

WATER MAIN SPECIFICATIONS

A. MATERIALS

PIPE AND FITTINGS

All water main pipe fittings & appurtenances shall be made in the U.S.A. Pipe for open cut applications shall be ductile iron. Pipe for directional drill applications shall be ductile iron, HDPE, or PVC. No second hand material or salvaged material shall be permitted.

1. Ductile Iron
Ductile iron pipe water main shall meet all the requirements of the latest revision of the AWWA/ANSI C151/A21.51. Pipe shall be furnished in 18 or 20 foot lengths, unless otherwise required. The pipe shall meet the thickness class requirements shown in the table below:

Size Nominal Inside Diameter Inches	Pressure Class (Minimum)
6	350
8	350
10	350
12	350
14	300
16	300
18	250
20	250
24	250

Pipe shall be double cement-lined and seal coated with an approved bituminous seal coat in accordance with AWWA/ANSI C104/A21.4

Push-on joints shall meet all the requirements of AWWA/ANSI C111/A21.11. Push-on joints shall consist of a ductile iron bell provided with a recess to receive a circular molded rubber gasket to effect the joint seal. A rubber gasket and sufficient lubricant to assemble the joint shall be furnished with each joint. The lubricant shall have no deleterious effect upon the color, taste or odor of potable water and shall not be corrosive to either the pipe or gasket. Pipe furnished with push-on type joints shall be equal in strength and leak tightness to pipe furnished with mechanical joints as specified under identical conditions, and shall meet all other requirements of these Specifications. In addition to the above requirements, the gasket and lubricant shall conform to the latest revision of the AWWA/ANSI C111/A21.11.

Bolts and nuts for buried service shall be made of non-corrosive, high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21.11. Bolts and nuts shall be Cor-Blue T-Bolts with a ceramic-filled, baked carbon resin.

Flanged joints shall conform to ANSI B16.1 Class 125.

Ductile iron or cast iron fittings shall meet all the requirements of the latest revision of AWWA/ANSI C110/A21.10 for full body fittings and A21.53 AWWA/ANSI C153/A21.53 for compact fittings ("S" through "16") for a minimum working pressure of 250 psi and be of the mechanical joint type. Plugs, where shown on the Plans, shall be solid mechanical joint plug type.

All ductile iron pipe and fittings shall be poly-wrap encased. The polyethylene encasement to be used with ductile iron pipe and fittings shall be manufactured in accordance with the specifications and requirements of AWWA/ANSI C105/A21.5. Encasement shall be a linear low-density polyethylene film with a minimum thickness of 8 mils. The polyethylene shall be installed in accordance with the specifications and requirements of AWWA 60.0. Overlap and taping requirements shall be per manufacturer specifications.

Ductile iron pipe for directional drill applications shall utilize one of the following pipe joints. American Snap-lock Flex-Rings, Glow Super Lock or U.S. Pipe TR Flex.

2. HDPE

Water main pipe and fittings shall be high density polyethylene plastic pipe, DR9, DIPS, manufactured in accordance with the specification and requirements of ANSI/AWWA C906 for use with potable water. All pipes shall have a blue stripe to indicate use with potable water.

Materials used for the manufacturing of polyethylene pipe and fittings shall be extra high molecular weight, high density PE 4710 polyethylene resin meeting the ASTM D3350 minimum cell classification of PE 445574C. The cell classification properties of the material shall be certified by the supplier.

Polyethylene material shall have a minimum Hydrostatic Design Basis (HDB) of 1600 psi at 73.4F when tested in accordance with ASTM D2837.

The material used in the production of potable water pipe shall be approved by the National Sanitation Foundation (NSF), and shall be compliant with the requirements of NSF Standard No. 61 and No. 14.

HDPE fittings shall be in accordance with ASTM D3261 (butt fused) and shall be manufactured by injection molding, a combination of extrusion and machining, or fabrication from HDPE pipe conforming to this specification and by the manufacturer of the pipe. The fittings shall be fully pressure rated and provide a working pressure equal to that of the pipe with an included 2:1 safety factor. The fittings shall be manufactured from the same base resin and cell classification as the pipe itself. The fittings shall be homogeneous throughout and free from cracks, holes, foreign inclusions, voids, or other injurious defects.

Mechanical fittings including flanged joints, restrained mechanical joints used with polyethylene pipe shall be specifically designed for restrained mechanical joints, or tested and found to be acceptable for use with polyethylene pipe by the fitting manufacturer.

The HDPE pipe shall contain no recycled compound except that generated in the manufacturer's own plant. The physical appearance of the pipe having deformities such as concentrated ridges, discoloration, excessive spot roughness, pitting, varying wall thickness, etc. shall constitute sufficient basis for rejection. The HDPE pipe shall be homogeneous throughout, free from visible cracks, foreign inclusions and other defects that may affect the wall integrity.

A certificate of "Compliance with Specification" shall be furnished for all materials to be supplied.

HDPE pipe shall only be used in directional drill applications.

HDPE pipe thrust restrainer shall be Thrust-Isolator manufactured by Independent Pipe Products or equal.

3. PVC, C900 or C905

Fusible PVC plastic material for pipe shall conform to AWWA C900 or C905, DR-14 (C900) OR DR21 (C905), DIPS, ASTM D1784, and cell classification 12454. Compound formulation shall be in accordance with PI TR-2/2006. Fusible PVC pipe shall be manufactured in 40' nominal lengths and shall be blue in color.

Pipe shall be manufactured with 100% virgin resin. Pipe shall also have 0% recycled plastics content, and shall not consist of any rework compound, even that obtained from the manufacturer's own production using the same formulation.

Acceptable ductile iron mechanical fitting for use with fusible PVC pipe shall include standard ductile iron fittings conforming to AWWA/ANSI C110/A21.10 or AWWA/ANSI C153/A21.53 and AWWA/ANSI C111/A21.11. Restrained connections to fusible PVC pipe may be made using a restraint gland product for C-900 or C-905 DIPS sizing to be Mega-lug, Series 2000PV by EBAA iron or approved equal.

Sleeve-type mechanical couplings shall be manufactured for use with PVC pipe, shall be restrained or by acceptable sleeve-type mechanical joint coupling for a restrained type coupling for transition between PVC, C-900/C-905 Pipe and ductile iron pipe shall be EBAA iron Series 3800 or approved equal for applicable size of pipe as shown on plans.

Fusible PVC pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

PVC pipe shall only be used in directional drill applications.

Pipe shall be marked per AWWA C900 or AWWA C905 as specified on the plans, and shall include as a minimum:

- Nominal size
- PVC
- Dimension Ratio, Standard Dimension Ratio or Schedule - DR-14 (C900) OR DR-18 (C905), DIPS
- AWWA pressure class or rating - Pressure Class 200
- AWWA standard designation number
- NSF-61 mark verifying suitability for potable water service
- Extrusion production-record code
- Trademark or trade name
- Cell Classification 12454 and/or PVC material code 1120 may also be included.

VALVES

All valves installed under this Specification shall conform to the applicable requirements of AWWA C500 and C504 standards governing construction materials and workmanship. Each valve shall carry the name or trademark of the manufacturer. All valves shall have operating nuts that turn "CLOCKWISE" to open.

1. Gate Valves

Gate valves shall be resilient seated and shall have a cast or ductile iron body and bonnet. Valves shall have a minimum non-shock W.O.G. working pressure of 200 psi. The wedge shall be ductile iron or cast iron encased in a bonded-in-place styrene-butadiene elastomer covering to form resilient seating surfaces. Stem shall be bronze of non-rising design with double o-ring packing. Joints shall be mechanical joint type.

Gate valves shall be used on mains less than 16" in diameter.

2. Butterfly Valves

Butterfly valves shall have a cast iron body, neck and top piece with a minimum non-shock W.O.G. working pressure of 150 psi. Seats shall be Hycarbuna "N" providing leak-proof shut-off with the disc and acting as a body liner to prevent corrosion. Disc shall be ni-resist cast iron with a 304 stainless steel shaft rotating in permanently lubricated bearings. Stem seal shall be Hycarbuna "N". Joints shall be flanged. Flanged to mechanical joint adapters shall be provided for each valve. Butterfly valves shall be Groundhog as manufactured by Frott Valve Company, or equal.

Butterfly valves shall be used on mains greater than or equal to 16" in diameter.

3. Tapping Valves

Tapping valves shall meet the specifications for gate valves except that the valve shall have a flange compatible with the tapping sleeve.

4. Tapping Sleeves

Tapping sleeves shall be full length heavy-duty construction designed for use with the type of pipe to be tapped. They shall be constructed of stainless steel material.

Stainless steel sleeves shall be constructed of 18-8 type 304 stainless steel. Flanged shall be CFS cast stainless steel and bolts shall be 304 stainless steel. Gaskets shall be full circumferential SBR compounded for water service. The tapping sleeve shall contain a test plug to assure seal prior to tapping. Stainless steel sleeves shall be as manufactured by JCM, Romac Industries, type SST, or approved equal.

5. Valve Boxes

Valve boxes shall be of cast iron construction. They shall be of three piece, screw type adjustment design. All valve boxes shall be installed flush with the top of the proposed site grade. Covers shall be designed to be removed easily to provide access to the valve.

Valve boxes shall be EJW 8560 with number 6 base, or equal.

6. Corporation Stops

Corporation stops used for insertion into mains shall be Mueller Type H-1500 plug style or approved equal. All stops shall have bronze cast bodies, keys, stem washers and nuts. Inlet threads shall conform to the latest revision of AWWA C800. The outlet connection shall be able to receive the flared end of the copper service pipe. Corporation stops for insertion into HDPE or PVC mains shall be Mueller P-35008 or approved equal.

7. Post Indicator Valves

Post indicator valves shall meet the specifications for gate valves.

8. Post indicator posts

Post indicator posts shall be manufactured of cast iron and adjustable. The indicator window shall be mounted at a height of 30" above grade. These portions of the post above grade shall have two coats of red enamel. The indicator window shall be masked during paint application to keep window clear. All unpainted surfaces shall have two coats of coal tar pitch varnish. Post indicators shall be shall be Mueller Model A-20806.

GATEWELLS

Gatewells shall be constructed of reinforced concrete conforming to the latest revision of ASTM Specifications for Precast Reinforced Concrete Manhole Sections, Serial Designation C478, with rubber gasket joints. The bottom section shall be furnished with an integral concrete base. Base and riser sections shall be precast reinforced concrete sized as follows:

Nominal I.D. of Water Main	Size of Well (I.D.)	
	Straight Thru	Tee/Top
10" and under	5'-0"	6'-0"
12"	6'-0"	6'-0"
16'-0"	7'-0"	7'-0"
18" and over	7'-0"	7'-0"

A gatewell shall be provided for valves 6 inches and larger (excluding hydrant valves and PIVs).

