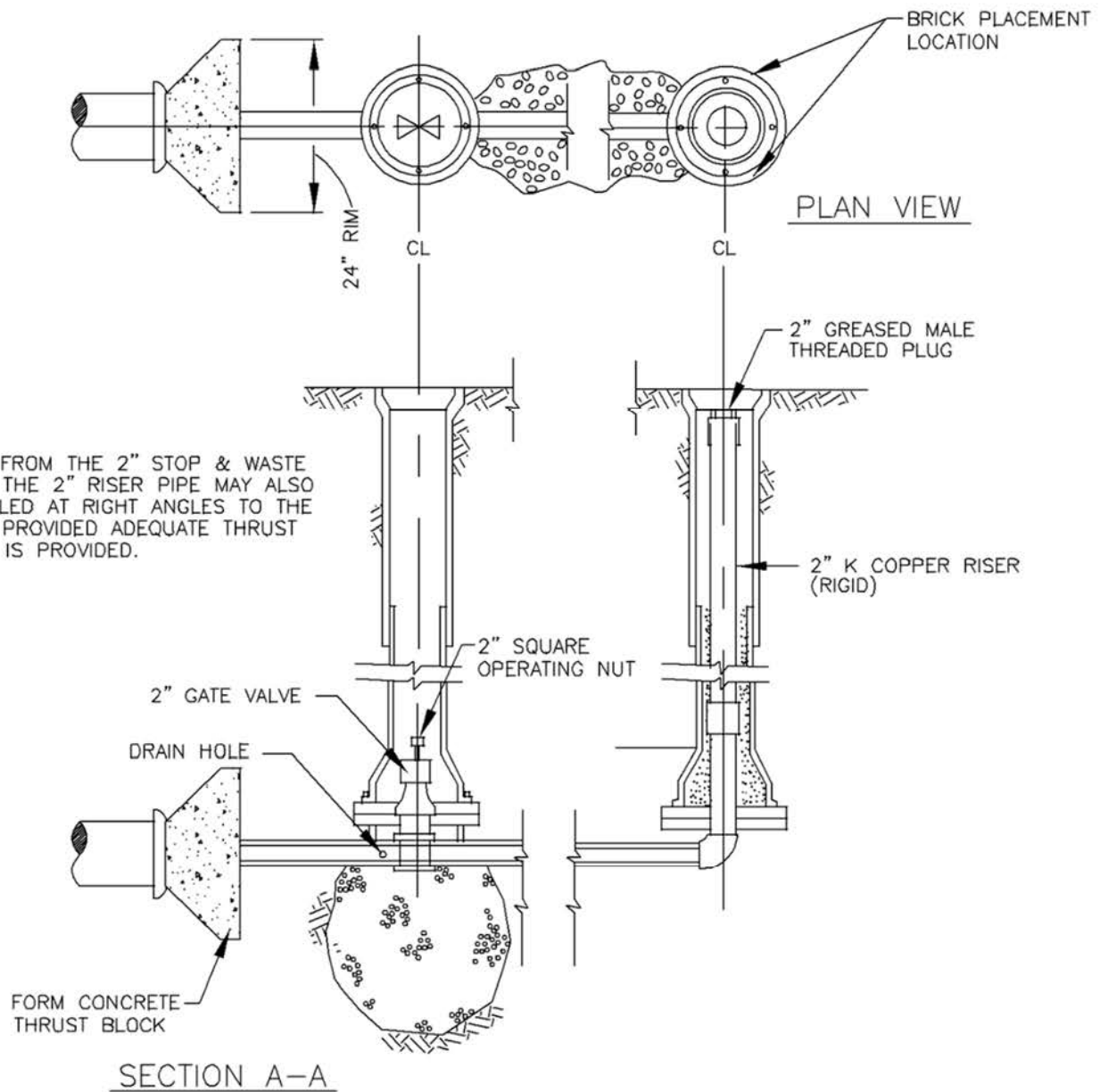
DETAIL B

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PVC PIPE TRACER WIRE DETAILS

