

SECTION 02660 - WATER MAINS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Scope: Furnish and install pipe, fittings, valves, hydrants and appurtenances necessary to complete work shown or specified.
- B. Codes, specifications and standards referred to by title or number in this specification shall be adhered to, and latest revisions shall apply in all cases.
- C. Definitions
 - 1. Abbreviations
 - a. ANSI - American National Standards Institute.
 - b. ASTM - American Society for Testing & Materials.
 - c. AWWA - American Water Works Association.
 - 2. All pipe, fitting and valve sizes and references to pipe diameter on the drawings or in the specifications are intended to be nominal size or diameter and shall be interpreted as such.

1.2 QUALITY ASSURANCE

- A. Mark pipe, fittings, valves and hydrants according to the applicable specification or standard. Each length of pipe shall bear the name or trademark of the manufacturer, the location of the plant, and the date of manufacture. Each length shall likewise be marked to designate the class or strength of the pipe. The marking shall be made on the exterior or interior of the pipe barrel near the bell or groove end and shall be plainly visible. Pipe shall have permanently extruded stripes on three (3) or four (4) sides according to the following schedule:

Water Main: Blue Stripes

- B. The Contractor shall test and disinfect water mains constructed under this Contract, as specified in this Section.
- C. The Town shall collect samples of water from water mains constructed after the piping has been disinfected. The Town will submit the samples to the applicable regulatory agency for bacteriological analysis. Collection and submittal of these samples shall meet the requirements of

the applicable regulatory agency. If samples do not pass the requirements of the bacteriological analysis, the water main will be disinfected and sampled again. This procedure will be followed until the samples pass the analysis.

- D. A performance test may be required by the Public Works Director, at any time, for each crew installing water mains. The Contractor shall perform these tests at no additional cost to the Owner. When required by the Public Works Director, the Contractor shall test a given section of water main installed by a given crew. The section shall be a continuous section of water main which can be isolated by valves shown on the drawings. The Contractor shall not install water mains in other sections until the first section has been successfully tested.

PART 2 - PRODUCTS

2.1 GENERAL

All pipe, fittings, valves, hydrants and appurtenances shall be as shown on the drawings or as required by the manufacturer's and ANSI/AWWA specifications. All pipe, fittings, valves, hydrants and appurtenances shall be new and unused.

2.2 BURIED WATER MAIN PIPE AND FITTINGS

A. Ductile Iron Water Mains (3" and Larger)

1. Pipe

- a. Ductile iron pipe shall meet the requirements of ANSI/AWWA C151/A21.51-91. Design and manufacture pipe for the pressure class listed plus 100 psi surge pressure. Additionally, a safety factor of 2.0 and a depth of cover, indicated on the drawings or as required by the manufacturer's and ANSI/AWWA specifications, shall be included. Minimum thickness class shall be as follows:

<u>Size Range</u>	<u>Pressure Class</u>
4" – 12"	350
14" – 20"	250

- b. Pipe joints shall be push-on type. Joints shall meet the requirements of ANSI/AWWA C111/A21.11. Restrained joints shall be Lok-Ring, Lok-Fast, Lok-Tyte, or equal,

2. Fittings

- a. Fittings shall be ductile iron. Fittings for standard size pipe shall meet the requirements of ANSI/AWWA C110/A21.10-93. Compact or short body fittings 3 inches through 16 inches shall meet the requirements of ANSI/AWWA C153/A21.53-94. Design and manufacture fittings for a pressure rating of at least 150 psi.
 - b. Fitting joints shall be mechanical joints or restrained push-on joints. Joints shall meet the requirements of ANSI/AWWA C111/A21.11. Thrust block all mechanical joints as indicated on the drawings or as required by the manufacturer's and ANSI/AWWA specifications. Pipe connecting to restrained joint fittings shall be restrained as indicated on the drawings or as required by the manufacturer's and ANSI/AWWA specifications.
3. Adapters
- a. Adapters from ductile iron water mains to flange joint valves or fittings shall be ductile iron. Adapters shall meet the requirements of ANSI/AWWA C110/A21.10-93. Design and manufacture adapters for a pressure class rating of 150 psi.
 - b. Adapter ends connecting to ductile iron water mains shall be one of the following: plain end, push-on joint, mechanical joint or restrained push-on joint. Adapters with plain ends, push-on joints or mechanical joints may be used where restrained joints are not required. Adapters shall have restrained push-on joints where restrained joint piping is required, as indicated on the drawings. Mechanical joints and restrained push-on joints shall meet the requirements of ANSI/AWWA C111/A21.11. Restrained joints shall be Lok-Ring, Lok-Fast, Lok-Tyte or as approved by the Public Works Director.
 - c. Adapter ends connecting to flange joint valves or fittings shall have joints complying with the specifications for the applicable valves or fittings.
4. Line the inside surfaces of all pipe, fittings and adapters with single layer cement mortar lining. Cement mortar lining and seal coating shall meet the requirements of ANSI/AWWA C104/A21.4-95. Coat the outside surfaces of all pipe, fittings and adapters with a bituminous coating, complying with ANSI/AWWA C151.
5. Gaskets for mechanical joints and push-on joints shall meet the requirements of ANSI/AWWA C111/A21.11.
6. Nuts and Bolts

- a. Nuts and bolts for mechanical joints shall be high strength, heat treated, alloy steel. Nuts shall be hexagon nuts, bolts shall be tee head bolts. Nuts and bolts shall meet the requirements of ANSI/AWWA C111/A21.11.
 - b. Nuts and bolts for restrained push-on joints shall meet the requirements of the joint manufacturer.
 7. Polyethylene encasement for ductile iron water mains shall be installed and shall meet the requirements of ANSI/AWWA C105/A21.5. Installation of the polyethylene encasement shall be omitted if written approval is made by the ductile iron pipe manufacturer and/or the Public Works Director.
Contractor/Developer shall be required to provide soils testing results for corrosivity at no additional charge to the Town if omission of the polyethylene encasement is proposed.
- B. Polyvinyl Chloride Water Mains (3" to 8")
1. Pipe
 - a. Polyvinyl chloride pipe shall meet the requirements of ANSI/AWWA C900, Class 150/DR18. Design and manufacture pipe for a working pressure of 150 psi plus 100 psi surge pressure. Additionally, a safety factor of 2.0 and a depth of cover, indicated on the drawings or as required by the manufacturer's and ANSI/AWWA specifications, shall be included.
 - b. Polyvinyl chloride pipe shall have ductile-iron-pipe-equivalent outside diameter.
 - c. Pipe joints shall be push-on type and meet the requirements of ANSI/AWWA C900. Do not use solvent-cement joints.
 2. Fittings
 - a. Fittings shall be ductile iron and meet the requirements of ANSI/AWWA C110/A21.10. Design and manufacture fittings for a pressure rating of 150 psi.
 - b. Line the inside surfaces of fittings with cement mortar lining and bituminous seal coating shall meet the requirements of ANSI/AWWA C104/A21.4. Coat outside surfaces of fittings with bituminous coating. Outside coating shall meet the requirements of ANSI/AWWA C110/A21.10.

- c. Fitting joints shall be mechanical joints. Mechanical joints shall meet the requirements of ANSI/AWWA C111/A21.11.
 - d. Mark each fitting. Marking shall meet the requirements of ANSI/AWWA C110/A21.10.
3. Adapters
- a. Adapters from polyvinyl chloride water mains to victaulic, flange joint valves or fittings shall be ductile iron. Adapters shall meet the requirements of ANSI/AWWA C110/A21.10. Design and manufacture adapters for a pressure rating of 150 psi.
 - b. Line the inside surfaces of adapters with a single cement mortar lining. Cement mortar lining and seal coating shall meet the requirements of ANSI/AWWA C104/A21.4. Coat outside surfaces of adapters with bituminous coating, complying with ANSI/AWWA C110/A21.10.
 - c. Adapter ends connecting to polyvinyl chloride water mains shall have plain ends or mechanical joints. Mechanical joints shall meet the requirements of ANSI/AWWA C111/A21.11.
 - d. Adapter ends connecting to victaulic, flange joint valves or fittings shall have joints complying with the specifications for the applicable valves or fittings.
4. Gaskets
- a. Gaskets for polyvinyl chloride push-on joints shall meet the requirements of ANSI/AWWA C900.
 - b. Gaskets for mechanical joints shall meet the requirements of ANSI/AWWA C111/A21.11 and ASTM F477.
5. Nuts and bolts for mechanical joints shall be high strength, heat treated, alloy steel. Nuts shall be hexagon nuts, and bolts shall be tee head bolts. Nuts and bolts shall meet the requirements of ANSI/AWWA C111/A21.11.

C. High-density polyethylene (HDPE) for Water Mains (3" or larger)

- 1. Pipes: Polyethylene piping and fittings shall be made of a high density polyethylene pipe compound with extra high molecular weight that meets the requirements for Type III, Grade P345 Polyethylene Material as defined in ASTM D-1248 (PE 3408). The minimum pressure class/SDR rating acceptable shall be Class 160/SDR 11. The pipe shall be DIPS and shall have an interior diameter no less than the

pipings that it is connected to.

2. Joints: Joints shall be of a heat fusion joining system. Pipe and fittings shall be thermal butt fusion, saddle fusion, or socket fusion in accordance with manufacturer recommended procedures and ASTM D-2161. At the point of fusion, the outside diameter and minimum wall thickness of the fitting shall match the outside diameter and minimum wall thickness specifications of ASTM D-1248 for the same size pipe.

Joining of the pipes and fittings shall be performed in accordance with ASTM D-2774. Depending upon the installation requirements and site location, joining shall be performed within or outside the excavation. Joints of the pipe sections shall be smooth on the inside and internal projection beads shall not be greater than 3/16 inch.

The tensile strength at yield of the butt-fusion joints shall not be less than the pipe. A specimen of the pipe cut across the butt-fusion joints shall be tested in accordance with ASTM D-638

The manufacturer shall provide fusion training. The contractor and the onsite joint inspector shall be trained by the manufacturer or manufacturer's authorized representative.

The fusion equipment and operator shall be required to demonstrate successful field experience. Regarding fusion over 36" capability, the fusion unit shall be field tested for a period of five years and the fusion operator shall have pipe size experience of the same size pipe on this project for five years or longer.

3. Fittings: All fitting shall be provided as indicated on the plans. HDPE Fittings shall be of the same material and class as the pipe and shall be manufactured by the manufacturer of the pipe. HDPE Elbows, tees, and wyes shall be manufactured by mitered fabrication. The manufacturer shall have a written specification for all standard mitered fittings, which establishes Quality Control criteria and tolerances. The manufacturer may be required to demonstrate its ability to produce product required by this specification.

Mechanical joint anchor fittings (MJ Adapter or Harvey Adapter) shall be used to transition from ductile iron to HDPE and from HDPE to PVC. The fitting shall be stronger than the pipe in that when it is subjected to tensile stress the pipe will pull apart before the fitting will pull out and the pipe will blow before the fitting will rupture under pressure.

All pressure rated fittings shall be rated according to the manufacturer's written specifications, and clearly labeled on the fittings as such.

2.3 PIPE AND FITTINGS SMALLER THAN 3-INCH

- A. Pipe shall be Type K drawn copper and shall meet the requirements of ASTM B88. Cooper pipe must be used for all piping to the meter pit.
- B. Fittings and couplings shall be cast bronze and shall meet the requirements of ASTM B16.18. Construct and manufacture fittings and couplings for a pressure rating of 150 psi.
- C. Unions shall be bronze and shall meet the requirements of ASTM B16.18. Design and manufacture unions for a pressure rating of 150 psi.
- D. Flanges for connection of screwed joint pipe to flange joint valves or fittings shall be 125-16 cast iron, screwed companion flanges, complying with both ASTM A126 and ANSI B16.1.
- E. Tape for screwed joints shall be teflon.
- F. Gaskets for flange joints shall be 1/16-inch thick, full face and conform to ANSI/AWWA C111/A21.11. Gaskets shall be rubber or as approved by the Public Works Director.
- G. Bolts for flange joints shall be steel, heavy hexagon head machine bolts. Nuts shall be steel, semi-finished, heavy hexagon nuts. Nuts and bolts shall meet the requirements of ASTM A307 for Grade B and be zinc-coated alloy steel.

2.4 VALVES

- A. Butterfly Valves
 - 1. Butterfly valves and operators shall meet the requirements of AWWA Standard C504. Valves and operators shall be Class 150B.
 - 2. Buried butterfly valves shall have mechanical joints. Mechanical joints shall meet the requirements of AWWA C111. Butterfly valves installed above ground or in structures shall have flange joints as specified in AWWA Standard C504. Nuts, bolts, and gaskets for flange joints shall meet the requirements of ANSI/AWWA C110/A21.10. Nuts and bolts shall be cadmium plated. Gaskets shall be full face and shall be red rubber, or equal.