Water pipe to gate well connections shall be through: 1) a flexible boot which shall be securely clamped into a core-drilled part. Pipe ports shall be core-drilled at the point of manufacturer and shall be accurately located within 1/2-inch of the proposed water main centerline (Kor-N-Seal); or 2) a self-adjusting mechanical pipe to manhole seal which provides a resilient flexible and infiltration-proof joint (Res-seal); or 3) a flexible rubber wedge firmly rammed into a rubber gasket which is cast into the manhole (Press Wedge II), or equal. All pipe to manhole connections shall be installed per the manufacturer's specifications

Neoprene rubber for the manhole boot shall meet ASTM Specification C443 and shall have a minimum thickness of 3/8-inch. Pipe clamp bands shall be of corrosion-resistant steel.

Brick for grade adjustment of gatewells shall meet the requirements for "medium brick" of the Standard Specifications for Concrete Sewer Brick, ASTM Serial Designation C139, or the latest revision thereof.

Mortar for masonry or plastering outside of gatewells shall be made of one part of Portland Cement to two parts of sand. Mortar materials and mixing shall correspond, in general, to those for concrete.

Gatewell steps shall be reinforced polypropylene plastic coated steel. They shall be M.A. Industries, Inc. PSI-FF.

Frames and covers shall be cast iron conforming to the Standard Specifications Castings, Serial Designation A 48, or the latest revision thereof and shall be 1040 A05 type A as manufactured by East Jordan Iron Works, or approved equal. They shall have machined bearing surfaces and suitable notches for convenient removal of the cover. Covers shall have the letters "NORTHVILLE TWP. WATER" cast integrally with the cover. Frames and covers shall be coated at the piece of manufacturer with coal tar pitch varnish or other approved asphaltum coating.

FIRE HYDRANTS

Hydrants shall be EJW SBR-250 with breakaway traffic flange and mechanical joint connections.

Fire hydrants shall comply with the latest revision of AWWA Standard, C502. Hydrants shall be compression type to open with the pressure. They shall have a valve opening of 5-1/4 inches and six-inch mechanical joint inlet. Hydrants shall have two pumper connections of 4-inches with Detroit Fire Department Standard Thread.

Detroit Fire Department Standard Thread:

Threads per Inch	6
Major Diameter	4.546"
Pitch Diameter	4.422"
Minor Diameter	4.299"
I.D. Bore	3 3/4"

All hydrants shall be constructed with a companion gate valve in a three-piece, adjustable cast iron valve box.

Fire hydrants shall have inside barrel dimension of not less than 8-1/2" I.D. from top to bottom. The 1-1/8" pentagon operating nut shall open "COUNTER CLOCKWISE".

All nozzles shall be on a removable head with a flange so that they may be rotated by changing the position of the flange.

Hydrant shall be fully bronze mounted, including top of the operating stem where it passes through the double o-ring seal in the bronze packing gland. The forged operating stem in the base and the valve seat shall also be of bronze. The molded valve shall be of composition rubber and the cast iron valve clamps shall be packed with o-ring seals and held tight to the stem by a threaded bronze hex retainer ring and threaded bronze locknut, anchored with set screws.

Hydrant shall be designed for 150 psi working pressure and tested to 300 psi. Those portions of the hydrant above grade shall have two coats of red enamel. All unpainted surfaces shall have two coats of coal tar pitch varnish.

Depth of bury is 6'-6" from the bottom of the connection pipe to the grade line on the hydrant. Drain hole shall be plugged.

Each hydrant shall be equipped with one integral startz connection on the right nozzle when facing the hydrant. The startz connection shall be a five (5)-inch connector and shall be manufactured by Harrington, Inc. per HHS trademark

SERVICE CONNECTIONS

Service connections to the main must be made by the TOWNSHIP.

1. Service Pipe

Service pipe 2-inch and smaller shall be copper, conforming to the requirements of the Standard Specifications for Seamless Copper Water Tube, ASTM Designation: B 88, Type K, annealed. Connections in copper service pipe, if necessary, shall be made with copper to copper union fittings, Mueller No. H-1540K or approved equal. Plastic Water Services shall conform to ASTM D-2737, PE 3608 polyethylene plastic tubing (C.T.S.) water pipe. The pipe shall meet or exceed a minimum working pressure of 150 p.s.i. The pipe shall meet or exceed NSF Standard 14, & AWWA C901. Pack joint connections shall be utilized with plastic water services. Tracer wire shall be installed with all plastic water services. (Refer to Tracer Wire)

2. Curb Stops

One-inch curb stops used for service connections shall be Ford B22-444 ball valve, McDonald 6100, Mueller B-25204, or approved equal. Curb stops 1-1/2" shall be Ford B22-666, McDonald 6100, or approved equal. Two-inch curb stops shall be Ford B44-777, McDonald 6100, or approved equal. All parts shall be cast from bronze. They shall have an inverted key stop. Both inlet and outlet connections shall be able to receive the flared end of the copper service pipe. Curb Stops for Plastic Water Services shall be Mueller P-35209 or approved equal.

3. Curb Boxes

Curb boxes shall be Extension Type "Arch Pattern" curb boxes, Mueller No. H-10306 or approved equal for one-inch curb stop, and Mueller No. H-10310 or approved equal for one-and-one-half-inch and two-inch curb stops. Cast-iron lids shall have the word "WATER" plainly cast on top, and shall have a threaded brass plug removable for inserting of shut off rod. Bases shall be six inch six inches long extended, and shall telescope to not more than five feet six inches. The shut off rods shall be no longer than 2 feet.

4. Saddles

Taps larger than 1-inch in existing 6" (d.i.p.) mains and larger than 1-1/2 inch in 8" (d.i.p.) mains shall be made with saddles. Saddles shall be Smith-Blair No. 325, Mueller BR2S Series or approved equal. Saddles shall be utilized for all taps (3/4"-2") into plastic water main (HDPE or PVC).

POLY PIG

The pig shall be a B-1 "Poly-Pig" manufactured by Pipeline Pigging Products or approved equal. The "Poly-Pig" shall be constructed of flexible open cell polyurethane foam with a polyurethane elastomer coating on the rear. The installation and location of all "Poly-Pigs" must be witnessed by the on site construction observer. All "Poly-Pigs" must be new and can be used once.

TRACER WIRE

Tracer wire to be used on open cut pipe shall be AWG #12 single strand copper with blue 30 mil HDPE insulation. Connections shall be made using 3M DBR-09964 wire connectors, or equal.

Tracer wire to be used on directional drill pipe shall be AWG #6 stainless steel braided with blue 30 mil HDPE insulation. Connections shall be made per the manufacturer's recommendations.

B. CONSTRUCTION

EXCAVATION

The Contractor must have a "Competent Person" pursuant to MIOSHA on-site at all times.

The Contractor shall do all the excavation required for the construction of the mains and appurtenances, including clearing of the site for the work and the removal and disposal of all materials necessary to be removed for construction.

Excavated materials may be temporarily stored along the trench, unless otherwise noted, in a manner that will not cause damage to trees, shrubs, fences, or other property, nor that will endanger the bank stability of the trench by imposing too great a load thereon.

Excavations shall be adequately braced and/or sheeted to prevent caving or squeezing of the soil, or disturbing existing utilities or pavement, and shall be completely dewatered prior to construction of the water mains and other structures.

The subgrade shall be accurately prepared to line and grade so that the pipe, when laid, shall have uniform bearing upon the approved backfill, throughout its length. Pipe bells shall be under cut.

The trench shall be backfilled closely behind the pipe laying. Unless otherwise directed or permitted by the Township Engineer, the backfilling shall follow at least two lengths behind pipe laying and shall be completed to the top of the trench not more than five lengths behind pipe laying.

Pavement cutting, maintenance and reinstatement shall be done in a manner satisfactory to the Wayne County Department of Public Services and the Township Engineer.

PIPE INSTALLATION

Any pipe damaged in transport or handling will be marked "Rejected" and removed from the site by the Contractor.

Before lowering in the trench, and while suspended, each pipe and fitting shall be inspected for defects. Defective, damaged or unsound pipe shall immediately be removed from the construction site. The interior of each pipe shall be inspected for cleanliness and cleared of all dirt and foreign matter before being lowered into the trench.

Unless otherwise directed, pipe shall be laid with bell ends facing in the direction of laying. After a length of pipe is placed in the trench, the spigot shall be centered in the bell of the adjacent pipe, the pipe shoved into position and brought to a true alignment. It will then be secured with sand backfill tamped under and on each side of the pipe, except at bell holes. No earth or other foreign matter shall be allowed to enter the joint space.

In handling and placing ductile iron pipe and fittings, no metal shall be used in contact with the inside of the pipe to fit or support the pipe. The pipe shall be moved only through the use of ball slings or automatic release type pipe tongs. Care shall be taken not to injure the pipe or pipe coating, and no damaged or imperfect pipe shall be used in the work except that minor damage to pipe coating may be repaired subject to the review of the Township Engineer.

Wherever deflections at joints are required by changes in grade or alignment or to plumb valve stems, the deflection at any bell and spigot joint shall not exceed that which will cause the spigot end of pipe to be away from home in the bell of the adjacent pipe a distance of 1/4 inch at the point of greatest opening.

The deflection at any mechanical joint shall not exceed three-quarters of the maximum deflection recommended by the manufacturer or 3 degrees, whichever is more conservative of the joint used.

Where necessary to cut pipe, cutting shall be done with approved tools and cut ends of pipe shall be square and regular. Cutting shall be done in a manner to avoid damage to lining and coating. Minor damage may be repaired subject to review of the Township Engineer.

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REV.	7	01/13	UPDATE TEXT FOR FITTINGS AND CONNECTIONS
REV.	6	05/11	UPDATE TEXT FOR HYDRANT TYPE TO MATCH DETAIL
REV.	5	01/10	MISCELLANEOUS REVISIONS FOR ORDINANCE UPDATE
REV.	4	08/08	ADDED SPEC. FOR POLYPIG AND TRACE WIRE
REV.	3	08/07	UPDATED PER TOWNSHIP
REV.	2	2/98	REVISED FIRE HYDRANT AND VALVE SPECIFICATION
REV.	1	11/96	ADOPTED WCDPS TRENCH REQUIREMENTS
		6/95	ORIGINAL ISSUE.

DRAWN BY: B.W.A.

CHECKED BY: G.A.T., C.E.

To prevent trench water from entering the pipe, joints which for any reason may not be completed as the pipe is laid shall be thoroughly packed with approved material, in a manner to make them watertight. Open ends of fittings shall be tightly closed with approved plugs and well packed as shall the end of the last pipe laid whenever work is not in progress. Pipe shall be laid at depths to provide minimum cover of 6'-0" over the top of the pipe unless otherwise noted on the plans or elsewhere in these specifications.

BEDDING

The main shall be laid on a compacted granular subgrade, minimum 4-inches thick. Granular backfill material shall be placed around and above the main to a height of not less than 12-inches above the crown of the pipe.

Granular material shall conform to Class II material as defined in MDOT 902.08 and shall be placed in not more than 6-inch layers and compacted to not less than 95% of the maximum unit density as determined at optimum moisture content.

BACKFILL

Backfill is defined as that material placed into the trench from the top of the standard pipe bedding to the ground surface.