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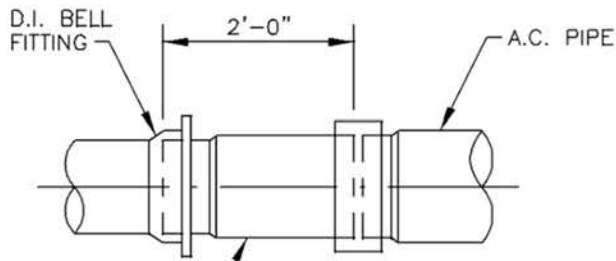


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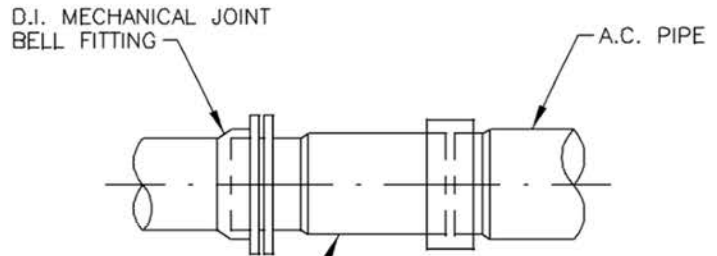
WATER MAIN BLOW OFF DETAIL

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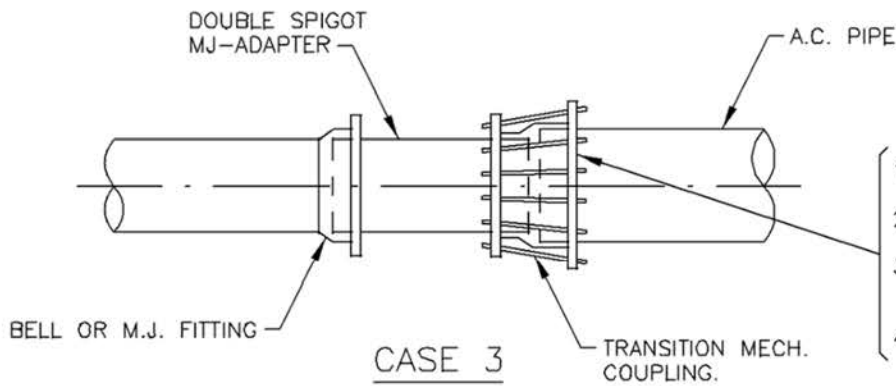
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CASE 1



CASE 2



CASE 3

TYPES OF COUPLINGS

- 1 - ROUGH BARREL TO D.I.
- 2 - MOA TO D.I.
- 3 - ROUGH BARREL TO ROUGH BARREL.
- 4 - MEE TO ROUGH BARREL.

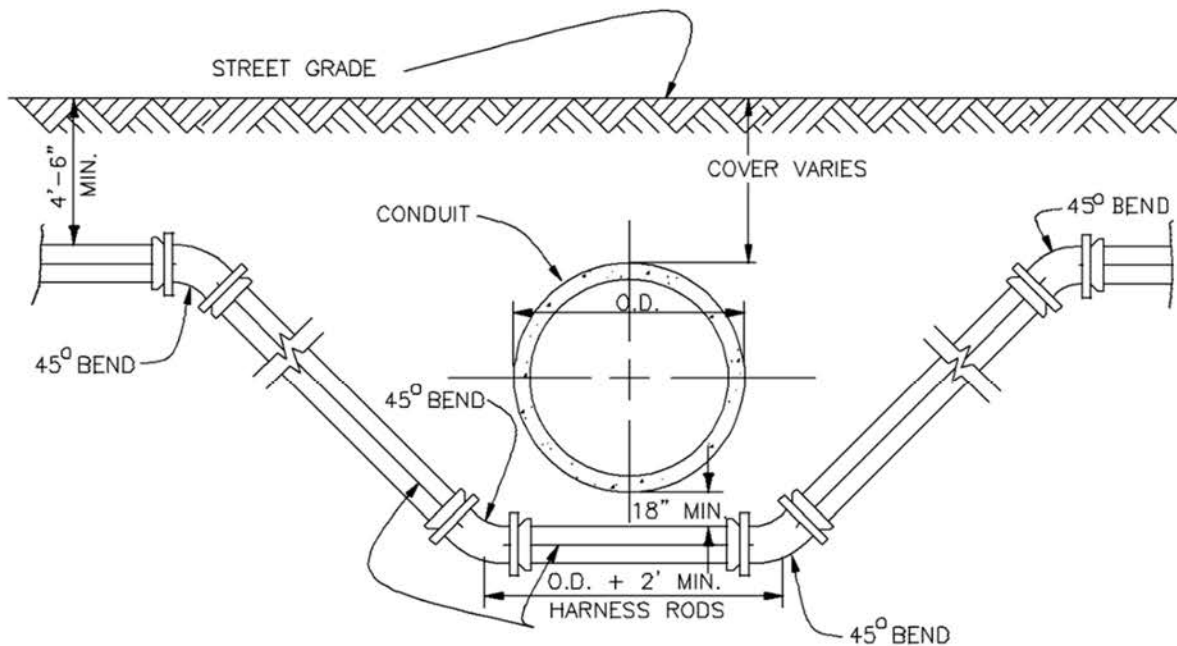
A.C. = ASBESTOS CEMENT
 D.I. = DUCTILE IRON
 MOA = MACHINED OVER ALL.
 MEE = MACHINED EACH END.
 MJ = MECHANICAL JOINT.
 MJ-B = MECHANICAL JOINT-BELL ADAPTER.