3. Each buried butterfly valve shall have a manual operator and a 2-inch operating nut. Valve opening direction shall be consistent with operation of existing valves in the waterworks in which the valves are installed, unless otherwise directed by the Engineer.
4. Each butterfly valve installed above ground or in a structure shall have a manual operator and handwheel.

B. Gate Valves

1. Buried gate valves 4-inches and larger shall be full ductile iron body, epoxy fusion bonded inside and out, non-rising stem gate valves. Valves shall meet the requirements of ANSI/AWWA C500 or C509 and have mechanical joint ends. Mechanical joints and joint accessories shall comply with ANSI/AWWA C111/A21.11. Valve opening direction shall be consistent with operation of existing valves in the waterworks where the valves are installed, unless otherwise directed by the Public Works Director.
2. Three-inch buried gate valves shall be full ductile iron body, epoxy fusion bonded inside and out, non-rising stem gate valves. Valves shall meet the requirements of ANSI/AWWA C500 or C509; except, ends shall be screwed. Screwed ends shall conform to ANSI B16.3. Valve opening direction shall be consistent with operation of existing valves in the waterworks where the valves are installed, unless otherwise directed by the Public Works Director.
3. Gate valves 4-inches and larger installed above ground or in structures shall be full ductile iron body, epoxy fusion bonded inside and out, outside screw and yoke gate valves. Valves shall correspond to ANSI/AWWA C500 or C509. Outside screw and yoke gate valves shall have flange joint ends and malleable iron handwheels. Flange joints and accessories shall be as specified in ANSI/AWWA C110/A21.10. Nuts and bolts shall be zinc-coated alloy steel. Gaskets shall be full face and rubber, or as approved by the Public Works Director.
4. Gate valves smaller than 4-inch installed above ground or in structures shall be bronze, 125 lb. S.W.P. double disc, screwed-in bonnet, rising stem, inside screw gate valves with screwed ends and malleable iron handwheels. Valves shall meet the requirements of federal specifications WASTEWATER-V-54d for Class A, Type III Valves.

- C. Buried valves 2-inch and smaller shall be curb stops. Curb stops shall meet the applicable requirements of ANSI/AWWA C800, ASTM B-62 for 85-5-5-5 composition bronze, and USAS B2.1. Curb stops shall be Mueller H-10283, Ford B11 Series, or as approved by the Public Works Director.

D. Tapping Valves

1. Tapping valves shall comply with both ANSI/AWWA C500 or C509 and have flange mechanical joint ends. Double disc gate valve gates, gate rings and body-seat rings shall be oversized to permit entry and exit of tapping machine cutters.
2. Valve end connecting to tapping sleeve shall have a flange for bolting to the sleeve. The flange shall have a tongue which fits a recess in the sleeve. Tongues shall meet the requirements of MSS SP-60. Resilient seated gate valves having a port diameter equal to or exceeding 1/4 inch over nominal diameter shall not require a tongue. Flange dimensions and drilling shall meet the requirements of ANSI B16.1. Nuts, bolts, and gaskets for flange joints shall meet the requirements of ANSI/AWWA C110/A21.10-93. Nuts and bolts shall be zinc-coated alloy steel, and gaskets shall be rubber, or as approved by the Public Works Director. Mechanical joints and accessories shall meet the requirements of ANSI/AWWA C111/A21.11. A full nominal diameter cutter shall be used for tapping.
Tapping valves 14-inch and smaller shall be installed vertically. Tapping valves 16-inch and larger shall be installed horizontally and shall have bypass valves. Tapping valves installed horizontally shall have rollers and tracks. Valves 16-inch and larger shall have gear operators with enclosed gear cases suitable for buried service. Gear cases shall be extended type or totally enclosed type. Extended type gear cases shall have bolted side plates to cover stem and stuffing box.

E. Air and Vacuum Valves: Air and vacuum valves shall be as follows:

<u>Size</u>	<u>Specification</u>
½"	Apco No. 141WD, Val-Matic 100DWS, or equal
1"	Apco No. 142WD, Val-Matic 101DWS, or equal
2"	Apco No. 144WD, Val-Matic 102DWS, or equal
3"	Apco No. 146WD, Val-Matic 103DWS, or equal
4"	Apco No. 1604/152, Val-Matic 104DWS, or equal
6"	Apco No. 1606/153, Val-Matic 106DWS, or equal

2.5 VALVE BOXES

- A. Valve boxes for butterfly valves and gate valves shall be cast iron. Valve boxes shall be two piece or three piece type. Each two piece box shall be complete with bottom section, top section and cover. Each three piece box shall be complete with base, center section, top section and cover. Valve boxes shall be extension type with slide or screw type adjustment.

Each base and bottom section shall be the proper size for the valve served. Each valve box assembly shall be the proper length for the valve served. The minimum thickness of metal shall be 3/16-inch. Cast the word "WATER" in each valve box cover.

2.6 FIRE HYDRANTS

- A. Fire hydrants shall be dry-barrel, compression shutoff, traffic model and comply with AWWA C502. Main valve size shall be 5-1/4 inch. Inlets shall be 6-inch mechanical joint. Each hydrant shall have two 2-1/2-inch nozzles and one 5-inch Storz pumper nozzle. Nozzle threads and hydrant opening direction shall be consistent with existing fire hydrants in the waterworks in which the fire hydrants are installed, unless otherwise directed by the Public Works Director. Each hydrant shall be the proper length for the water main to which the hydrant is connected. Fire hydrant coating shall meet the requirements of AWWA C502. Fire hydrants shall be MAB Fire Protection Red (7068), within the Westfield Washington Fire Department jurisdiction or MAB Caution Yellow (7077), within the Noblesville Fire Department jurisdiction. Hydrants shall be Model No. A423, as manufactured by Mueller Company.

- B. Fire Hydrant Placement – Fire Hydrants shall be placed no farther apart than 300 feet in all residential subdivisions, subdivision sections, and other residential areas in which dwelling density meets or exceeds three dwelling units per gross acre. Fire hydrants shall be placed no further apart than 300 feet in all Industrial, Business, and Commercial areas, and all Industrial, Business, and Commercial uses. Such requirement shall be in full force and effect unless explicitly exempted by the Chief of the local fire department. For residential uses with densities less than three dwelling units per gross acre, the requirements as established in Table No. III-B-A of the Uniform Fire Code shall apply. Where there is any ambiguity or dispute concerning the interpretation of this requirement, the decision of the Chief of the local fire department shall prevail subject to appeal.

2.7 SPRINKLER SYSTEMS

Multi-family developments, duplexes, and hotels/motels shall be required to have sprinkler systems installed in the attics of said structure as approved by the Chief of the local fire department. Such requirement shall be in full force and effect unless explicitly exempted by the Chief of the local fire department. Where there is any ambiguity or dispute concerning the interpretation of this requirement, the decision of the Chief of the local fire department shall prevail subject to approval.

2.8 TAPPING SLEEVES

- A. Tapping sleeves shall be stainless steel split sleeves. Each sleeve shall have a branch connection with a flange end. The inside diameter of each branch shall be over-sized to permit entry and exit of tapping machine cutters. Each flange shall have a recess to center a tapping valve. Recesses shall meet the requirements of MSS SP-60. Flange dimensions and drilling shall meet the requirements of ANSI B16.1. The sleeve dimensions shall be such that the sleeves will not leak when installed on cast iron, ductile iron, or polyvinyl chloride pipe with outside diameters shown in ANSI/AWWA Standards.
- B. Tapping sleeves for 4-inch through 16-inch pipe shall be mechanical joint type. Design and manufacture tapping sleeves for a working pressure of 200 psi.
- C. Tapping sleeves for 18-inch and larger pipe shall be mechanical joint type. Design and manufacture tapping sleeves for a working pressure of 150 psi.

2.9 TAPPING SADDLES

- A. Design and manufacture tapping saddles for a working pressure of 200 psi. Saddle bodies shall be stainless steel. Saddle straps shall be corrosion resistant steel alloy. Saddle gaskets shall be positively confined O-ring gasket. The sleeve dimensions shall be such that the sleeves will not leak when installed on cast iron, ductile iron, or polyvinyl chloride pipe with outside diameter shown in ANSI/AWWA Standards.
- B. Each saddle used for making a wet connection shall have a branch connection with a flange end. The inside diameter of each branch shall be oversized to permit entry and exist of tapping machine cutters. Each flange shall have a recess to center a tapping valve. Recesses shall meet the requirements of MSS SP-60. Flange dimensions and drilling shall meet the requirements of ANSI B16.1.
- C. Each saddle used for making a dry connection shall have a branch connection with a flange or mechanical joint end. Flange dimensions and drilling shall meet the requirements of ANSI B16.1. Nuts and bolts for flange joints shall meet the requirements of ANSI/AWWA C110/A21.10 and be zinc-coated alloy steel. Gaskets shall comply with ANSI/AWWA C110/A21.10, be full face and rubber, or as approved by the Public Works Director. Mechanical joints and accessories shall meet the requirements of ANSI/AWWA C111/A21.11.
- D. Gaskets used to seal joints between saddle bodies and tapped pipes shall be O-ring type, circular in cross section, and made of natural or synthetic rubber with a Durometer Hardness of 70 ± 5 .

2.10 FLANGE-MECHANICAL JOINT ADAPTERS

Flange-mechanical joint adapters shall be Dresser Style 127, Smith-Blair Type 912 or as approved by the Public Works Director.

2.11 AIR AND VACUUM VALVE CHAMBERS

- A. Air and vacuum valve chambers shall be 4-foot diameter precast concrete manhole barrels with precast concrete flat slab tops. Precast manhole barrels shall meet the requirements of ASTM C478.
- B. Air and vacuum valve chamber access frames and cover shall be Neenah R-1915-G, or equal. Cast the word "WATER" in each cover.

2.12 WATER SERVICES

- A. Pipe shall be seamless copper tubing and shall meet the requirements of ASTM B88, Type "K."
- B. Fittings and Couplings: Couplings for copper tubing shall be copper to copper or copper to iron, as required, and shall meet the applicable requirements of AWWA C800, ASTM B-62 for 85-5-5-5 composition bronze, and ANSI B2.1. Fittings and couplings shall be Ford Products, Pack Type Compression Joints, or equal.
- C. Service connections made to a PVC water main shall be made using a stainless steel saddle with a corporation stop.

PART 3 - EXECUTION

3.1 INSPECTION

Inspect water main pipe, fittings, valves, hydrants, and appurtenances prior to installation. Promptly remove damaged or unsuitable products from the job site. Replace damaged or unsuitable products with undamaged and suitable products.

3.2 LAYING OF WATER MAINS

- A. Proper tools and facilities shall be provided and used by the Contractor for safe working conditions.
- B. Lay and maintain pipe to the lines and grades shown on the drawings or to the minimum depth specified in this Article. Install fittings, valves and hydrants in the locations shown on the drawings.

- C. When the exact location of buried utilities is unknown and piping is to be constructed parallel and close to said utilities, adjust the alignment of the piping to least interfere with these utilities. This applies unless otherwise shown on the drawings or specified by the Public Works Director.
- D. All crossings of water mains and sanitary sewers or storm sewers must be in accordance with 327 IAC 8-3.2-9. Water mains shall be laid at least 10 feet horizontally from any existing sanitary sewer, sewage force main, or storm sewer. The distance shall be measured from outside edge of water main to outside edge of the sanitary sewer or storm sewer. Water mains crossing sanitary sewer, sewage force mains, or storm sewer shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sanitary sewer, force main, or storm sewer. The 18-inch separation shall apply whether the water main is over or under the sewer or force main. Lay water mains at crossings of sewers and force mains so a full length of water main pipe is centered on the sewer or force main whenever possible.
- E. No watermains shall be within eight (8) feet of a sanitary sewer manhole, a storm sewer manhole, or a drainage grate support structure as measured from the outside edge of the water main to the outside edge of the sanitary sewer manhole, storm sewer manhole, or drainage grate support structure, per 327 IAC 8-3.2-9.e.
- F. All piping shall be laid at a depth that provides at least 4'-6" of cover. Cover shall be measured as the vertical distance from the top of the pipe to the finish grade elevation.
- G. Laying of water mains shall meet the requirements of ANSI/AWWA C600, unless otherwise specified in this Section.
- H. Shape the bottom of the trench to give uniform circumferential support of the lower quarter of each pipe.
- I. Do not lay pipe in water or when the trench or weather conditions are unsuitable for proper installation.
- J. As each length of pipe is placed in a trench, joint the pipe being laid to the previously laid pipe. Bring the pipe to correct line and grade. Secure the pipe in place with bedding tamped under the pipe. Tamp bedding up to the centerline of the pipe.
- K. Deflection from a straight line or grade shall not exceed the limits specified in this Section. If the alignment requires joint deflections in excess of the allowable deflection per joint, furnish and install fittings or a sufficient number of shorter lengths of pipe.