Trench backfill requirements are as follows:

Trench	Location	Backfill Requirements
A.	Open areas and all areas not in compliance with the trench locations identified for trench B.	Selected excavated or other approved backfill material shall be placed, after standard bedding (2" layers, loose measure, with each layer compacted to not less than 95% of its maximum unit weight at optimum moisture content per A.A.S.H.T.O.-180 or by M.D.O.T. Cone Density Method.
B.	Under existing or proposed pavement. Sidewalk, paved driveways, curb and gutter, and where pipe bottom is within one on one influence of pavement.	Backfill shall be full depth mechanically compacted Class II granular material constructed in 6" layers, loose measure, with each layer compacted to not less than 95% of its maximum unit weight at optimum moisture content per A.A.S.H.T.O.-180 or by M.D.O.T. Cone Density Method.

For areas not requiring granular backfill, backfill shall be of the excavated material, with the exception that materials such as soft clay, topsoil, muck, cinders, vegetable matter, refuse, stone larger than 3 inches in any dimension and other objectionable and non-packing earth shall be excluded from the backfill and removed from the site by the Contractor.

Where water main is constructed in pavement areas or where water main is within a one-on-one influence of pavement, compaction testing shall be performed by an independent testing laboratory. Testing shall be performed at intervals of one test per 75 feet of trench or as determined necessary by the Township Engineer.

Backfill shall not be placed against any portion of a structure until the structure has passed inspection and has been approved by the Township Engineer for backfilling. All trenches shall be backfilled as soon as inspection is completed in order to avoid unnecessary risk or damage to the structure and also to reduce the risk of accidents involving the public.

Prior to backfilling, all underground utilities encountered, shall be adequately protected by the use of supporting concrete or timber bents (to be left in place) of such a size and construction as to effectively prevent failure of the utility in settlement.

If a bulldozer or other machine is used to place the backfill material, no material shall be pushed or dropped into the trench, but shall be placed on the sloping ends of the completed backfill, and allowed to roll in place to the bottom of the trench.

UTILITY CROSSINGS

A minimum of 18-inches clearance shall be provided between the water main and any existing underground facility, unless otherwise approved by the Township Engineer. Whenever a main is installed under any existing utility line such as gas, buried electric power, telephone line, sewer or water, provisions shall be made to properly support or distribute any concentrated load to avoid settlement and possible failure of either main. Such provisions shall consist of 6A crushed clean limestone bedding of the main, complete 6A crushed clean limestone encasement, or some other method as shown on the plans. Water mains passing under sewers, in addition, shall be protected by providing:

- A vertical separation of at least 18-inches between the bottom of the sewer and the top of the water main.
- Adequate structural support for the sewer to prevent excessive deflection of joints and settlement of the sewer about the water main, i.e., a 6A crushed clean limestone saddle under the pipe with a span length extending to undisturbed earth bearing saddle under the pipe with a span length extending to undisturbed earth bearing.

TUNNELING OR BORING

When tunneling of the water main is required it shall be in accordance with the current Wayne County Department of Public Services Requirements for Construction within Road Right of Way or Parks under Jurisdiction of the Board (Revised June 1, 1980).

When tunneling by jacking or boring, all voids shall be filled by means of pressure grouting with a 1:3 cement-sand mortar. This work must be accomplished within 24 hours after the conduit crossing has been completed. The tunneling shall extend a minimum of 10 feet outside the edges of the County road pavement. Pressure grouting will not be required for casings 4' in diameter or smaller unless the voids are 1' or larger.

DIRECTIONAL DRILL APPLICATIONS

1. Joining of Polyethylene Pipe or Polyvinylchloride (PVC) Pipe Main Line

Sections of polyethylene pipe shall be assembled and joined by the butt fusion process into continuous lengths on the job site above the ground. The joining method shall be the heat fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations and ASTM Standard D2657 Practice for Heat-Joining of Polyolefin Pipe and Fittings. The heat fusion equipment used in the joining procedures shall be capable of meeting all conditions recommended by the pipe manufacturer. Hot fusion joining of HDPE end sections and fittings may be performed in

THRUST BLOCKS

Concrete thrust blocks shall be placed at all 1 1/4 degree or greater bends, dead-ends, fittings, tees, hydrants and at crosses where required by the Township Engineer.

Thrust blocks shall bear on undisturbed soil and shall be 3000 psi concrete.

In unstable soil conditions, the thrust blocks are to be supported by removal of the unstable soils and replacement with ballast of sufficient stability to resist the thrusts. All thrust blocks shall be approved by the Township Engineer before backfilling.

All water main fittings shall be designed with joint restraint. Engineers are to submit joint restraint calculations based on individual site conditions. Engineers refer to DIPRA Thrust Restraint Design for Ductile Iron Pipe.

GATE WELLS AND VALVES & ADJUSTMENT

Gate valves shall be of the size and installed at the location as shown on the plans. They shall be set square with the line of the main, and unless otherwise directed by the Township Engineer, all gate valves shall be set with stems plumb. At each side of gate valve, the Contractor shall furnish and install a 1-inch corporation stop on the main as shown on the Standard Details.

The joint between a precast riser section and the base of the structure shall be set in a full bed of mortar and pointed inside and out. The butt section of the precast riser shall be full wall thickness in bearing on the masonry base. Bell or spigot ends will not be permitted.

All precast section joints and lift holes shall be pointed and plugged, inside and outside, with mortar.

Where gate wells are located outside of pavements and sidewalks, the final grade adjustments shall be made with pre-cast concrete grade adjustment rings; brick construction will not be allowed except where located in paved surfaces. Grade rings shall be a minimum of 3 inches thick, reinforced with 2 full circles of 3/16" diameter steel reinforcing wire. Manhole casting frame concrete adjustment rings shall be secured to the precast cone section with a minimum of four 5/8" diameter cadmium coated threaded studs or bolts. All joints in the assembly shall be sealed with 2 rows of butyl rope. The maximum allowable grade adjustment using grade rings shall be 11 inches.

The final grade adjustment for manholes located in pavements and sidewalks shall be made with brick and mortar. A maximum adjustment of 11 inches shall be placed on top of the precast cone section. This height shall not include the height of the casting.

HYDRANTS

Hydrant leads shall have a minimum of 6.0 feet of cover in all areas, including crossings through ditch sections.

Hydrants shall be carefully plumbed, braced and backfilled so they remain plumb.

All grade, facing, and vertical alignment adjustment of hydrants shall be completed prior to pressure testing and charging of the hydrants.

All hydrants shall be cleaned and painted with a rust inhibitive, oil base paint such as "Rustoleum" or approved equal to the Township's color code prior to acceptance.

The lubricant reservoirs in all hydrants having such construction shall be filled with a lubricant acceptable to the Michigan Department of Environmental Quality and recommended by the hydrant manufacturer.

Backfilling around fire hydrants shall be carefully tamped sand in 12-inch layers from the centerline of the lead main to a height of 1-foot below finished grade.

Contractor shall place burlap sack or equivalent material over the hydrant nozzles after installation.

Fire hydrant nozzles shall be aligned as required by the Township Fire Chief.

Stortz connector shall be installed integral to hydrant per manufacturer specifications and installation procedures for the Harrington Hydrant stortz HHS trademark.

CONNECTIONS

All connections to existing water mains shall be made at the locations as shown on the plans.

No connections to existing water mains shall be made until after the new main has passed the bacteriological and hydrostatic tests.

All valves shall be operated by the Northville Township Water and Sewer Department.

C. TESTING

All tests shall be conducted under the supervision of the Township Engineer. All water mains, branches and valves shall be poly-pigged for cleaning, disinfected and pressure tested for leakage. A copy of all test results shall be furnished to the Township Engineer. Contractor shall furnish all material and labor to provide for an acceptable full size blow-off to flush the poly-pig out of the main at the far end of the project not connected to the existing system.

1. SEQUENCE

All water mains connected to an existing water system shall be flushed, chlorinated and bacteriological tested prior to pressure testing. The sequence for acceptance testing shall be:

- Connect to system on one end
- Flushing with approved B-1 poly-pig
- Chlorination
- Flushing
- Bacteriological Testing
- Pressure testing
- Connect to system at all other locations

Where mains can be totally isolated from the existing water system with airgaps, pressure testing shall precede chlorination and bacteriological testing. The sequence for acceptance testing shall be:

- Pressure testing
- Connect to system at one end.
- Flushing with approved B-1 poly-pig
- Chlorination
- Flushing
- Bacteriological Testing
- Connect to system at all other locations

2. FLUSHING

- The first flush of the water main shall be done with the use of a "Poly-Pig". The connection location and number of "Poly-Pigs" required to flush a project will be determined by the Township Engineer prior to the installation of the water main. The pig shall be a B-1 "Poly-Pig" manufactured by Pipeline Piping Products or approved equal. The "Poly-Pig" shall be constructed of flexible open cell polyurethane foam with a polyurethane elastomer coating on the rear. The installation and location of all "Poly-Pigs" must be witnessed by the site construction observer. All "Poly-Pigs" must be new and can be used once.
- Mains shall be flushed with clean potable water until the water runs clear.

3. CHLORINATION

All new mains and pipe or any existing mains contaminated by the Contractor shall be chlorinated to a minimum residual chlorine concentration of fifty (50) parts per million with commercial liquid chlorine solution or approved equal.

The chlorinated water shall be allowed to stand in the mains for 24 hours. At the end of the 24-hour period the chlorinated water at all parts of the mains shall show a free available chlorine residual of not less than fifty (50) parts per million. After another 24 hour period the chlorinated water at all parts of the mains shall show a free available chlorine residual of not less than twenty-five (25) parts per million. The chlorinated water shall then be removed from the mains and the mains flushed with potable water until the free available chlorine residual is five (5) parts per million or less. Upon meeting the five (5) parts per million chlorine residual the water is required to stand in the water main for 24 hours prior to taking the bacteriological samples.

4. BACTERIOLOGICAL TESTING

Bacteriological samples shall be taken by an independent laboratory certified by the State of Michigan, hired by the contractor, and approved by the Township Engineer. The Township Engineer will witness the sampling and delivery of the sample to the private laboratory. The Contractor shall require the independent laboratory representative to take bacteriological samples of the water in the mains for analysis of two different times. The first samples will be taken 24 hours after the mains have been satisfactorily chlorinated, flushed and filled with potable water. The second sample will be taken after a minimum 48 hours subsequent to taking the first samples. No continuous flushing of the main will be allowed during the sampling period.

The contractor shall provide a sufficient number of corporation stops and copper tubing for taking samplers. Samples shall not be collected from hoses.

5. PRESSURE TESTING

Testing against the valve will not be permitted, except for the valve at the one connection made for poly-pigging the water main. Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants are not available at high points, the Contractor shall make the necessary taps to release the air and insert plugs after the test has been completed, or install corporation stops and leave them in place after testing. Preliminary pressure testing of the mains shall be done by the Contractor to ascertain if there are any breaks.