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WATER MAIN ADAPTER COUPLING
 DETAILS

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NOTES:

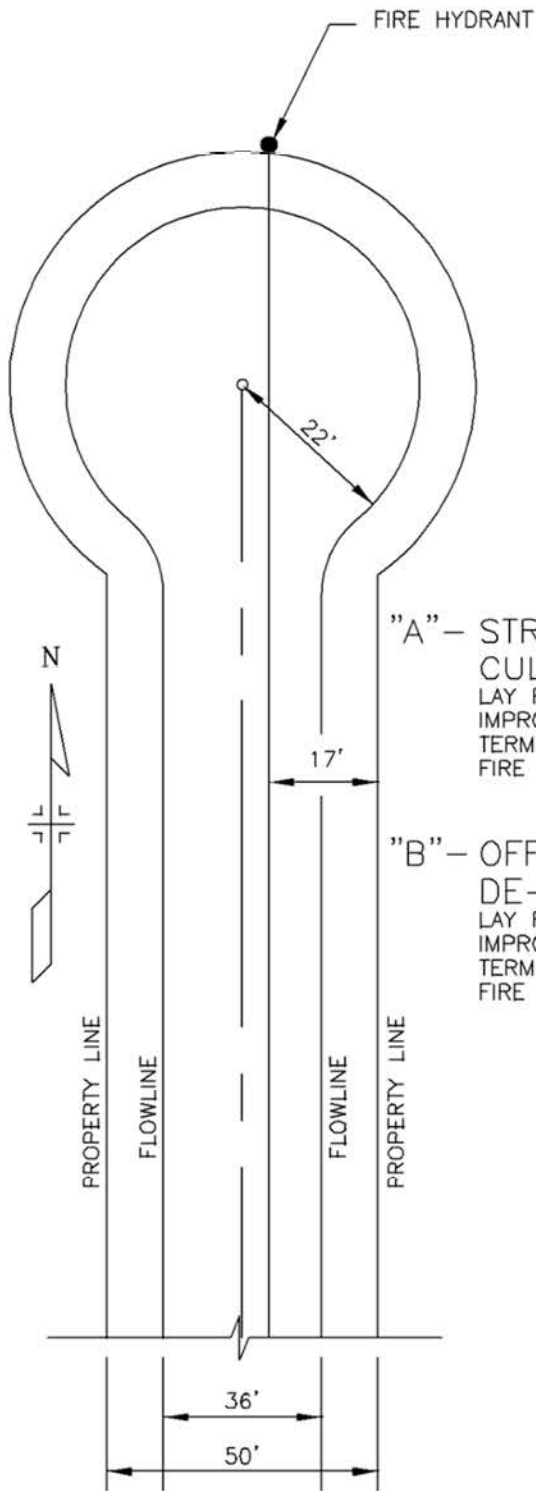
1. SEWER LINES CROSSING ABOVE WATER MAINS SHALL BE DUCTILE IRON PIPE, C900 PVC, OR ENCASED IN CONCRETE 10' EACH SIDE OF CROSSING (MIN.).
2. MINIMUM CLEARANCE 18" AS SHOWN ABOVE.
3. D.I.P. WILL BE WRAPPED.
4. CONDUIT TO BE PROPERLY SUPPORTED.