- L. Provide thrust restraint at horizontal and vertical deflection fittings and at tees, plugs, tapping sleeves and tapping saddles. Restraint shall be concrete thrust blocking or restrained joint piping.
- M. Where concrete thrust blocking is used, cover the fitting to be blocked with visqueen or a heavy duty grease to prevent adherence of the concrete to the fitting.
- N. Block the open end of the pipe at the close of each day's work to prevent contamination from dirt or rain water and entry of any animal or foreign material.
- O. Lower pipe, fittings, valves and hydrants into the trench by hand, hoists or ropes or other suitable tools or equipment that will not damage products, coatings or linings. Do not drop or dump pipe, fittings, valves, or hydrants into the trench.
- P. Water main designs that require crossing a county legal drain shall be approved and constructed per the latest standards of the Hamilton County Surveyor's Office.

3.3 SETTING VALVES, VALVE BOXES AND FIRE HYDRANTS

- A. Clean the interiors of valves and hydrants of foreign matter before installation. Tighten stuffing boxes. Inspect valves and hydrants in opened and closed positions to ensure all parts are in working condition.
- B. Set valves and valve boxes plumb. Center valve boxes on the valves or valve operators. Locate valves outside the area of roads and streets where feasible. Tamp backfill around each valve box to a distance of 4 feet on all sides of the box or to the undisturbed trench face if less than 4 feet.
- C. Set hydrants plumb with the pumper nozzle facing the street. The centerline of the outlet nozzles shall be at least 18 inches or at most 30 inches above finished grade at a hydrant. Install hydrant extensions where required to bring hydrant to proper elevation. Set each hydrant upon a slab of stone or concrete not less than 4 inches thick and 15 inches square. Wedge the side of each hydrant opposite the pipe connection against the undisturbed trench face to prevent the hydrant from blowing off the branch connection. Compact the backfill around each hydrant to finish grade. Furnish and install a gate valve and valve box in each hydrant branch connection. In the field, (Westfield) apply two coats of MAB Fire Protection Red (7068), (Noblesville) MAB Caution Yellow (7077) to the fire hydrants installed. All installed hydrants meeting the requirement of Section 2660; Para. 2.6 (a), shall be painted by the contractor either MAB

Fire Protection Red (7068), within the Westfield Washington Fire Department jurisdiction or MAB Caution Yellow (7077), within the Noblesville Fire Department jurisdiction. A three (3) foot clear space shall be maintained around the circumference of fire hydrants except as otherwise required or approved.

- D. All inline water valve box caps should be painted blue. All hydrant valve caps should be painted MAB Fire Protection Red (7068).

3.4 CONNECTING TO EXISTING MAINS

- A. The Contractor shall locate and verify exact size of all existing mains, both horizontally and vertically. Additionally, allow adequate time, after location and prior to making new connections, for changes in the connection location and size. Backfill excavation immediately after main is located and measured.
- B. Make each wet connection with a tapping valve and tapping sleeve. Install and hydrostatically test each tapping valve and tapping sleeve assembly prior to tapping existing water main. Inspect each tapping valve prior to tapping existing water main. Open and close tapping valves, and inspect tapping valves in opened and closed positions to ensure all parts are in working condition. Inspect each tapping valve immediately before connecting tapping machine to ensure the tapping valve is open. Install watertight plug on the tapping valve outlet and backfill excavation if existing water main is not tapped within 48 hours after installing tapping valve and tapping sleeve or tapping saddle assembly. Install watertight plug on the tapping valve outlet and backfill excavation if new water main is not connected to tapping valve within 48 hours after making tap in existing water main.
- C. Make each dry connection with fittings and valves indicated on the drawings. Furnish and install sleeves required to complete connections. All required pipe, fittings, valves, tools, and equipment shall be at the connection site prior to starting connection. Wash interior of new pipe, fittings, and valves with a solution containing 50 mg/l of chlorine prior to making connection. Make connections at night and on weekends when required. The Owner will operate existing valves. Install sufficient water main and restrain joints so existing water mains can be up in service immediately after connection is completed. Inspect joints and eliminate leaks immediately after connection is completed and existing mains are put in service. Install watertight plugs on open ends of pipe and valves, and backfill excavation if new water main is not connected to dry connection within 48 hours after completing dry connection.

3.5 JOINTING

A. Ductile Iron Push-on Joints

1. Pipe must be cleaned and installed as specified by the manufacturer and ANSI/AWWA C600 requirements. Additionally, all lumps, blisters, excess bituminous coating and foreign material must be removed from the bell and spigot end of each pipe.
2. For restrained push-on joints, move the loose retainer ring into position against the retainer bar on the spigot end of the pipe being installed. Loosely assemble the joint bolts and nuts.
3. Deflect pipe after jointing, if deflection is required. The amount of deflection shall not exceed the limits shown in the following table:

<u>Pipe Size</u>	<u>Maximum Deflection Angle</u>	<u>Maximum Deflection Based Upon 18-Foot Pipe Length</u>
4"	5°	18-1/2"
6"	5°	18-1/2"
8"	5°	18-1/2"
10"	5°	18-1/2"
12"	5°	18-1/2"

4. For restrained push-on joints, pull the nuts to a uniform tightness by hand or with a short wrench. Do not pull the spigot of the pipe being installed against the back of the bell of the receiving pipe. Engage at least a full nut on each bolt when joint deflection is required.

B. Polyvinyl Chloride Push-on Joints

1. Pipe must be cleaned and installed as specified by the manufacturer's requirements. Additionally, all joints must be free of all foreign material.
2. Deflect the pipe after jointing, if deflection is required. The amount of deflection shall not exceed the limits recommended by the pipe.

C. Mechanical Joints

1. Pipe must be cleaned and installed as specified by the manufacturer and AWWA C600 requirements. Additionally, all

lumps, blisters, excess bituminous coating and foreign material must be removed from the bell and spigot end of each pipe.

2. Evenly tighten the nuts using a torque wrench. The torque shall be within the range listed in the following table:

<u>Pipe Size</u>	<u>Bolt Size</u>	<u>Torque Range</u>
4" thru 24"	3/4"	75 to 90 ft.-lb.

3. Deflect pipe, fittings or valves after jointing, if deflection is required. The amount of deflection shall not exceed the limits shown in the following table:

<u>Pipe Size</u>	<u>Maximum Deflection Angle</u>	<u>Maximum Deflection Based Upon 18-Foot Pipe Length</u>
4"	8° - 18'	31"
6"	7° - 7'	27"
8"	5° - 21'	20"
10"	5° - 21'	20"
12"	5° - 21'	20"
14"	3° - 35'	13-1/2"
16"	3° - 35'	13-1/2"
18"	3° - 0'	11"
20"	3° - 0'	11"
24"	2° - 23'	9"

D. Shouldered Type Joints

1. Pipe must be cleaned and installed as specified by the manufacturer and AWWA C600 requirements. Additionally, all lumps, blisters, excess bituminous coating and foreign material must be removed from the bell and spigot end of each pipe.
2. The tightening torque shall not exceed the limits recommended by the joint manufacturer.
3. Deflect pipe, fittings, adapters or valves after jointing, if deflection is required. The amount of deflection shall not exceed the limits recommended by the joint manufacturer.

E. Threaded Joints

1. Pipe must be cleaned and installed as specified by the manufacturer and AWWA C600 requirements. Additionally, all lumps, blisters, excess bituminous coating and foreign material must be removed from the bell and spigot end of each pipe.

2. Do not overtighten joints.
3. Backing off made-up threaded joints to facilitate fit-up or alignment will not be permitted

F. Flange Joints

1. Pipe must be cleaned and installed as specified by the manufacturer and AWWA C600 requirements. Additionally, all lumps, blisters, excess bituminous coating and foreign material must be removed from the bell and spigot end of each pipe.
2. Do not overtorque nuts and bolts.

3.6 RESTRAINING AND SUPPORTS

A. Thrust Blocking

1. Construct thrust blocks of concrete having a 28-day compressive strength of at least 2,000 psi.
2. Lubricate fitting surfaces to prevent bonding between fittings and thrust blocks.
3. Construct thrust blocks between fittings and undisturbed soil. The area of thrust blocking bearing on undisturbed soil shall be at least the area indicated on the drawings. Construct thrust blocking so pipe and joints are accessible for repair and joint flexibility is not impaired.

B. Restrained joint piping shall be as specified in this Section. Distance from fitting to end of restraint shall not be less than that indicated on the drawings.

C. Mechanical Joint Rod Restraint

1. Mechanical joint rod restraint shall be from fitting to fitting.
2. The number of rods shall conform to the following table:

<u>Pipe Size</u>	<u>Rod Size</u>	<u>Minimum No. of Rods</u>
4"	3/4"	2
6"	3/4"	2
8"	3/4"	4
10"	3/4"	4
12"	3/4"	6
14"	3/4"	6
16"	3/4"	8

18"	3/4"	8
20"	3/4"	10
24"	3/4"	16

D. Pipe Supports

1. Furnish and install supports required to hold pipe, fittings and valves at the lines and grades indicated on the drawings, without causing strain upon pipe, fittings and valves.
2. Support piping by suitable saddle stands, concrete piers or hangers.
3. Locate supports where necessary, at least 8 feet on center.

3.7 AIR AND VACUUM VALVE CHAMBERS

- A. Install air and vacuum valve chambers as indicated on the drawings.
- B. Mortar for joints and plastering shall consist of one part Portland Cement and two parts fine sand. Lime may be added to the mortar used for brick work. Add lime in an amount of not more than 20% of the volume of cement. Complete fill joints between precast chamber sections. Joints shall be smooth and free from surplus mortar on the inside surface of the chamber. Plaster brick at the top of chambers with 1/2-inch of mortar.
- C. Set frames and covers so the top of the cover will be flush with finished grade.
- D. Vent air and vacuum valve outlets to the surface. Terminate vent outlets 3 feet above finished grade. Screen vents to prevent the entrance of insects. Paint air and vacuum valve vents yellow.

3.8 HYDROSTATIC TEST

- A. Hydrostatic tests shall be performed on all water mains installed. The Contractor shall make arrangements with the Town Engineer and/or Town Representative for scheduling each test. Each test shall be performed on the day mutually agreed upon and in the presence of the Town Engineer and/or Town Representative.
- B. The Contractor shall furnish equipment, temporary piping, pumps, fittings, gauges, and operating personnel necessary to conduct the tests. Water for testing may be obtained from the Owner.
- C. The water mains may be tested in sections between valves when there is one or more intermediary valves in a water main.
- D. Test procedures shall meet the requirements of AWWA Standard C600.

- E. Each section of water main shall be complete, and thrust blocks shall have been in place for not less than 10 days prior to being tested.
- F. Expel all air from the water main test section during the filling of the main and prior to the application of test pressure. Tap the water main at high points, if necessary, to release all air from the water main. Plug taps after the test is successfully completed. Plugs shall be watertight.
- G. Test water mains at a static pressure of 150 pounds per square inch over a period of two consecutive hours. The test will be considered successful when the pressure drop over the test period is 5 pounds per square inch or less. If the pressure drop exceeds 5 pounds per square inch, repair leaks and repeat the test until the pressure drop over the test period is 5 pounds per square inch or less.

3.9 FLUSHING

- A. Flush water mains and fire hydrants prior to disinfection. Flush water mains with a flushing velocity of at least 2.5 feet per second. Following are flows required to provide a flushing velocity of 2.5 feet per second:

<u>Pipe Size</u>	<u>Inside Diameter</u>	<u>Flow at a Velocity of 2.5 Feet per Second</u>
½"	0.622"	2.4 gpm
¾"	0.824"	4.2 gpm
1"	1.05"	6.8 gpm
1¼"	1.38"	12 gpm
1½"	1.61"	16 gpm
2"	2.07"	27 gpm
2½"	2.47"	38 gpm
3"	3.07"	58 gpm
4"	4"	98 gpm
6"	6"	220 gpm
8"	8"	390 gpm
10"	10"	620 gpm
12"	12"	880 gpm
14"	14"	1,200 gpm
16"	16"	1,600 gpm
18"	18"	2,000 gpm
20"	20"	2,500 gpm
24"	24"	3,600 gpm

- B. Flush water mains and hydrants until the water discharged is clear.