Temporary connections (jumpers) between existing water mains and the newly constructed system for testing purposes, shall include a reduced zone backflow preventer (Watts 900, Febco 825Y, or approved equal) to prevent backflow and possible contamination of the public water. The Contractor must contact the Township Water Department for meter and backflow preventer.

Lengths in excess of 2000 feet, only the allowable leakage for 2000 feet will be permitted. The Contractor shall pressure test sections of water main as sections of 2000 feet or less unless otherwise authorized by the Township Engineer. When permitted to test.

All ductile iron and PVC, C-900/C-905 water mains shall be subjected to a hydrostatic pressure of 150 psi based on the elevation of the lowest point in the system. The main shall be maintained under the test pressure for a minimum continuous period of two (2) hours by pumping potable water into the line at frequent intervals. The volume of water so added shall be measured and considered to represent the leakage from the main. No pipeline installed will be accepted until the leakage measured is less than 0.092 gallons per inch diameter of the pipe per 1,000 feet. All visible leaks must be corrected.

In the event that the leakage exceeds the specified amount, the main shall be carefully inspected for leaks and repaired as necessary. Any cracked or defective pipe, fittings, valves or hydrants discovered shall be removed and replaced with sound material and the test repeated to the satisfaction of the Township Engineer.

All HDPE water main shall be pressure tested after the line and all fittings and valves have been installed and before being put into service. Mechanical joint or flange joint connections may be left exposed for visual leak inspection. Pressure testing shall be conducted in accordance with this specification, the standard specification/detail drawings, and manufacturer's recommended procedure.

After all free air is removed from the test section, raise the pressure at a steady rate to the required pressure. The pressure in the section shall be measured as close as possible to the lowest point of the test section.

Test pressure should not exceed 1.5 times the rated operating pressure of the pipe or the lowest rated component in the system. Initially, the pipe should be raised to test pressure and allowed to stand without make-up pressure for a sufficient time to allow for expansion of the pipe. This usually occurs within 2-3 hours. After equilibrium is established, the test section is pressurized to 1.5 times operation pressure, the testing pump is turned off, and the final test pressure is held for 1, 2 or 3 hours. Polyethylene pipe is tested by measuring the makeup water required to return the section to test pressure. Allowable amounts of makeup water for expansion during the pressure test are shown in the table below. If the test pressure is not returned within the allowable volume of water, the test fails. If there are no visual leaks or significant pressure drops during the final test period, the pipeline passes the test.

Allowance for Expansion Under Test Pressure *
(U.S. Gallons/100 Feet of Pipe)

Nominal Pipe Size (Inches)	1 Hour Test	2 Hour Test	3 Hour Test
3	0.10	0.15	0.25
4	0.13	0.25	0.40
6	0.30	0.60	0.90
8	0.50	1.0	1.5
10	0.75	1.30	2.10
11	1.0	2.0	3.0
12	1.1	2.3	3.4
14	1.4	2.8	4.2
16	1.7	3.3	5.0
18	2.2	4.3	6.5
22	3.5	7.0	10.5
24	4.5	8.8	13.3
28	5.5	11.1	16.8
32	7.0	14.3	21.5
36	9.0	18.0	27.0
40	11.0	22.0	33.0
48	15.0	27.0	43.0

*These allowances only apply to the test period and not to the initial expansion phase.

Changes in temperature will increase or decrease the apparent test pressure in any piping system. When possible, testing should be done during periods of relatively stable atmospheric temperatures.

Under no circumstances shall the total time under the test exceed eight (8) hours at 1.5 times the pressure rating of the lowest rated component in the system. If the test is not completed due to leakage, equipment failure, etc., the test section shall be allowed to relax for eight (8) hours prior to the next test.

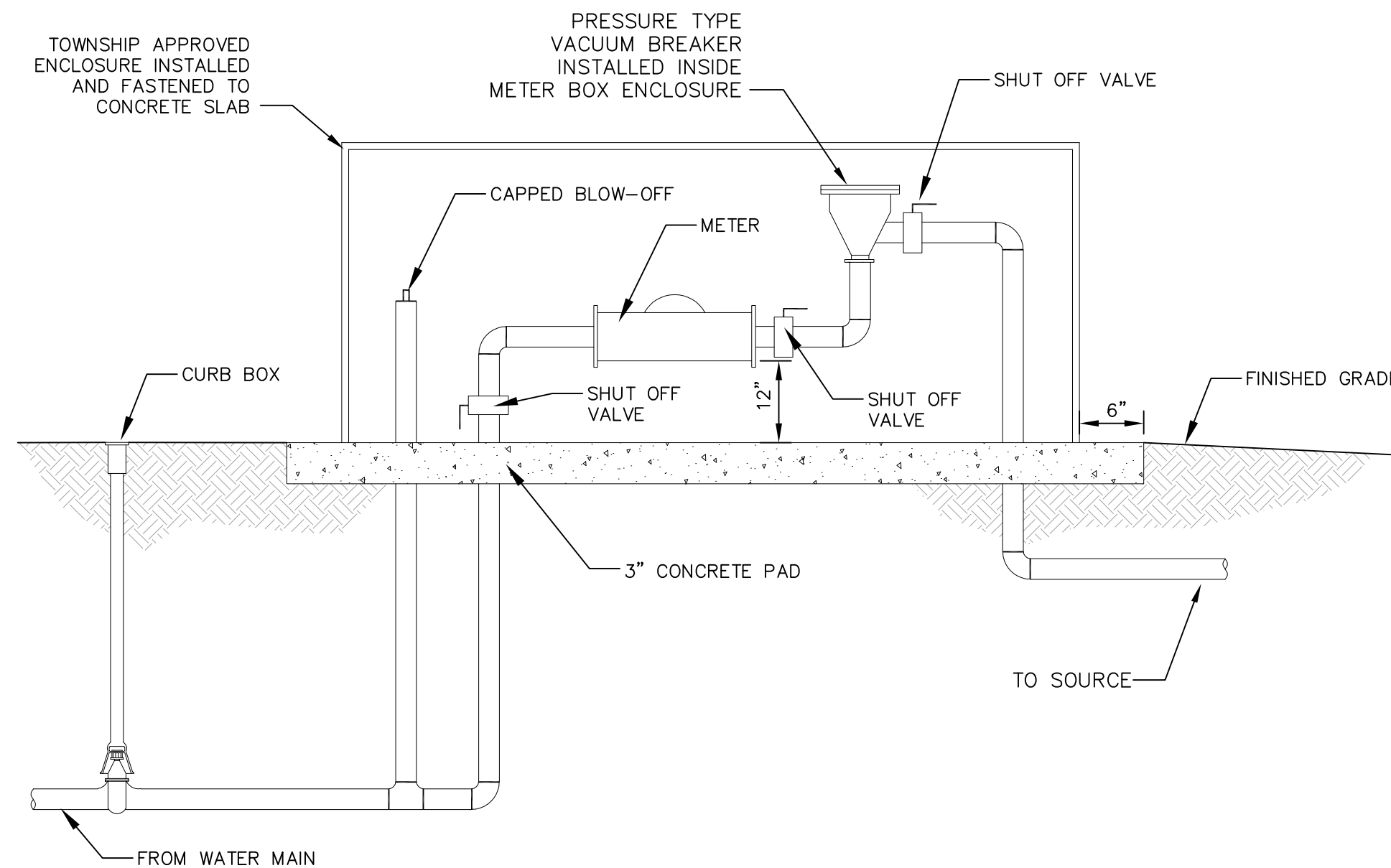
COMPACTION TESTING

Where water main is constructed in pavement areas or where the main is within a one on one influence of pavement, compaction testing shall be performed by an independent testing laboratory.

Testing shall be performed at intervals of one test per layer per 75 feet of trench or as determined necessary by the Township Engineer.

WATER MAIN CONSTRUCTION NOTES

- ALL WORKMANSHIP, MATERIALS, AND TESTING SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CHARTER TOWNSHIP OF NORTHVILLE AND THE DETROIT WATER AND SEWERAGE DEPARTMENT.
- A PRE-CONSTRUCTION MEETING SHALL BE SCHEDULED PRIOR TO THE EXPECTED START OF CONSTRUCTION WITH THE TOWNSHIP DEPARTMENT OF PUBLIC SERVICES AND THE TOWNSHIP ENGINEER. THE CONTRACTOR SHALL CONTACT THE TOWNSHIP DEPARTMENT OF PUBLIC SERVICES TO ARRANGE THE MEETING.
- CONTRACTOR SHALL SUBMIT A MINIMUM OF THREE (3) COPIES OF SHOP DRAWINGS TO THE TOWNSHIP ENGINEER FOR REVIEW OF COMPLIANCE WITH THE TOWNSHIP STANDARDS FOR ALL MATERIALS PROPOSED FOR CONSTRUCTION.
- CONTRACTOR SHALL NOTIFY THE TOWNSHIP WATER AND SEWER DEPARTMENT AT (248) 348-5820 AND THE TOWNSHIP ENGINEER AT (734) 761-1010 48 HOURS PRIOR TO THE START OF CONSTRUCTION.
- CONTRACTOR SHALL CALL MISS DIG AT (800) 482-7171 PRIOR TO START OF CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE DONE TO ANY EXISTING UTILITY DURING CONSTRUCTION.
- CONTRACTOR SHALL NOTIFY WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES, ENGINEERING DIVISION, PERMIT OFFICE, 48 HOURS PRIOR TO START OF CONSTRUCTION. [(734) 595-6504]
- CONTRACTOR SHALL SCHEDULE THE HYDROSTATIC TESTING DATE WITH THE CITY OF DETROIT WATER AND SEWERAGE DEPARTMENT AT (313) 833-4682.
- CONTRACTOR SHALL NOTIFY THE TOWNSHIP ENGINEER AND NORTHVILLE TOWNSHIP WATER AND SEWER DEPARTMENT AT (248) 348-5820 24 HOURS PRIOR TO FLUSHING OR CHLORINATION OF THE WATER MAIN.
- CONTRACTOR SHALL SCHEDULE THE BACTERIOLOGICAL SAMPLING DATES WITH THE TOWNSHIP'S ENGINEERING CONSULTANT.
- CONTRACTOR SHALL NOTIFY THE CITY OF DETROIT WATER AND SEWERAGE DEPARTMENT (313) 822-4682 48 HOURS PRIOR TO CONNECTING TO AN EXISTING WATER MAIN.
- CONTRACTOR SHALL SCHEDULE A FINAL INSPECTION OF THE COMPLETED WATER SYSTEM WITH THE TOWNSHIP ENGINEER AND DEPARTMENT PERSONNEL. HYDRANTS AND VALVES WILL BE CHECKED FOR POSITIONING AND WORKABILITY. A PUNCH LIST WILL BE SUBMITTED TO THE CONTRACTOR IN LETTER FORM, ENCLOSED WITH A LIST OF ITEMS NECESSARY FOR THE FINAL ACCEPTANCE OF THE PROJECT. ITEMS NECESSARY TO RECEIVE ACCEPTANCE INCLUDE (1) BILL OF SALE CONVEYING THE WATER SYSTEM AND ALL APPURTENANCES TO THE TOWNSHIP, (2) CONSTRUCTION RECORD DRAWINGS, (3) A ONE YEAR MAINTENANCE BOND, (4) A FINAL WAIVER OF LIEN FROM ALL CONTRACTORS AND SUBCONTRACTORS THAT WORKED ON THE PROJECT, AND (5) CONSTRUCTION RECORD EASEMENTS SIGNED ON THE CURRENT TOWNSHIP EASEMENT FORM.