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WATER MAIN UTILITY CROSSING DETAIL

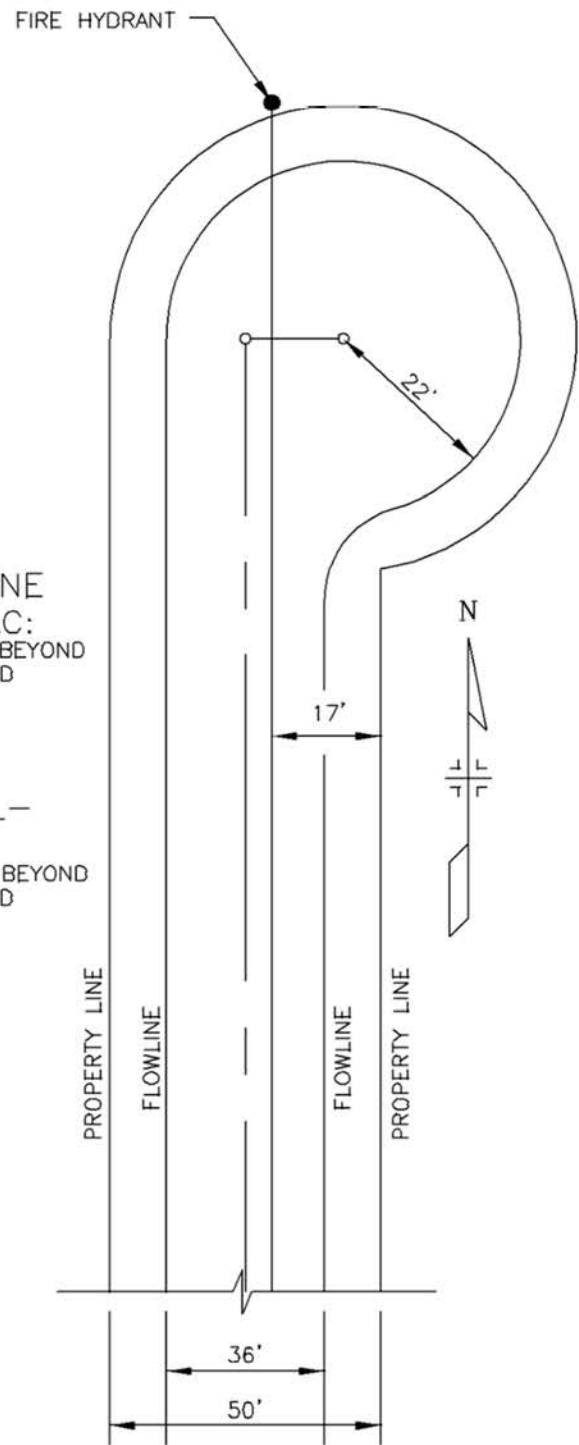
DATE: JULY, 2017

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"A" - STRAIGHT LINE
CUL-DE-SAC:
LAY PIPE TO 18' BEYOND
IMPROVEMENTS AND
TERMINATE IN A
FIRE HYDRANT.

"B" - OFFSET CUL-
DE-SAC:
LAY PIPE TO 18' BEYOND
IMPROVEMENTS AND
TERMINATE IN A
FIRE HYDRANT.