3.10 DISINFECTION

- A. Disinfect all new and repaired water mains prior to placing them in service. Disinfect pipe, fittings, valves and hydrants with a chlorine solution containing 50 mg/l \pm 5 mg/l of available chlorine.
- B. The chlorinating material shall be calcium hypochlorite . Calcium hypochlorite shall have 70% available chlorine by weight, and sodium hypochlorite shall have 5.25% to 14.7% available chlorine. Placing chlorine tablets in the mains during construction is not an acceptable method of disinfection. The following table shows the quantity of hypochlorite required to produce 50 mg/l of available chlorine per 100 feet of pipe.

Pipe Size	Inside Diameter	Chlorine Gas	Pounds	Ounces
			Cal. Hycl. (70%)	Cal. Hycl. (70%)
½"	0.622"	0.00066	0.0094	0.015
¾"	0.824"	0.0012	0.0017	0.026
1"	1.05"	0.0019	0.0027	0.043
1 ¼"	1.38"	0.0032	0.0046	0.074
1 ½"	1.61"	0.0044	0.0063	0.10
2"	2.07"	0.0073	0.010	0.17
2 ½"	2.47"	0.010	0.015	0.24
3"	3.07"	0.016	0.023	0.37
4"	4"	0.027	0.039	0.62
6"	6"	0.061	0.087	1.4
8"	8"	0.11	0.16	2.5
10"	10"	0.17	0.24	3.9
12"	12"	0.24	0.35	5.6
14"	14"	0.33	0.48	7.6
16"	16"	0.44	0.62	10
18"	18"	0.55	0.79	13
20"	20"	0.68	0.97	16
24"	24"	0.98	1.40	22
30"	30"	1.5	2.2	34
36"	36"	2.2	3.1	50
42"	42"	3.0	4.3	69
48"	48"	3.9	5.6	90
54"	54"	5.0	7.2	110

- C. Tap water mains where required to inject chlorine solution into all pipe, fittings, valves and hydrants installed and repaired. Inject chlorine solution into water mains. Leave the chlorine solution in the water mains for 24 hours or longer. Open and close valves in lines being disinfected several times during contact period. Following the contact period, flush

the water mains with potable water until the chlorine residual is 1.0 mg/l or less.

- D. Bacteriological Tests - The water main shall be tested for bacteriological quality after disinfection and final flushing. Two or more successive sets of bacteriologically satisfactory samples taken at 24-hour intervals must be recorded before the facilities are released for use. Bacteriological testing shall meet the requirements of the applicable regulatory agency. Disinfection shall be repeated if the piping is not bacteriologically acceptable. Repeat disinfection and testing until the mains are approved for service by the applicable regulatory agency.
- E. Hose connections on fire hydrants shall not be used for collecting samples. Contact the applicable regulatory agency for sampling criteria and procedures.
- F. The time for disinfection, bacteriological testing, and approval of the main for service shall be included in the contract time.
- G. The Contractor shall be responsible for disposal of chlorinated disinfection waters. If the water is discharged in an open channel or storm sewer, the Contractor shall dechlorinate the disinfection waters to 0.05 mg/L of total chlorine.

3.11 COMPLETION SCHEDULING

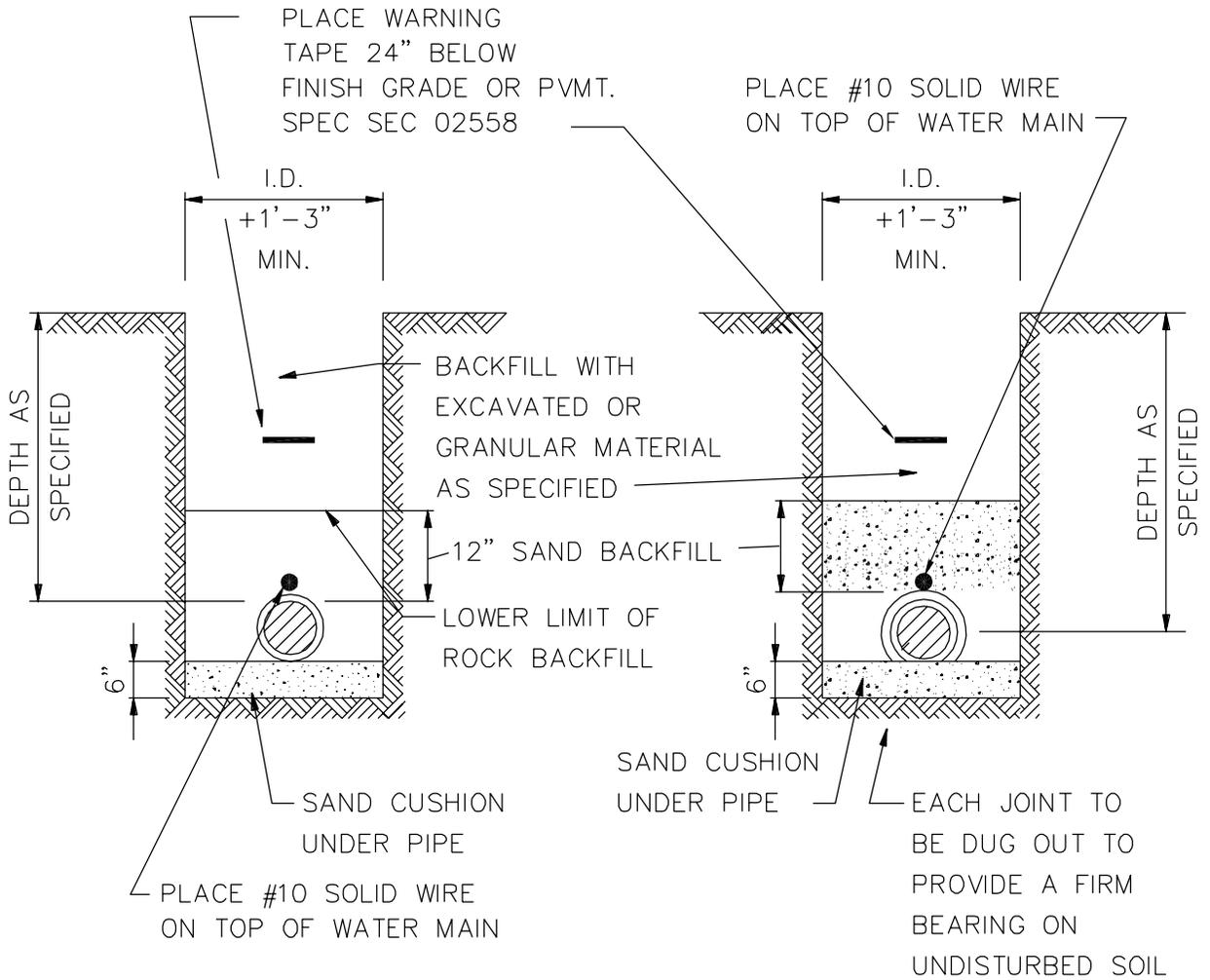
Complete water mains as they are installed. Test, flush, sterilize, and place in service each part of the water main which is complete and can be placed in service without preventing work to continue on uncompleted parts of the new water mains.

PART 4 – FIGURES

4.1 INDEX

<u>FIGURE</u>	<u>DESCRIPTION</u>
W-1	Water Main Installation Detail
W-2	Thrust Block Details
W-3	Restrained Joint Details
W-4	Steel Casing Detail
W-5	Connection to Existing Main
W-6	Gate Valve and Box
W-7	Fire Hydrant Details
W-8	¾" Single Pit
W-8a	¾" Water Meter and Pit Detail (For Residential)
W-9	1" Water Meter and Pit Detail
W-10	2" Water Meter and Pit Detail
W-11	Double Water Service Detail
W-11a	¾" Dual Water Meter and Pit Detail (For Residential)
W-12	Irrigation System Connection Detail (Residential)
W-13	Standard Fire Service and Meter Vault
W-14	PVC Pipe Bedding Detail

END OF SECTION 02660



ROCK EXCAVATION

FOR C900 PVC AND DUCTILE IRON PIPE

EARTH EXCAVATION

FOR C900 PVC PIPE

NOTE:

DUCTILE IRON PIPE OR HDPE (D11) PIPE DOES NOT REQUIRE SPECIAL BACKFILL UNLESS DIRECTED ON THE PLANS OR REQUIRED BY THE DIRECTOR OR THIER DESIGNEE.

WATER MAIN INSTALLATION DETAIL

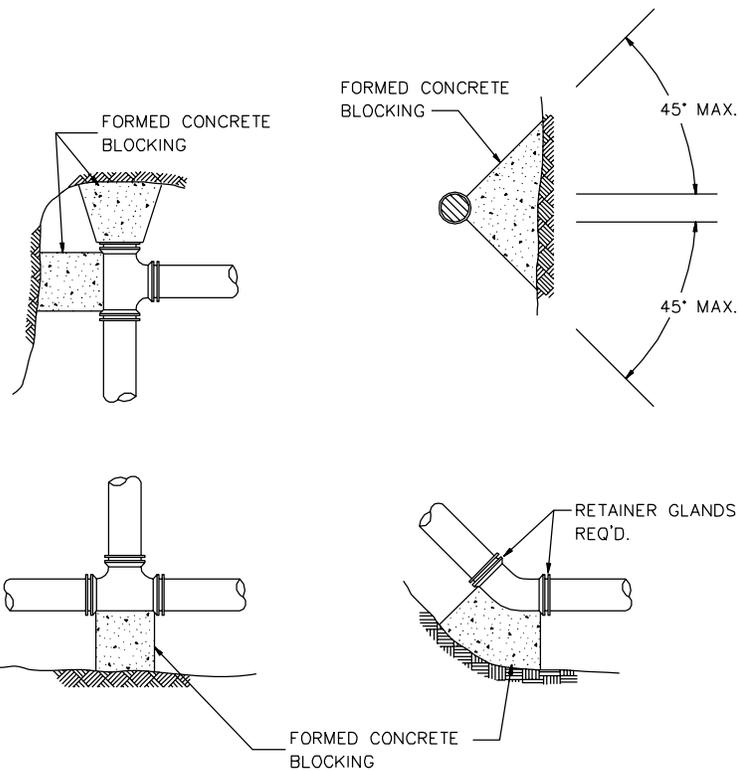


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FIGURE W-1



SIZE	TEE & PLUG	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND
4"	2.0	2.5	1.5	1.0	1.0
6"	4.0	5.5	3.0	1.5	1.0
8"	6.5	9.0	5.0	2.5	1.5
10"	10.0	14.0	7.5	4.0	2.0
12"	14.0	20.0	11.0	5.5	3.0
14"	19.0	27.0	14.5	7.5	4.0
16"	25.0	35.0	19.0	10.0	5.0
18"	31.5	44.5	24.0	12.5	6.5
20"	40.0	54.0	31.0	16.5	7.5
24"	55.5	78.5	42.5	22.0	11.0
30"	86.5	122.0	66.0	34.0	17.0
36"	124.0	175.5	95.0	48.5	24.5
42"	168.0	237.5	128.5	65.5	33.0
48"	212.0	366.0	160.0	85.0	42.0

(AREA IN SQ. FT. REQUIRED FOR CONCRETE THRUST BLOCKING)

NOTE:

THE THRUST BLOCK AREAS ARE BASED ON A SOIL BEARING LOAD OF 2,000 LB./SQ. FT.