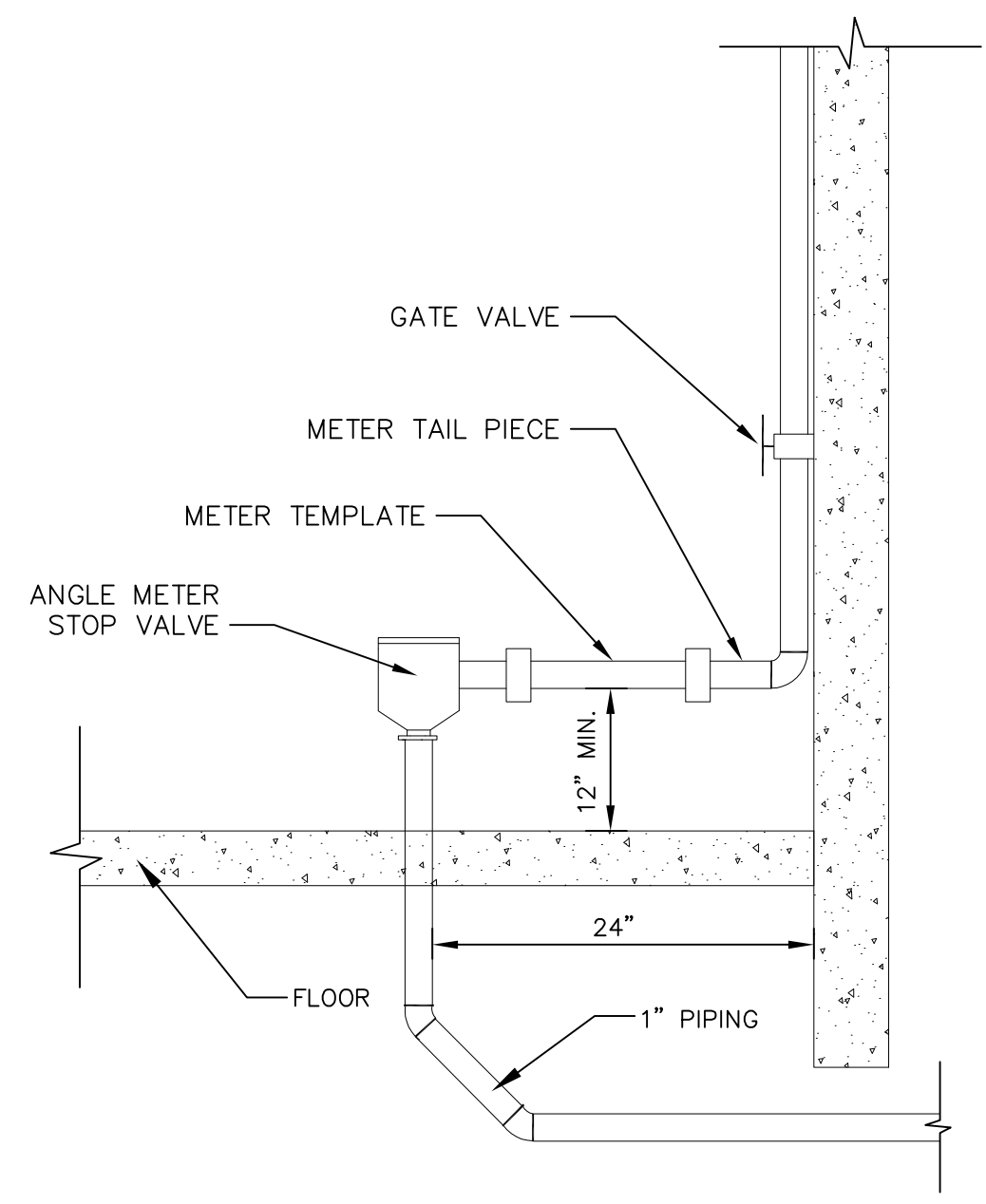
IRRIGATION METER ABOVE GROUND INSTALLATION
N.T.S.

PIPE (FOR POLYWRAPPED PIPE, RESTRAINT LENGTHS ARE IN FEET)						
SIZE	DEPTH	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND	DEAD END
4"	6"	28	12	6	3	50
6"	6"	39	16	8	4	71
8"	6"	52	21	10	5	93
12"	6"	74	30	15	7	133
16"	6"	95	39	19	9	172

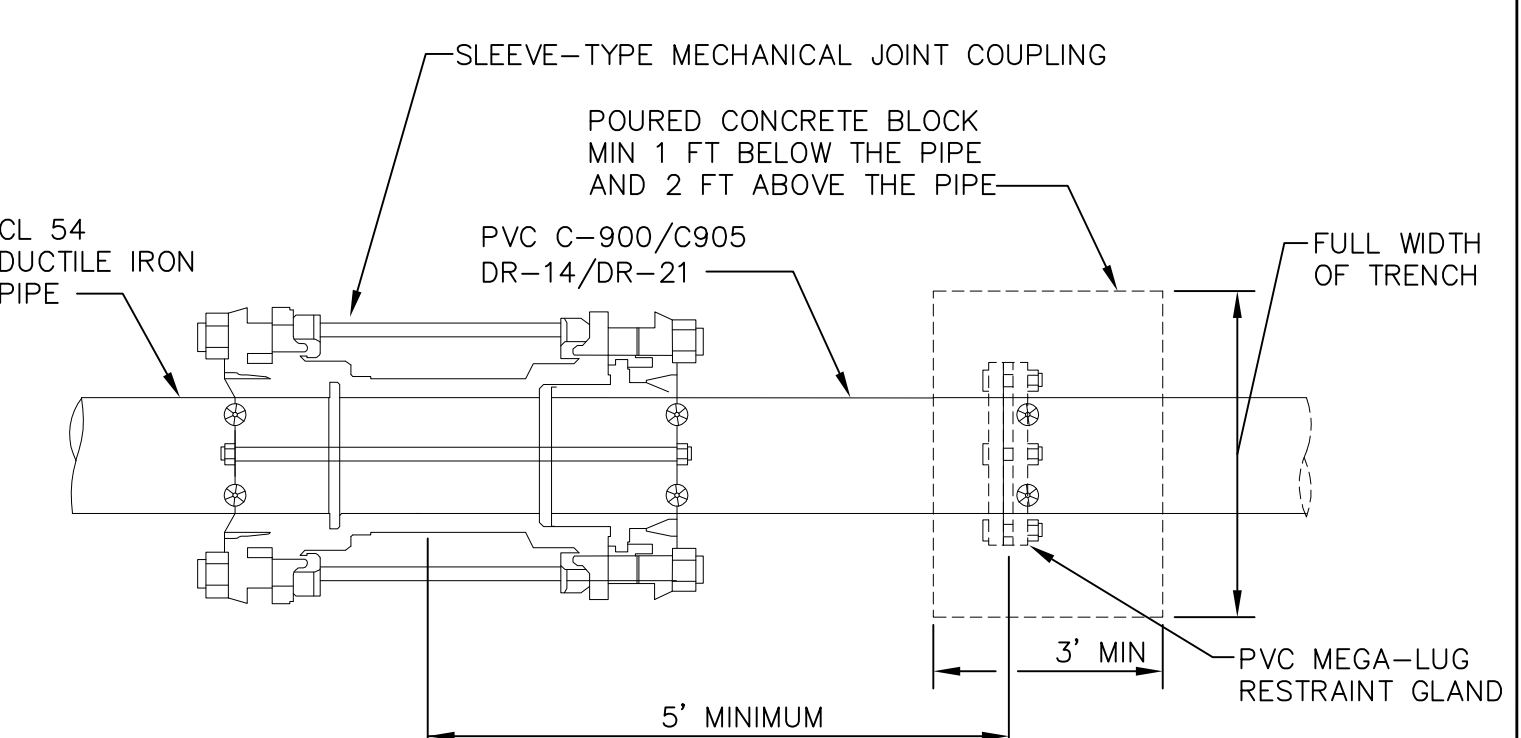
REDUCERS (FOR POLYWRAPPED PIPE, RESTRAINT LENGTHS ARE IN FEET)							
RESTRAINT LENGTH ON 16" SIDE	RESTRAINT LENGTH ON 12" SIDE	RESTRAINT LENGTH ON 8" SIDE	RESTRAINT LENGTH ON 6" SIDE	RESTRAINT LENGTH ON 4" SIDE			
16"x12"	73						
16"x8"	126	12"x8"	70				
16"x6"	145	12"x6"	97	8"x6"	39		
16"x4"	159	12"x4"	115	8"x4"	67	6"x4"	36

TEES (FOR POLYWRAPPED PIPE, RESTRAINT LENGTHS ARE IN FEET)							
16" RUNS	RESTRAINT LENGTH OF BRANCH	12" RUNS	RESTRAINT LENGTH OF BRANCH	8" RUNS	RESTRAINT LENGTH OF BRANCH	6" RUNS	RESTRAINT LENGTH OF BRANCH
16"x16"	172						
16"x12"	133	12"x12"	133				
16"x8"	93	12"x8"	93	8"x8"	93		
16"x6"	71	12"x6"	71	8"x6"	71	6"x6"	71
16"x4"	50	12"x4"	50	8"x4"	50	6"x4"	50