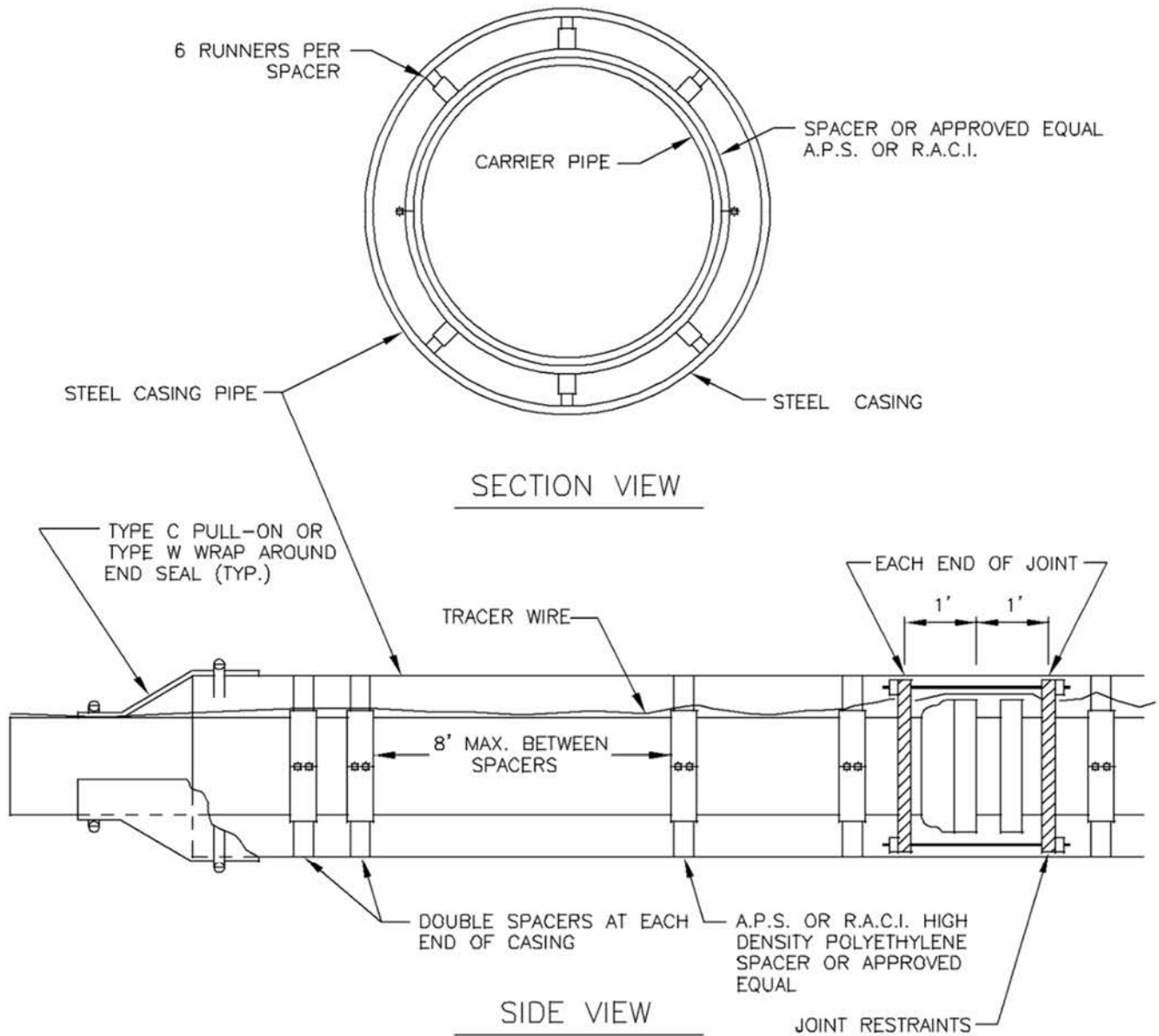


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CUL-DE-SAC WATER MAIN DETAILS