GREASE OR PLACE A LAYER OF VISQUEEN ON ALL WATER MAIN SURFACES PRIOR TO PLACEMENT OF CONCRETE

THRUST BLOCK DETAIL

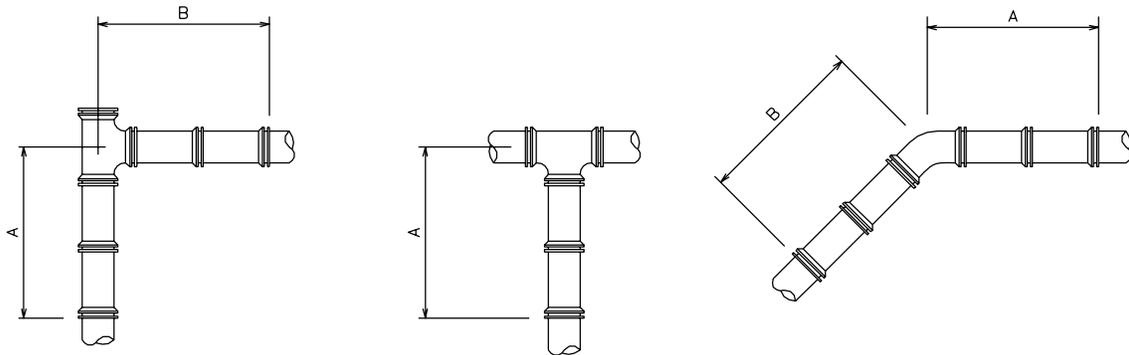


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FIGURE W-2



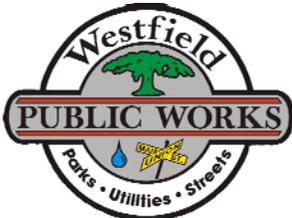
NOTE:

THE LENGTHS OF PIPE WITH RESTRAINED JOINTS ARE BASED ON A COMPACTED SILTY SOIL SURROUNDING THE PIPE

	A		B		
SIZE	TEE & PLUG	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND
6"	12'-0"	17'-0"	10'-0"	6'-0"	3'-0"
8"	16'-0"	22'-0"	13'-0"	8'-0"	4'-0"
10"	19'-0"	27'-0"	16'-0"	9'-0"	5'-0"
12"	23'-0"	32'-0"	19'-0"	11'-0"	6'-0"
14"	26'-0"	36'-0"	21'-0"	12'-0"	7'-0"
16"	29'-0"	41'-0"	24'-0"	14'-0"	8'-0"
18"	32'-0"	45'-0"	26'-0"	15'-0"	8'-0"
20"	35'-0"	50'-0"	29'-0"	16'-0"	9'-0"
24"	41'-0"	58'-0"	34'-0"	19'-0"	10'-0"
30"	50'-0"	70'-0"	40'-0"	22'-0"	12'-0"
36"	58'-0"	82'-0"	46'-0"	26'-0"	14'-0"
42"	66'-0"	93'-0"	52'-0"	29'-0"	15'-0"

(LENGTH IN FEET REQUIRED FOR RESTRAINING JOINTS)

RESTRAINED JOINT DETAILS

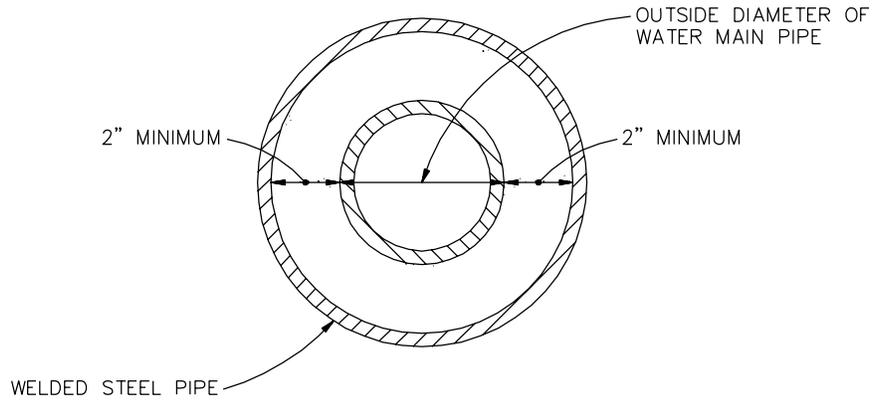


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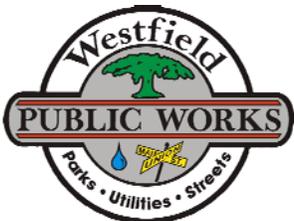
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FIGURE W-3



DIAMETER OF CASTING	WALL THICKNESS (INCHES)	
	UNDER HIGHWAY	UNDER RAILROAD
UNDER 14"	0.250	0.188
14"	0.250	0.219
16"	0.250	0.219
18"	0.250	0.250
20"	0.375	0.281
22"	0.375	0.312
24"	0.375	0.344
26"	0.375	0.375
28"	0.500	0.406
30"	0.500	0.406
32"	0.500	0.438
34"	0.500	0.469
36"	0.500	0.469
38"	0.500	0.500
40"	0.500	0.500
42"	0.500	0.500

STEEL CASING DETAIL

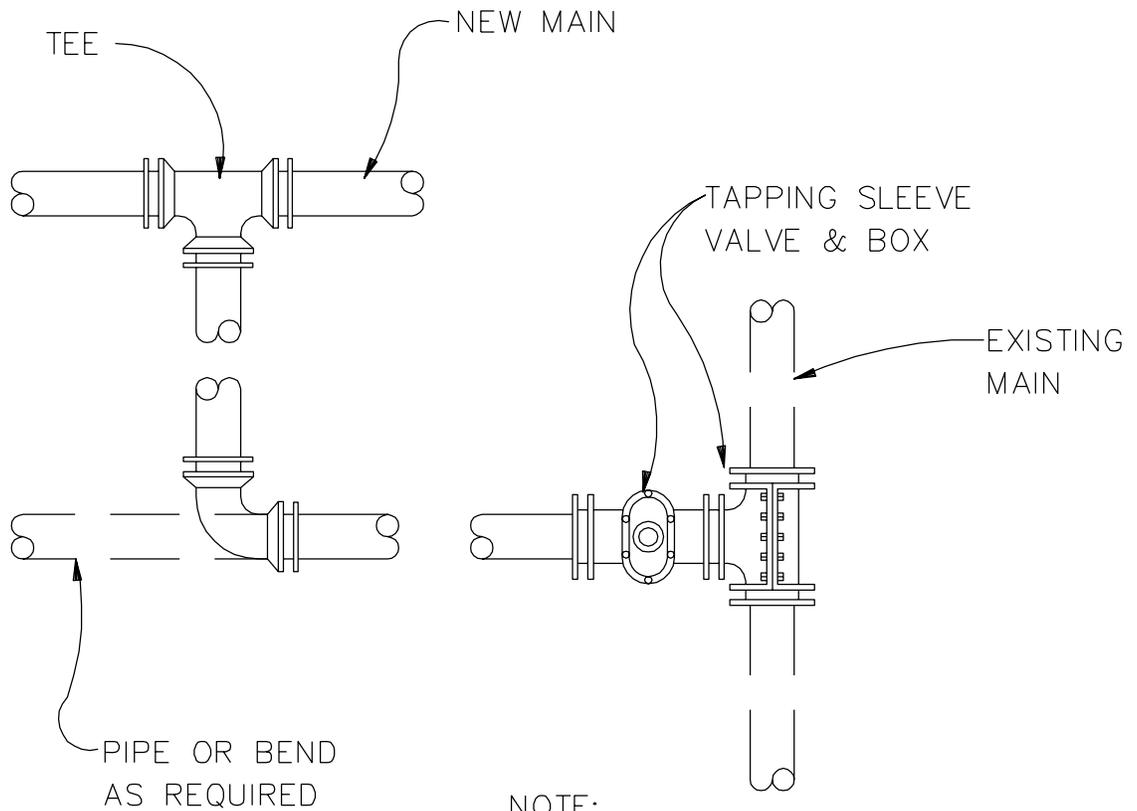


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FIGURE W-4



NOTE:

1. BENDS & FITTINGS AS REQUIRED
SEE PLAN SHEETS FOR DETAILS
2. SEE FIGURES W-2 & W-3 FOR THRUST
BLOCK AND RESTRAINED JOINT DETAILS.

CONNECTION TO EXISTING MAIN



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FIGURE W-5

SET TOP FLUSH WITH FINISH GRADE



ADJUSTABLE VALVE BOX (COVER TO BE MARKED "WATER")

POSI CAP

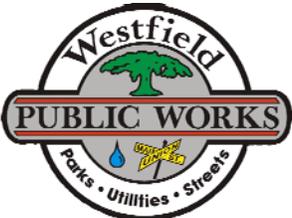
WATER MAIN

VALVES 3" AND LARGER SHALL BE FULL DUCTILE IRON BODY, NON-RISING STEM, FUSION BOND EPOXY COATED GATE VALVES. VALVES SHALL BE RESILIENT SEATED GATE VALVES AND SHALL MEET THE REQUIREMENTS OF ANSI/AWWA C-509 AND SHALL HAVE MECH. JOINTS AND ACCESSORIES SHALL MEET THE REQUIREMENTS OF ANSI/AWWA C111/A21.11

#10 TRACER WIRE

GATE VALVE AND BOX

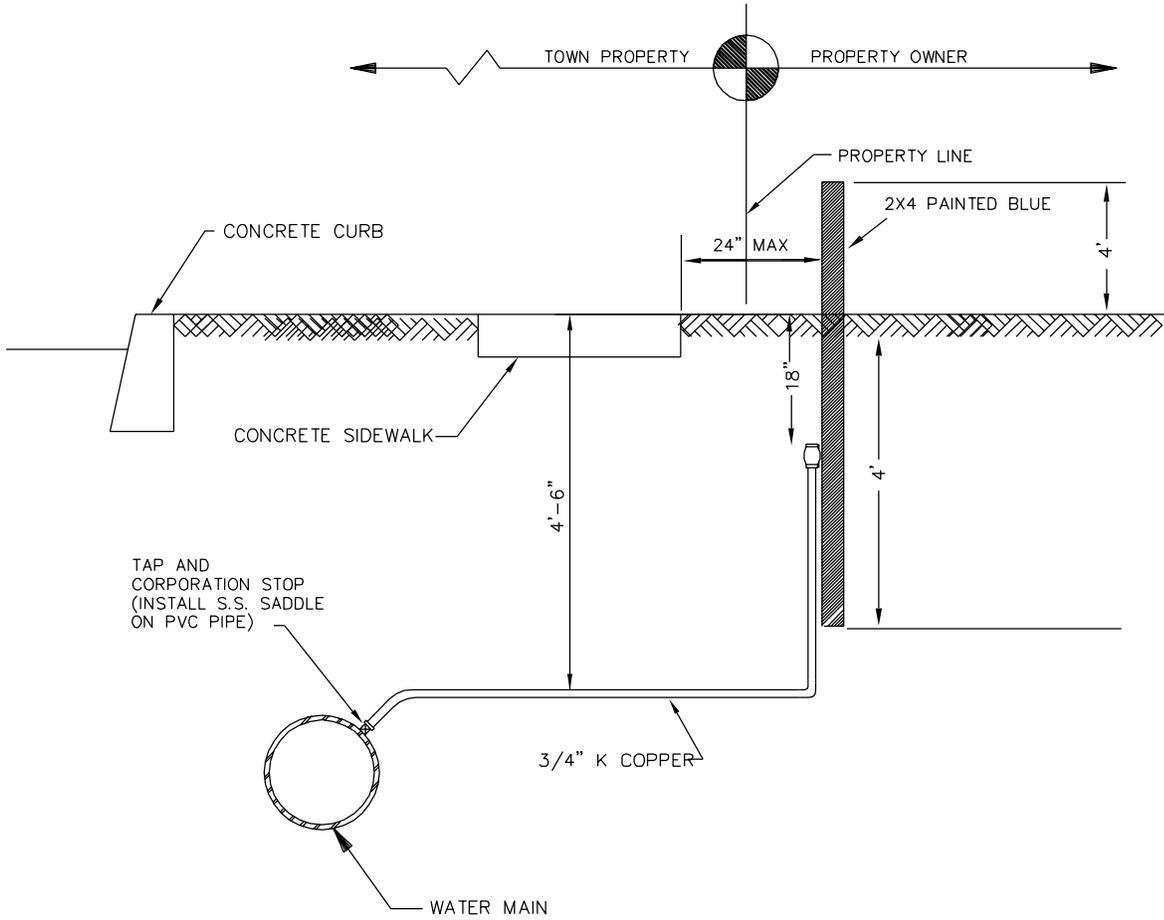
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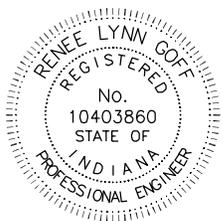
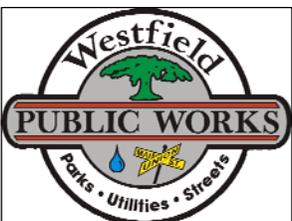
FIGURE W-6



NOTE:
 CONTRACTOR SHALL FURNISH AND INSTALL ALL NECESSARY MATERIALS
 TO PROVIDE A NEW WATER SERVICE. AS SHOWN IN THIS DETAIL

PART NUMBER FOR TERMINATING SERVICE LINE			
PART DESCRIPTION	FORD METER BOX CO.	MUELLER CO.	A.Y. MCDONALD MFG. CO.
ANGLE BALL VALVE	BA94-323-0	B-24273	4642BYQ-3/4X02