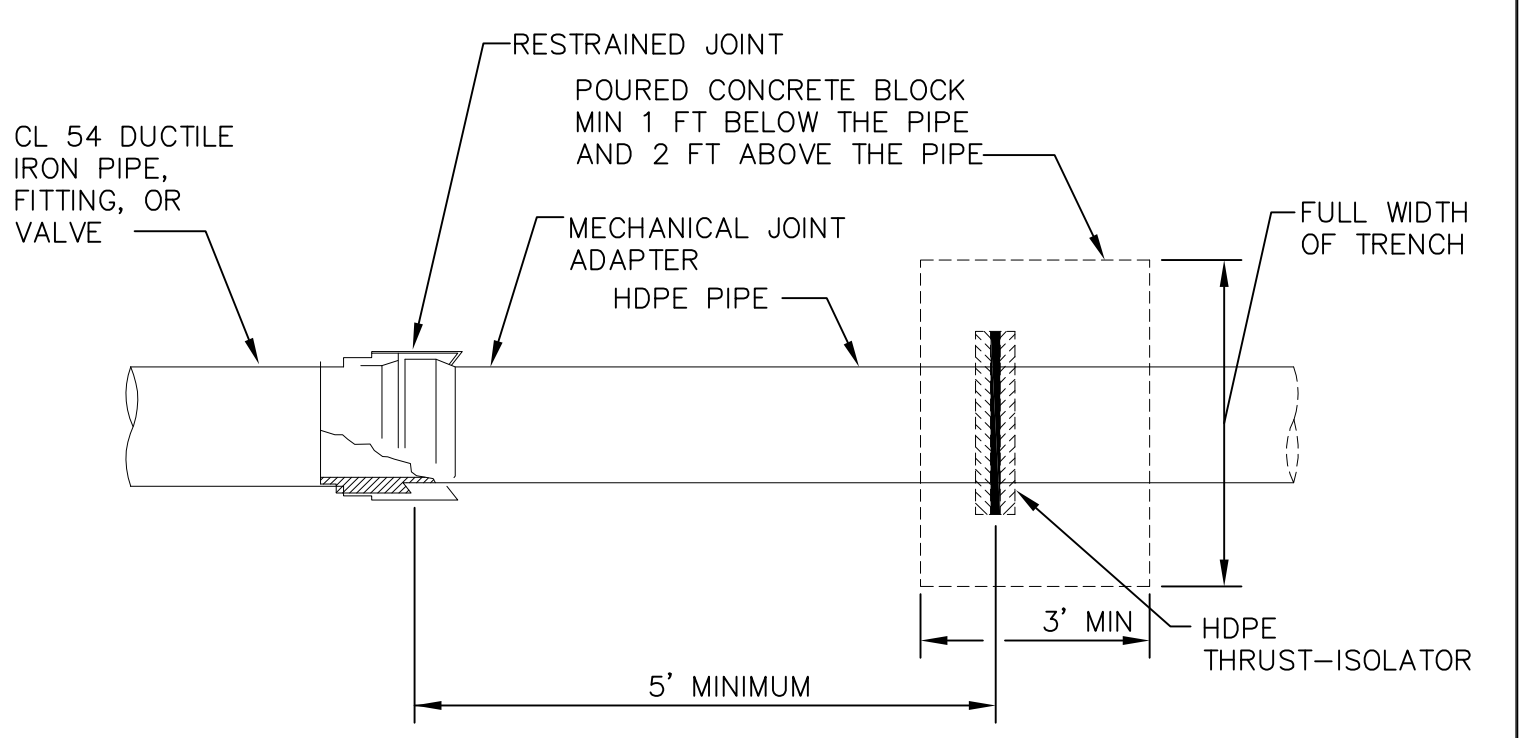
JOINT RESTRAINT CHART
N.T.S.



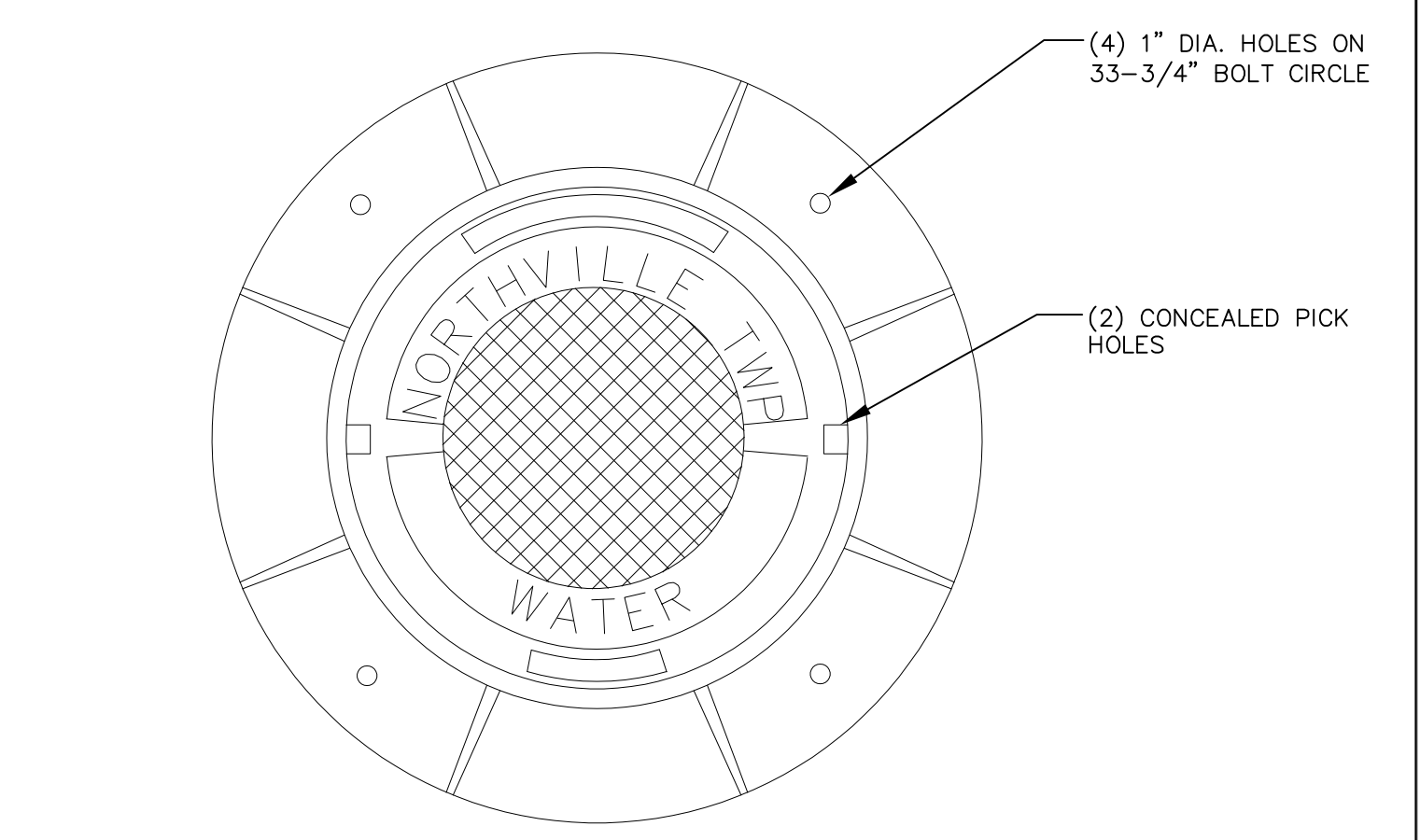
TYPICAL WATER METER TEMPLATE DETAIL
N.T.S.



PVC WATERMAIN MECHANICAL JOINT ADAPTOR/RESTRAINT DETAIL
N.T.S.



HDPE WATERMAIN MECHANICAL JOINT ADAPTER/RESTRAINT DETAIL
N.T.S.



EAST JORDAN IRON WORKS 1040-Z FRAME
EAST JORDAN IRON WORKS 1040 AGS COVER
EAST JORDAN IRON WORKS 1040-A WT (AS REQUIRED)

MANHOLE COVER

3 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 1-800-482-7171
FOR FREE LOCATION OF PUBLIC UTILITY LINES

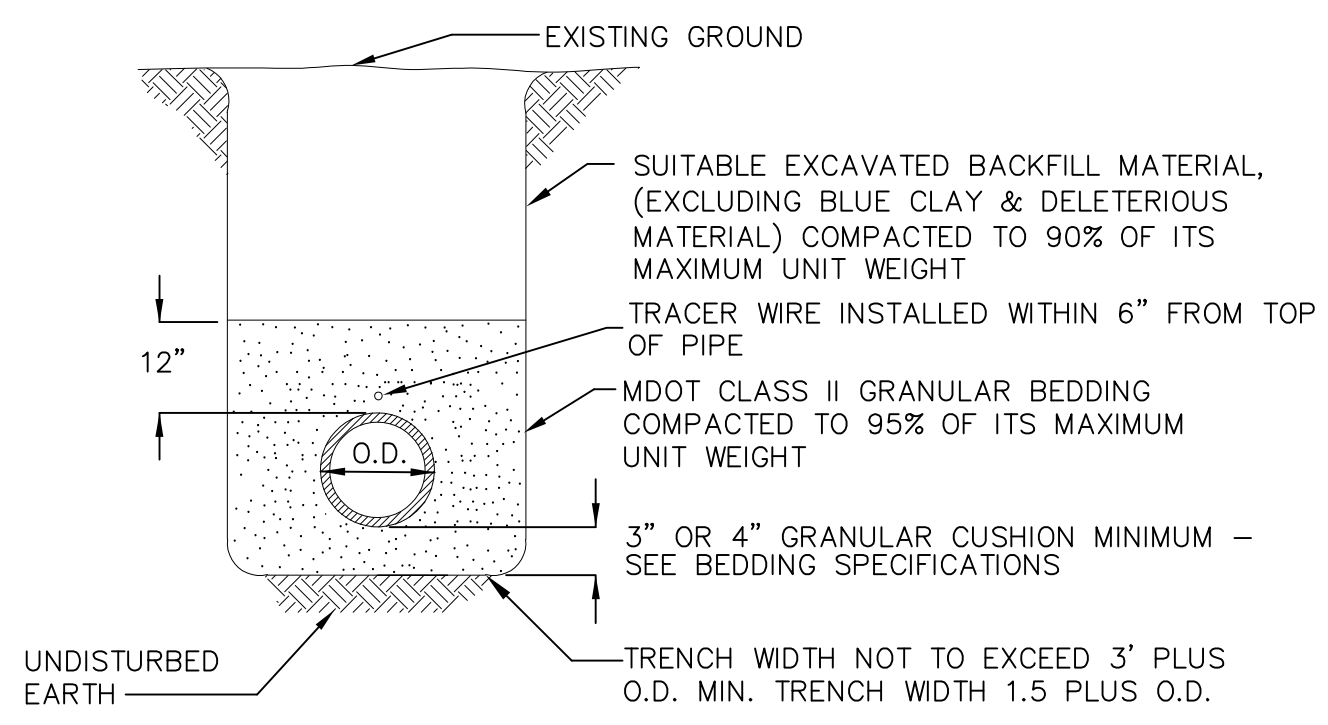
REV.	9	12/13	ADDED JOINT RESTRAINT CALCULATIONS
REV.	8	01/13	MANHOLE COVER, THRUST BLOCKS, TESTING
REV.	7	11/11	ADDED TYPICAL WATER METER TEMPLATE DETAIL
REV.	6	05/11	ADDED IRRIGATION METER DETAIL
REV.	5	01/10	MISCELLANEOUS REVISIONS FOR ORDINANCE UPDATE
REV.	4	08/08	ADDED SPEC. FOR POLYPIG AND TRACE WIRE
REV.	3	08/07	UPDATED PER TOWNSHIP
REV.	2	2/98	REVISED FIRE HYDRANT AND VALVE SPECIFICATION
REV.	1	11/96	ADDITIONAL WCDPS TRENCH REQUIREMENTS
REV.		6/95	ORIGIONAL ISSUE.
DRAWN BY: K.C.M., J.L.P.			CHECKED BY: D.P.W., T.M.M.