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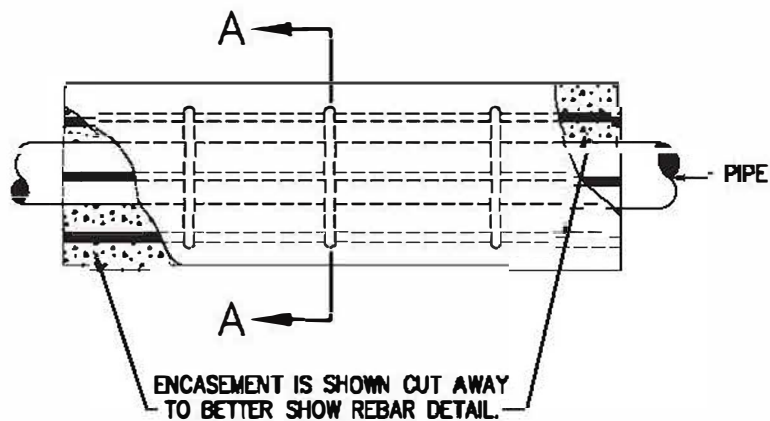
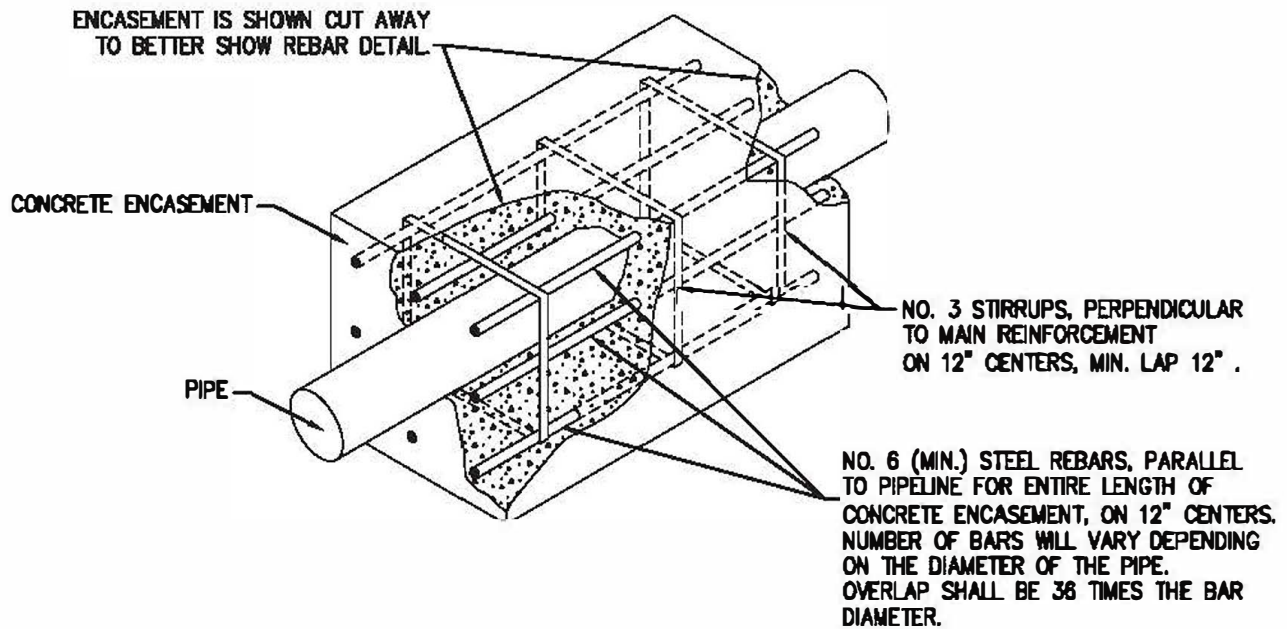


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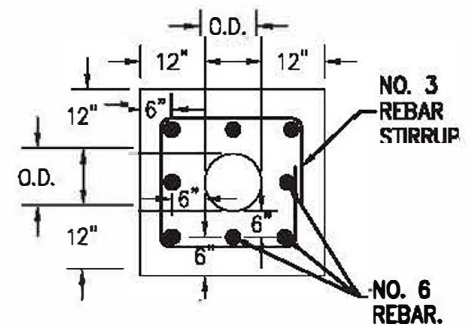
WATER MAIN CASING DETAIL

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PROFILE VIEW



CROSS SECTION A-A

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REINFORCED CONCRETE
ENCASEMENT DETAIL

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