3/4" SINGLE PIT

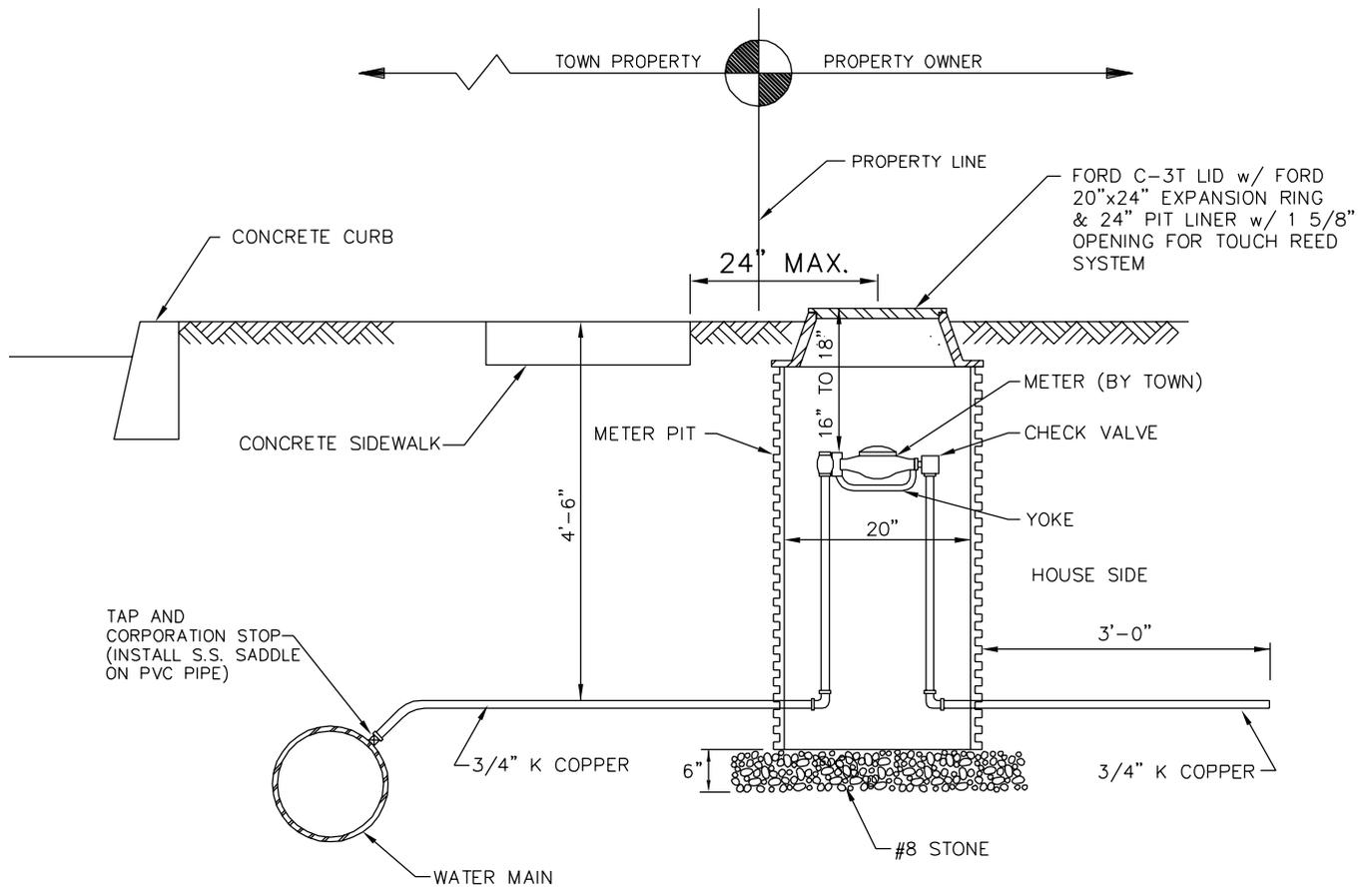


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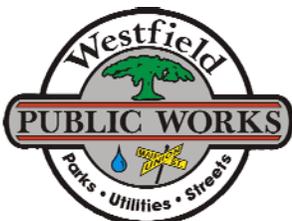
FIGURE W-8



NOTE:
 CONTRACTOR SHALL FURNISH AND INSTALL ALL NECESSARY MATERIALS TO PROVIDE A NEW WATER SERVICE METER PIT (EXCEPT FOR THE WATER METER) AS SHOWN IN THIS DETAIL

ITEMS	PART NUMBERS (FOR 3/4" SERVICE)			
	FORD METER BOX CO.	MUELLER CO.	A.Y. MCDONALD MFG. CO.	VESTAL
YOKE	Y502	H-5020,5/8"	14-2	
ANGLE BALL VALVE	BA9-1-323WQ	B-24273	AY4642BYQ $\frac{3}{4}$ x02	
CHECK VALVE	HA 94-323	H-14245	12-3YQ-33	
FRAME & COVER	NO. C-3T	TYLER MODEL 6150	74M3CT	32-262

3/4" - WATER METER AND PIT DETAILS (FOR RESIDENTIAL)

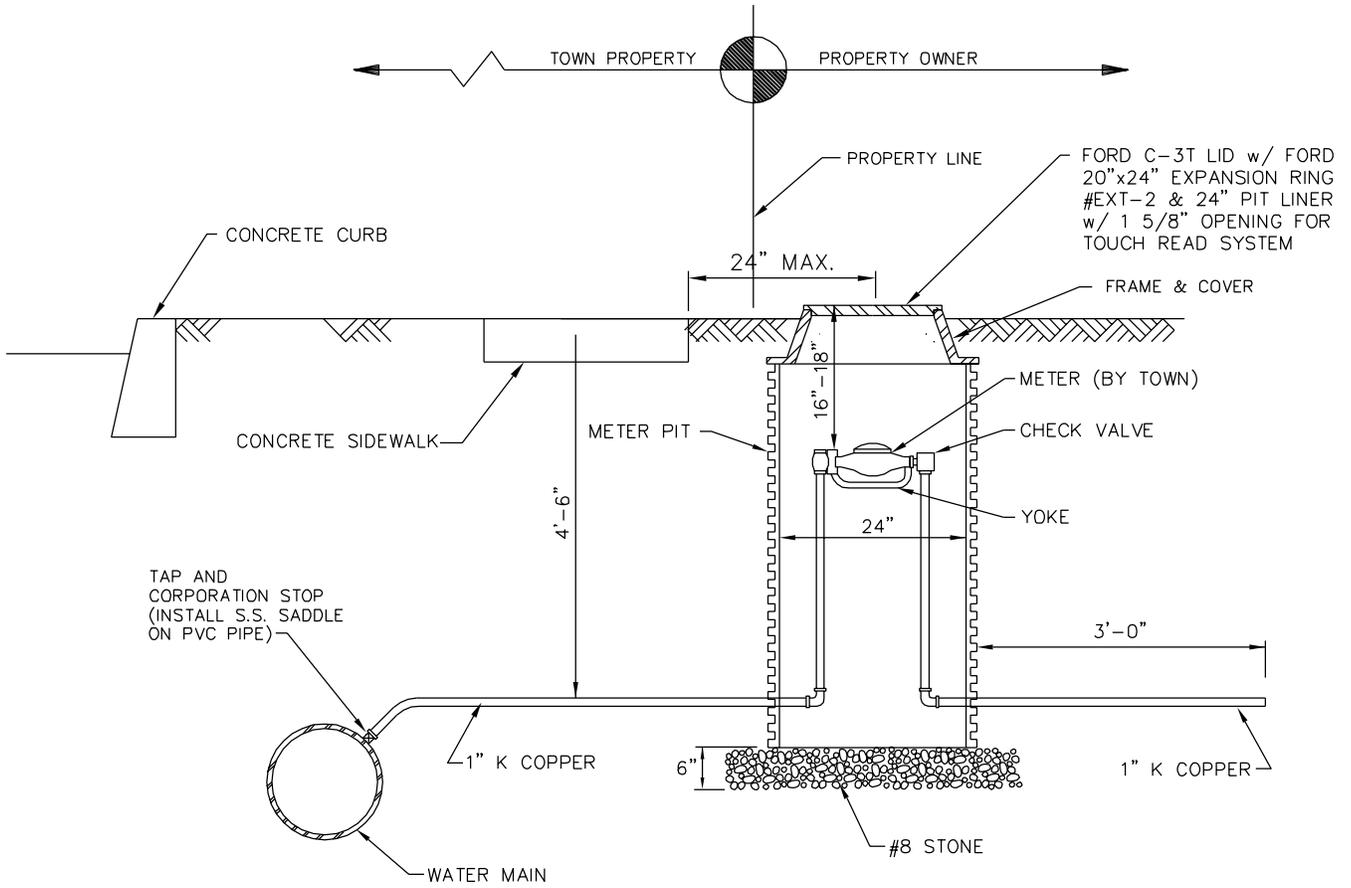


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FIGURE W-8a



NOTE:
 CONTRACTOR SHALL FURNISH AND INSTALL ALL NECESSARY MATERIALS
 TO PROVIDE A NEW WATER SERVICE METER PIT (EXCEPT FOR THE
 WATER METER) AS SHOWN IN THIS DETAIL

ITEMS SUPPLIED & INSTALLED BY CONTRACTOR	PART NUMBERS		
	FORD METER BOX CO.	MUELLER CO.	A.Y. MCDONALD MFG. CO.
YOKE	Y504	H-5040	14-4
ANGLE BALL VALVE	BA94-444WQ	B24273	46-42BYQ1X04
CHECK VALVE	HA 91-444	H 15428	12-4YQ-44

1" - WATER METER AND PIT DETAIL

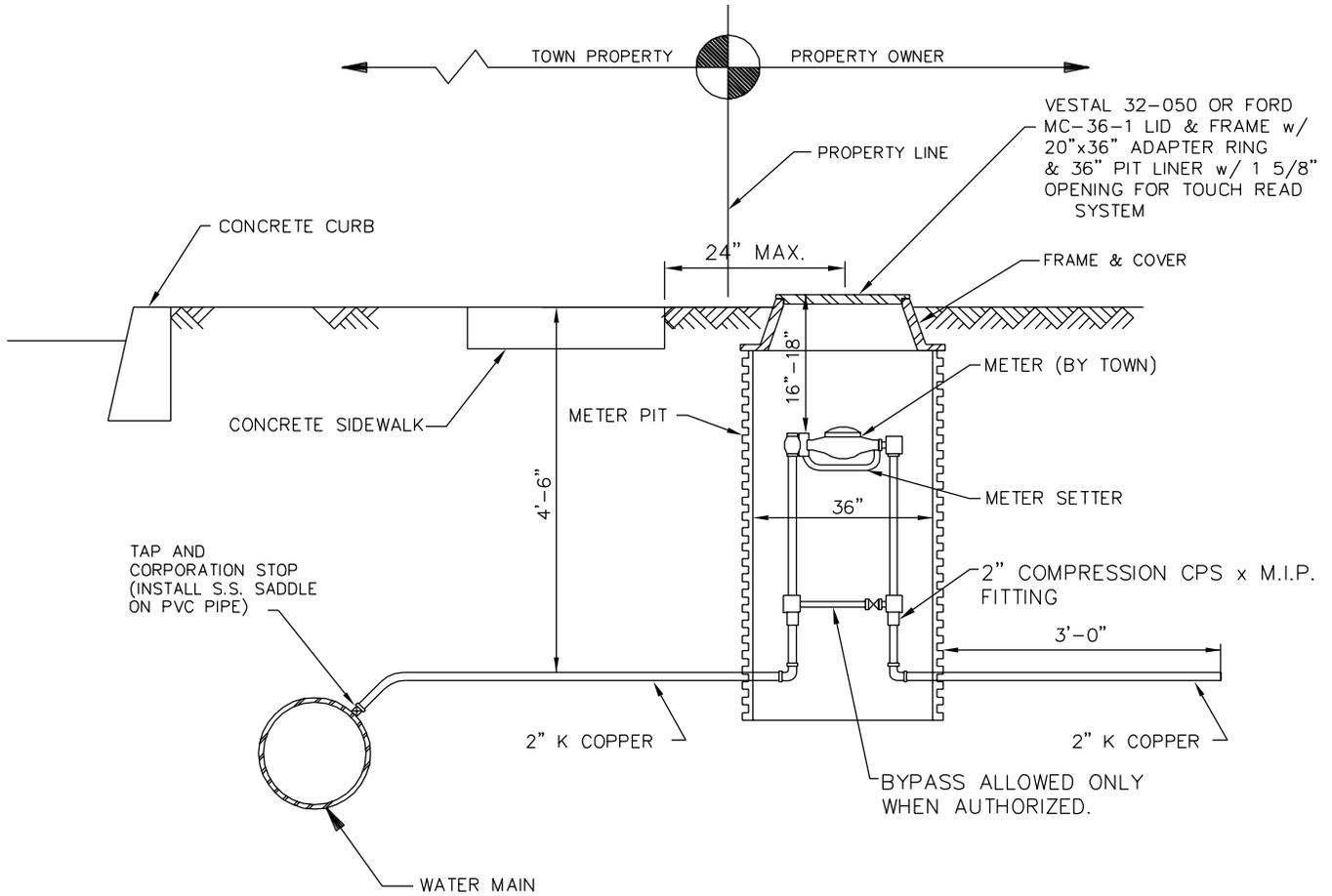


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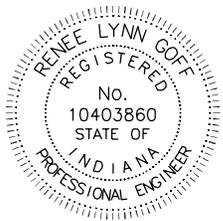
FIGURE W-9