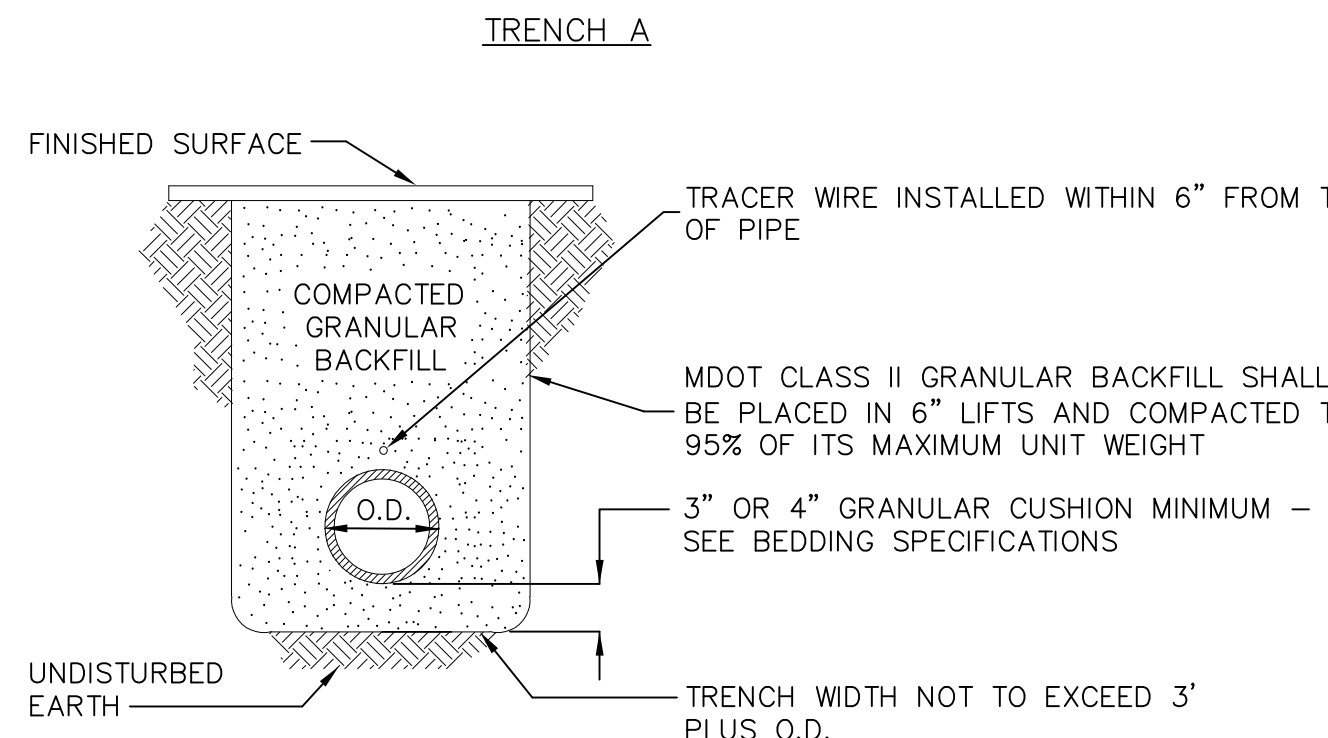
CHARTER TOWNSHIP OF NORTHVILLE
WATER MAIN SPECIFICATIONS/DETAILS

Stantec
SCALE: NONE
STANTEC
3754 RANCHERO DRIVE
ANN ARBOR, MI 48108
(734) 761-1010
stantec.com
REVISION
9

W-2

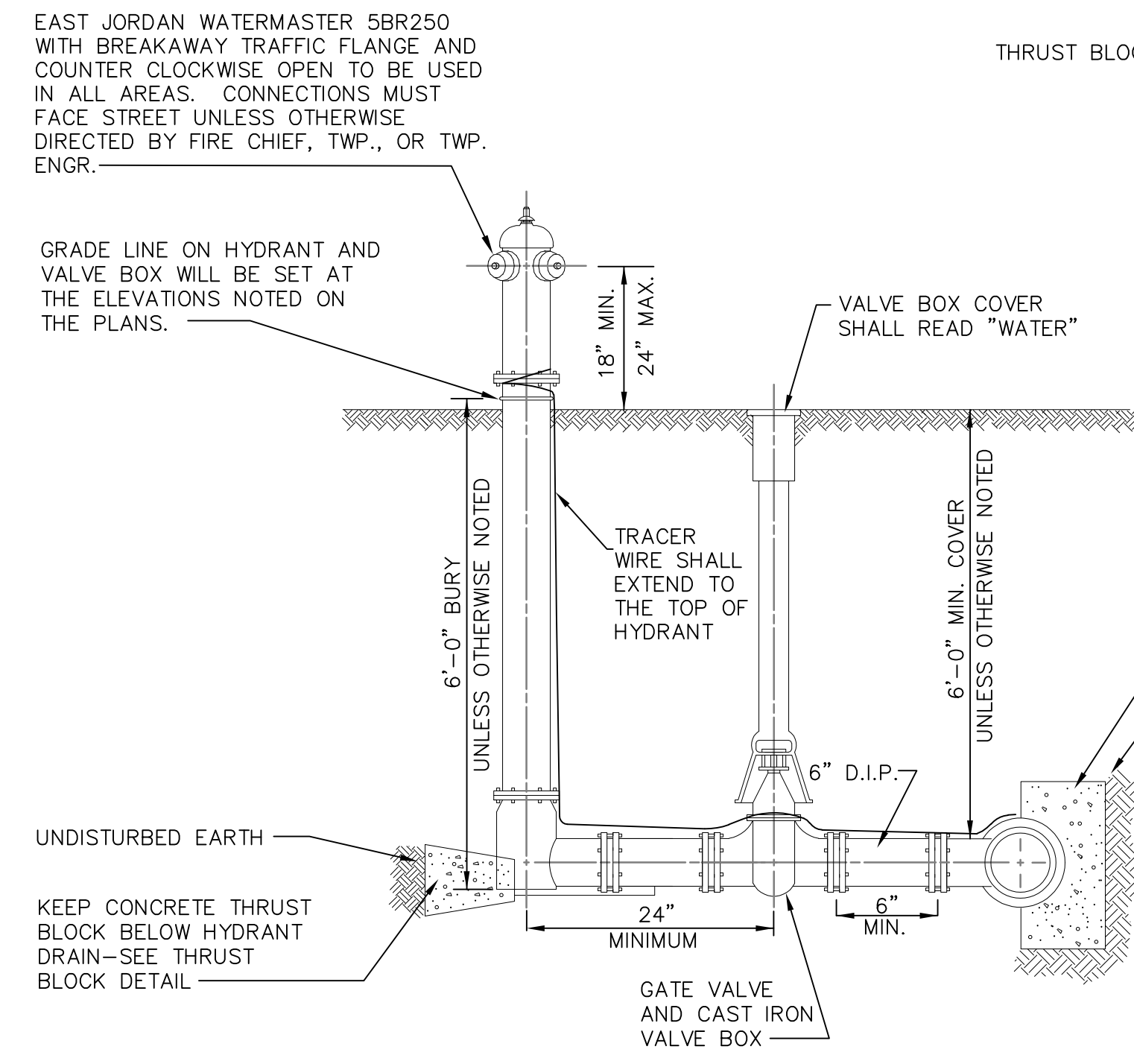


NOTE: TRENCH A SHALL BE USED UNDER ALL CONDITIONS IN WHICH TRENCH B DOES NOT APPLY.

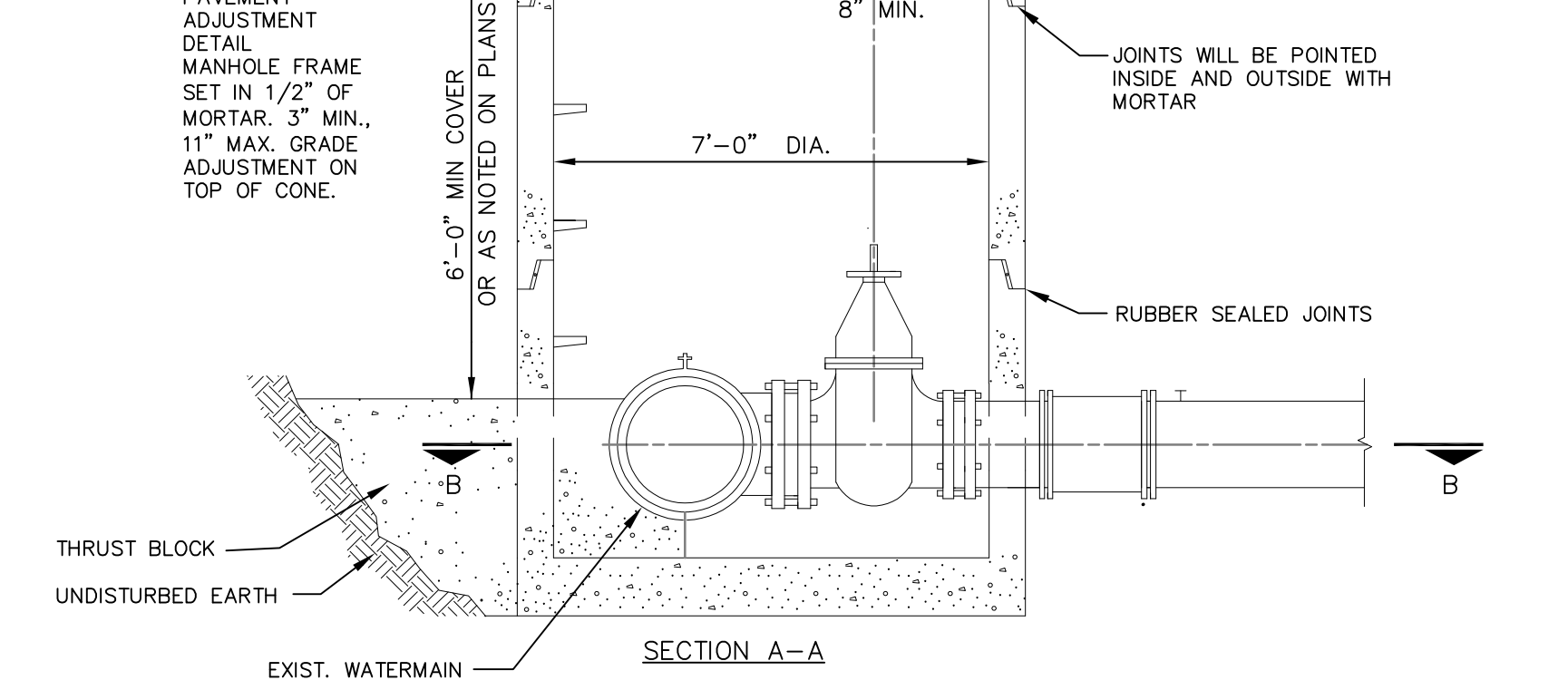
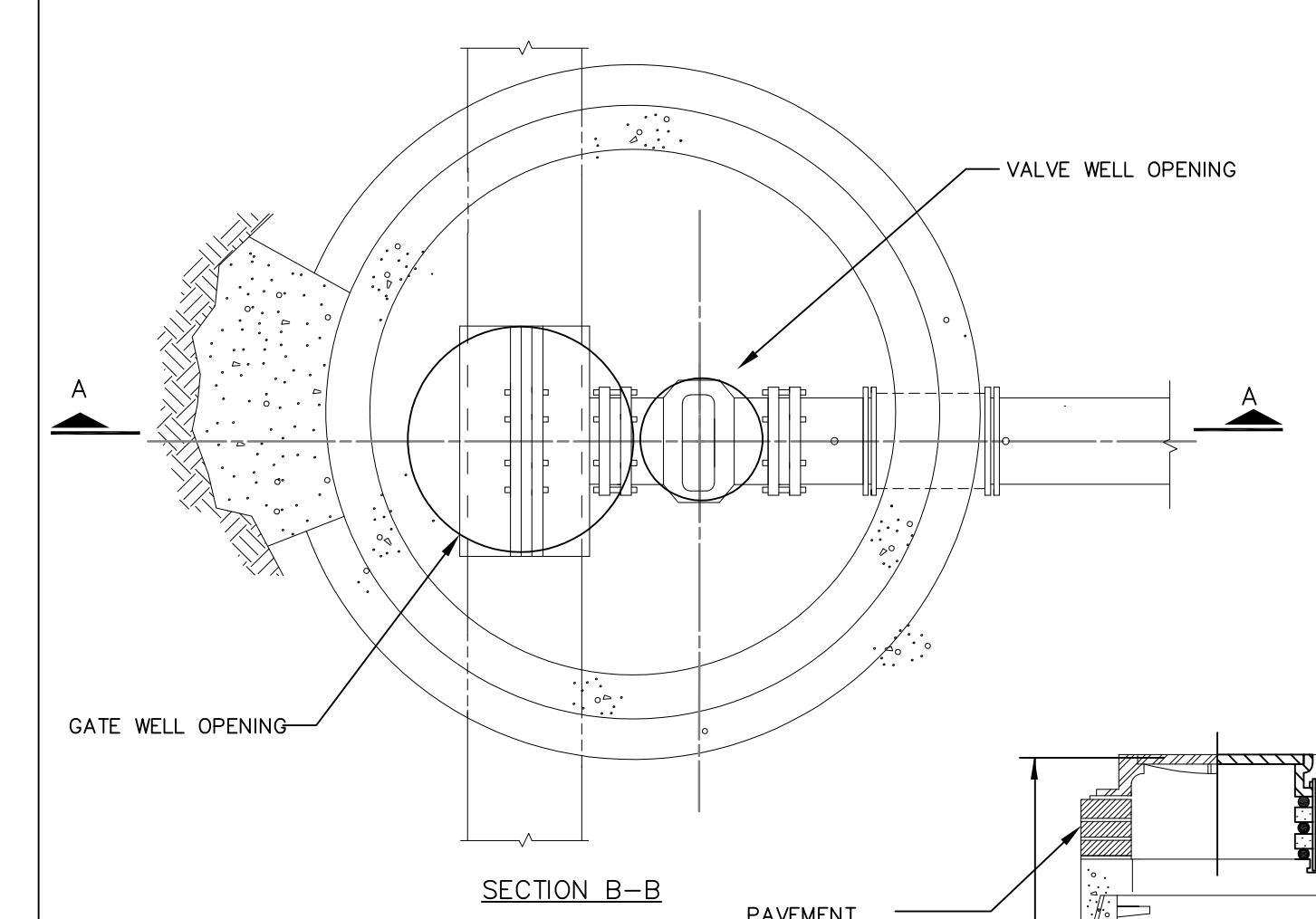