NOTE:
 CONTRACTOR SHALL FURNISH AND INSTALL ALL NECESSARY MATERIALS TO PROVIDE A NEW WATER SERVICE METER PIT (EXCEPT FOR THE WATER METER) AS SHOWN IN THIS DETAIL

ITEMS SUPPLIED & INSTALLED BY CONTRACTOR	PART NUMBERS			
	MUELLER CO.	FORD METER BOX CO.	A.Y. McDONALD MFG. CO.	VESTAL
METER SETTER	B-2427-2	VBHH87-18B-11-77	30-715-WD-FF-770	
2" COMPRESSION COUPLING	H-15428-2		47S3Q/T	
ADAPTER RING	20" x 36"	20" x 36"	20" x 36"	20" x 36"
COVER		MC-36-1		32-050

2" - WATER METER AND PIT DETAIL

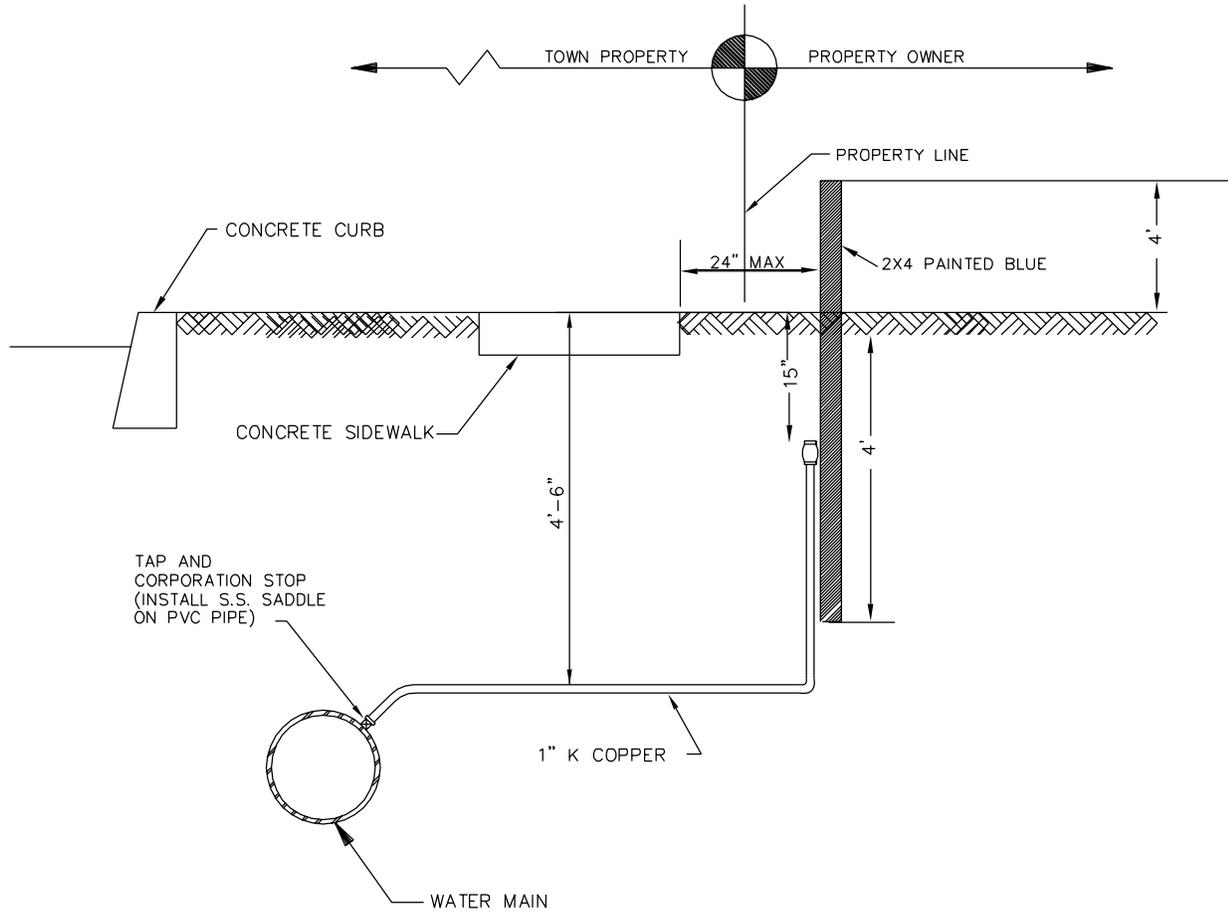


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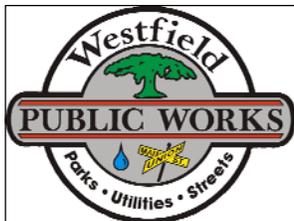
FIGURE W-10



NOTE:
 CONTRACTOR SHALL FURNISH AND INSTALL ALL NECESSARY MATERIALS
 TO PROVIDE A NEW WATER SERVICE. AS SHOWN IN THIS DETAIL

PART NUMBER FOR TERMINATING SERVICE LINE			
PART DESCRIPTION	FORD METER BOX CO.	MUELLER CO.	A.Y. MCDONALD MFG. CO.
SHUT-OFF VALVE	B44-444a (1")	B-25172 (1")	6100Q (1")

DOUBLE WATER SERVICE DETAIL

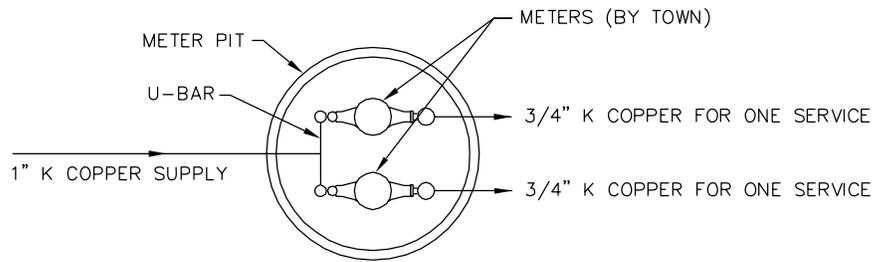


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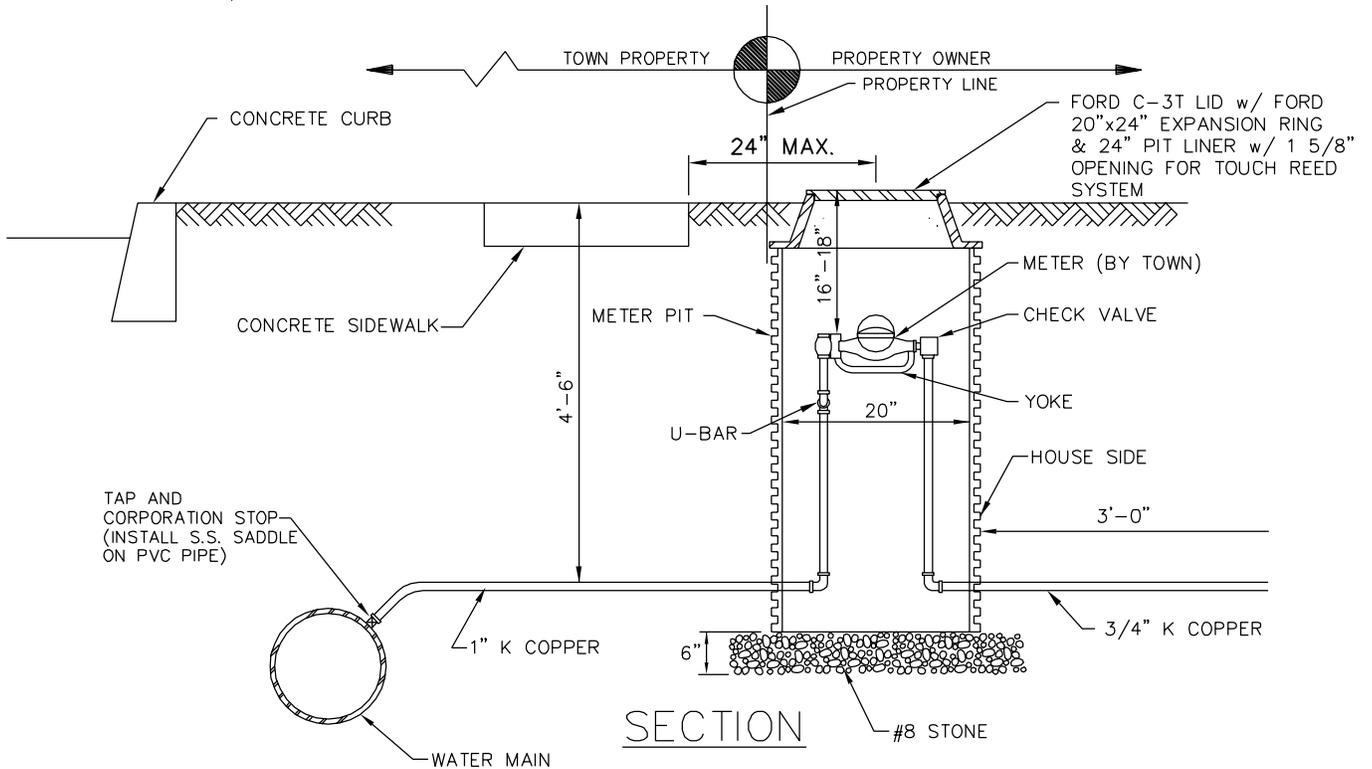
10/9/06
DATE

FIGURE W-11



NOTE:
 CONTRACTOR SHALL FURNISH AND INSTALL
 ALL NECESSARY MATERIALS TO PROVIDE A NEW
 WATER SERVICE METER PIT (EXCEPT FOR THE
 WATER METERS) AS SHOWN IN THIS DETAIL

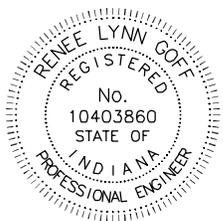
PLAN



SECTION

ITEMS SUPPLIED & INSTALLED BY CONTRACTOR	PART NUMBERS (FOR 3/4" SERVICE)			
	FORD METER BOX CO.	MUELLER CO.	A.Y. MCDONALD MFG. CO.	VESTAL
YOKE	Y502	H-5020,5/8"	14-2	
ANGLE BALL VALVE	BA91-323W	B-24278	AY4642BYQ3/4x02	
CHECK VALVE	HA 94-323a	H-14245	12-3YQ-33	
FRAME & COVER	NO. C-3T	TYLER MODEL 6150	74M3CT	32-262
U-BAR	U8843-7.5/C14-44Q	H-15363 1x3/4x7.5	O8UQM1x3/4x7.5	

3/4" - DUAL WATER METER AND PIT DETAIL
 (FOR RESIDENTIAL)

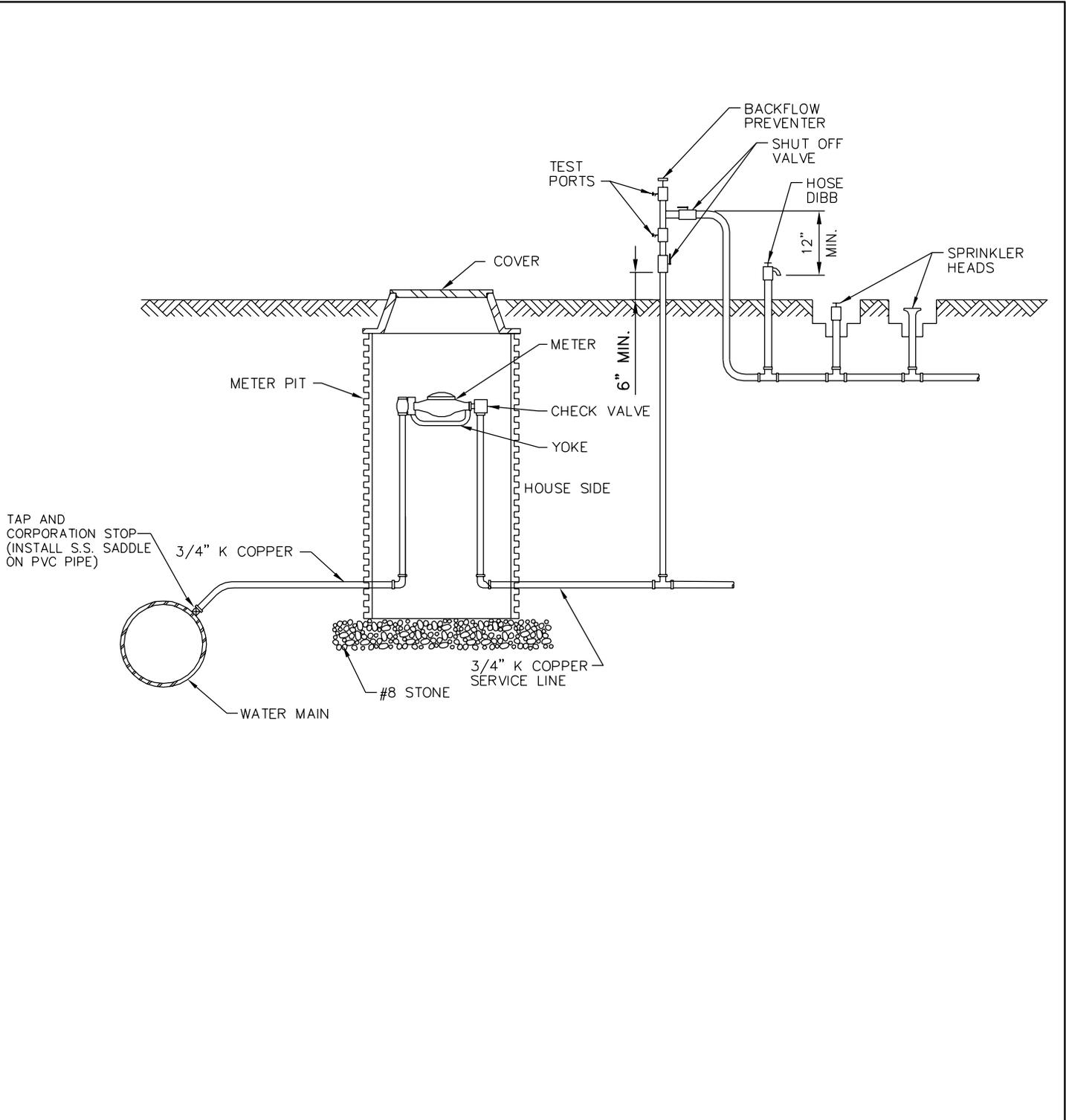


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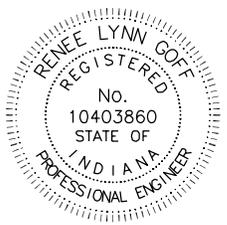
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10/9/06
 DATE

FIGURE W-11a



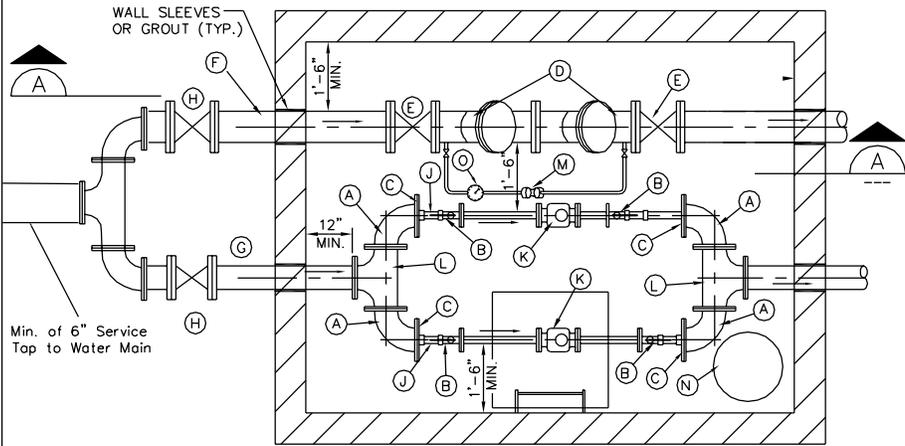
IRRIGATION SYSTEM CONNECTION DETAIL (RESIDENTIAL)



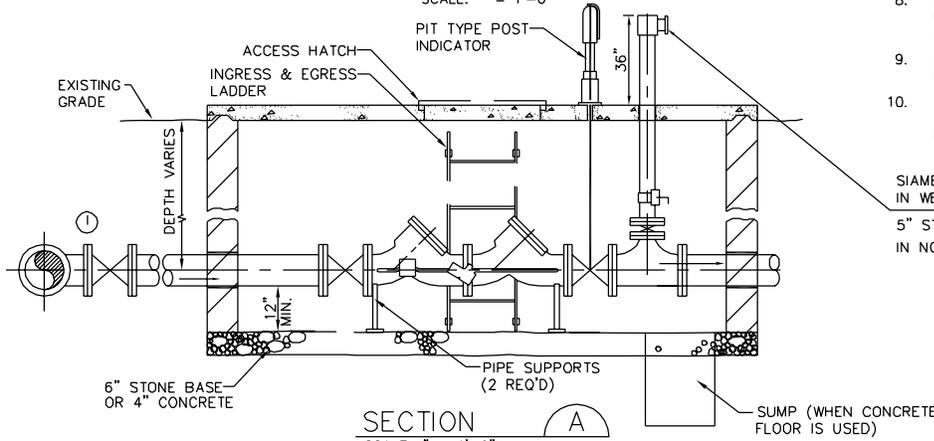
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FIGURE W-12



PLAN
SCALE: " = 1'-0"



SECTION A
SCALE: " = 1'-0"

LEGEND

- | | |
|--|--|
| (A) 90° FLANGED BEND | (H) MECHANICAL JOINT GATE VALVE & BOX |
| (B) BALL VALVE W/ FLANGED END | (I) TAPPING SLEEVE W/ TAPPING VALVE & BOX |
| (C) REDUCING FLANGE | (J) LOK-PAK |
| (D) DOUBLE DETECTOR CHECK VALVE ASSEMBLY | (K) TURBINE METER - FLANGED BOTH ENDS (BY UTILITY) |
| (E) FLANGED OS & Y VALVE | (L) FLANGED TEE |
| (F) FIRE LINE | (M) DOUBLE CHECK VALVE |
| (G) DOMESTIC SERVICE | (N) SUMP WITH PUMP (USE WHEN FLOOR IS CONCRETE) |
| | (O) 3/4" x 5/8" METER |

NOTES:

1. CUSTOMER SHALL CONSTRUCT METER VAULT.
2. CONSTRUCTION MATERIALS: CONCRETE, 8"x8"x16" CONCRETE BLOCKS AND MORTAR, OR PRECAST/CAST-IN-PLACE AS DIRECTED BY WATER COMPANY.
3. INSIDE DIMENSIONS PER DRAWING NOTES. VAULT TO BE SET LENGTHWISE WITH SERVICE.
4. TOP OF VAULT TO BE CONCRETE, AT LEAST 4" THICK WITH REINFORCING. WHEN VAULT IS CONSTRUCTED IN PAVED AREAS, PAVEMENT IS TO BE LEVEL WITH TOP OF VAULT, AND THE TOP REINFORCED AS REQUIRED TO SUPPORT TRAFFIC LOADS. WHEN VAULT IS CONSTRUCTED IN GRASS PLOT, TOP OF VAULT SHALL CORRESPOND WITH FINISHED GRADE LEVEL OF SURROUNDING AREA.
5. BOTTOM OF VAULT TO BE MINIMUM OF 6" OF CRUSHED STONE OR 4" CONCRETE AS DIRECTED BY WATER COMPANY, WITH MINIMUM CLEARANCE OF 12" BELOW BOTTOM OF FIRE/SERVICE LINE.
6. CUSTOMER SHALL FURNISH 2" BALL VALVES ON OUTLET SIDE OF THE 2" METER SETTING.
7. CUSTOMER SHALL FURNISH DOUBLE DETECTOR CHECK VALVE AS APPROVED BY THE INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT, WITH RESILIENT SEAL GATE VALVE ON OUTLET SIDE OF CHECK VALVE. METER IS FURNISHED BY WATER COMPANY.
8. CUSTOMER SHALL FURNISH VAULT FRAME AND LID TO BE INSTALLED IN TOP OF VAULT BY CUSTOMER (BILCO J-2AL OR 30"x30" ALUMINUM PCM)
9. CUSTOMER SHOULD INSTALL A LADDER IN PIT FOR INGRESS AND EGRESS, AS PER OSHA REQUIREMENTS.
10. A 2" TEST PLUG SHALL BE INSTALLED AT LEAST 2 PIPE DIAMETERS DOWNSTREAM OF 2" OR LARGER METERS.

SIAMESE FITTING WITH TWO 2 1/2" HOSE CONNECTORS IN WESTFIELD FIRE DEPT. DISTRICT
5" STORZ CONNECTION FOR HOSE CONNECTION IN NOBLESVILLE FIRE DEPT. DISTRICT

STANDARD FIRE SERVICE & METER VAULT



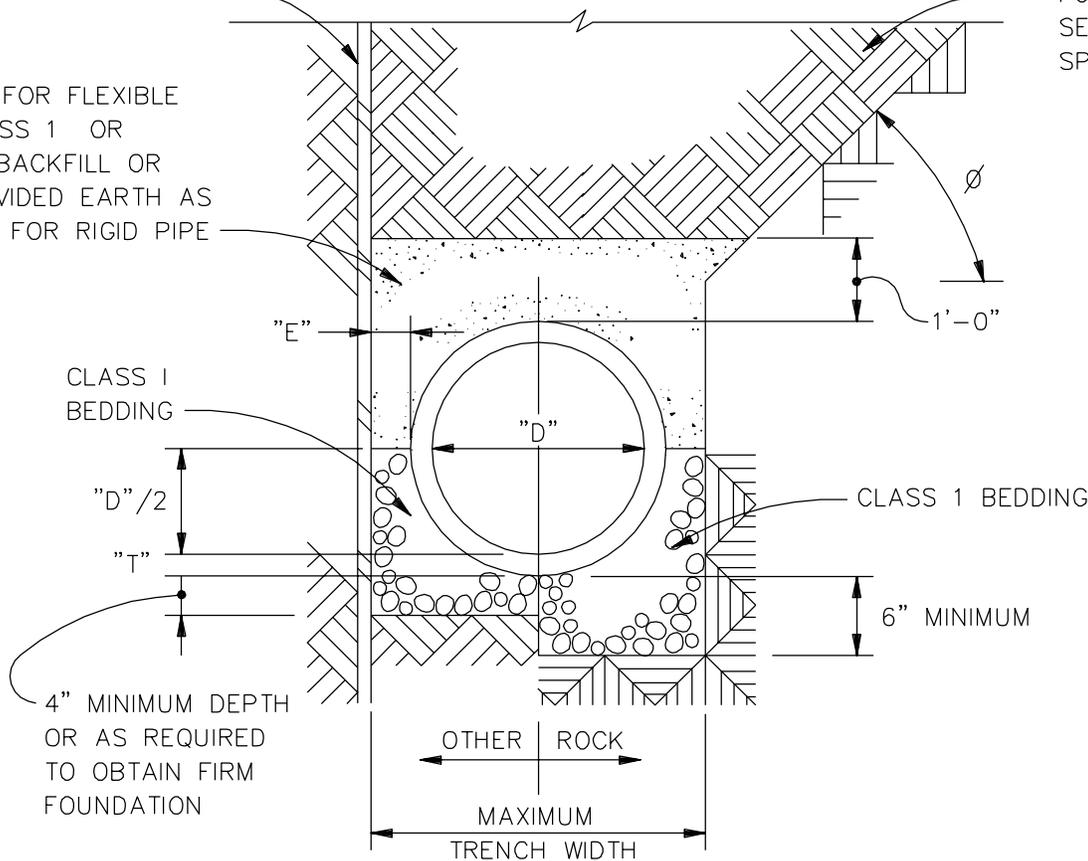
TOWN OF WESTFIELD, INDIANA

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SHEETING WHERE SPECIFIED OR REQUIRED BY TRENCH CONDITIONS

FOR BACKFILLING SEE DETAILED SPECIFICATIONS

CLASS 1 BACKFILL FOR FLEXIBLE PIPE, CLASS 1 OR CLASS II BACKFILL OR FINELY DIVIDED EARTH AS SPECIFIED FOR RIGID PIPE



CLASS I BEDDING

CLASS 1 BEDDING

"D"/2

"T"

4" MINIMUM DEPTH OR AS REQUIRED TO OBTAIN FIRM FOUNDATION

6" MINIMUM

OTHER ROCK

MAXIMUM TRENCH WIDTH

CLASS I BEDDING

TYPICAL SECTIONS IN FIRM FOUNDATIONS

NOTES:

1. SLOPE ANGLE, ϕ , SHALL BE LESS THAN THE FRICTION ANGLE OF THE EXCAVATED MATERIAL.
2. "D" = NOMINAL PIPE SIZE.
3. "T" = PIPE WALL THICKNESS.

PVC BEDDING DETAIL



TOWN OF WESTFIELD, INDIANA

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FIGURE W-14