NOTE: TRENCH B SHALL BE USED UNDER ALL PAVEMENT CONDITIONS, SIDEWALK, CURB, & GUTTER, AND WHERE PIPE BOTTOM IS WITHIN 1 ON 1 INFLUENCE OF PAVEMENT.

TRENCH BEDDING AND BACKFILL NORTHVILLE WM-2 REV. 10/96



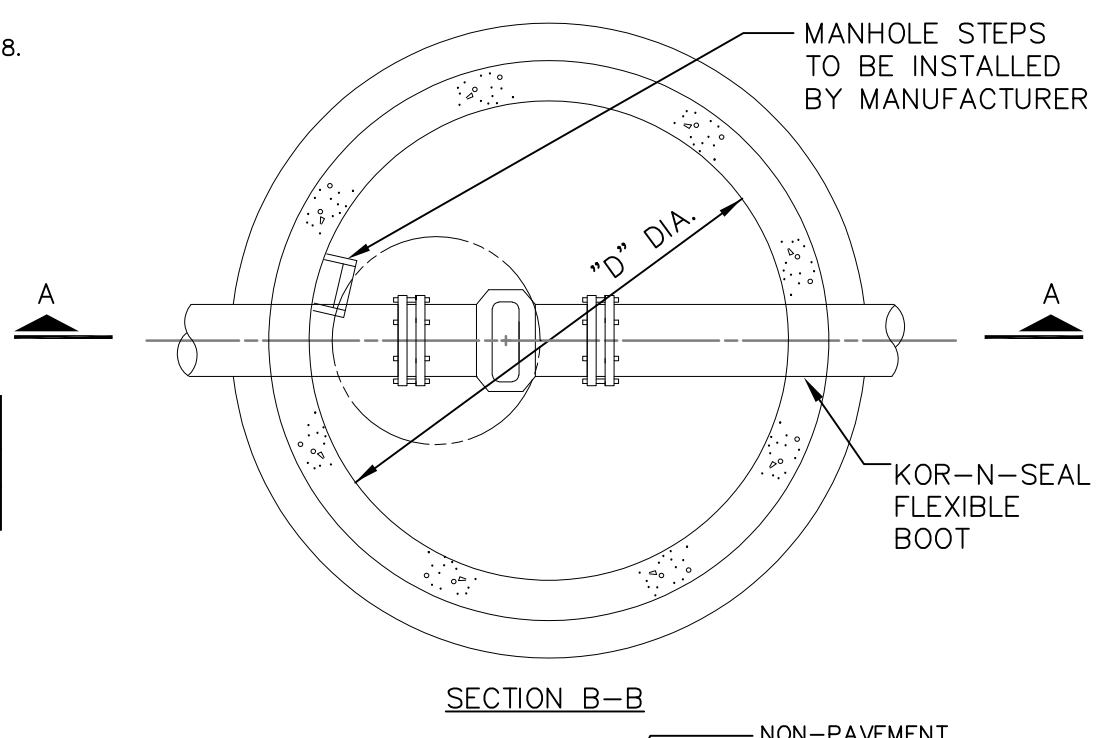
CROSS SECTION STANDARD FIRE HYDRANT NORTHVILLE WM-1 REV. 1/95



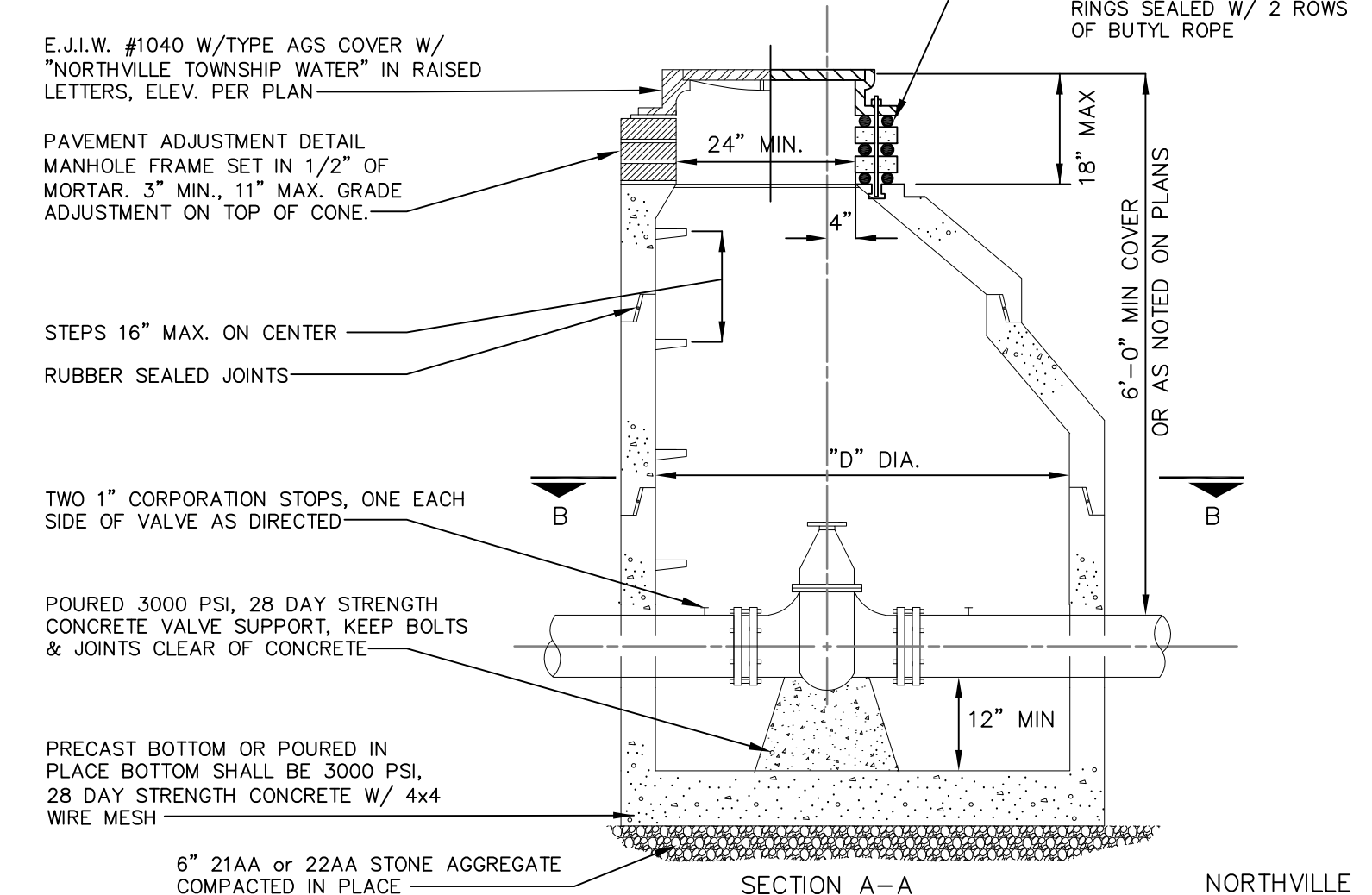
7 FOOT DIAMETER TAPPING GATE WELL

- GATEWELL NOTES
- SECTIONS SHALL MEET ASTM C478.
 - ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS.
 - GATEWELL TO HAVE FLAT TOP WITH ECCENTRIC OPENING.

- GATEWELL NOTES
- SECTIONS SHALL MEET ASTM C478.
 - ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS.
 - FOR 6" GATEWELL, CONE TO BE ECCENTRIC TYPE.
 - FOR 7" GATEWELL PROVIDE FLAT TOP WITH OFFSET OPENING.

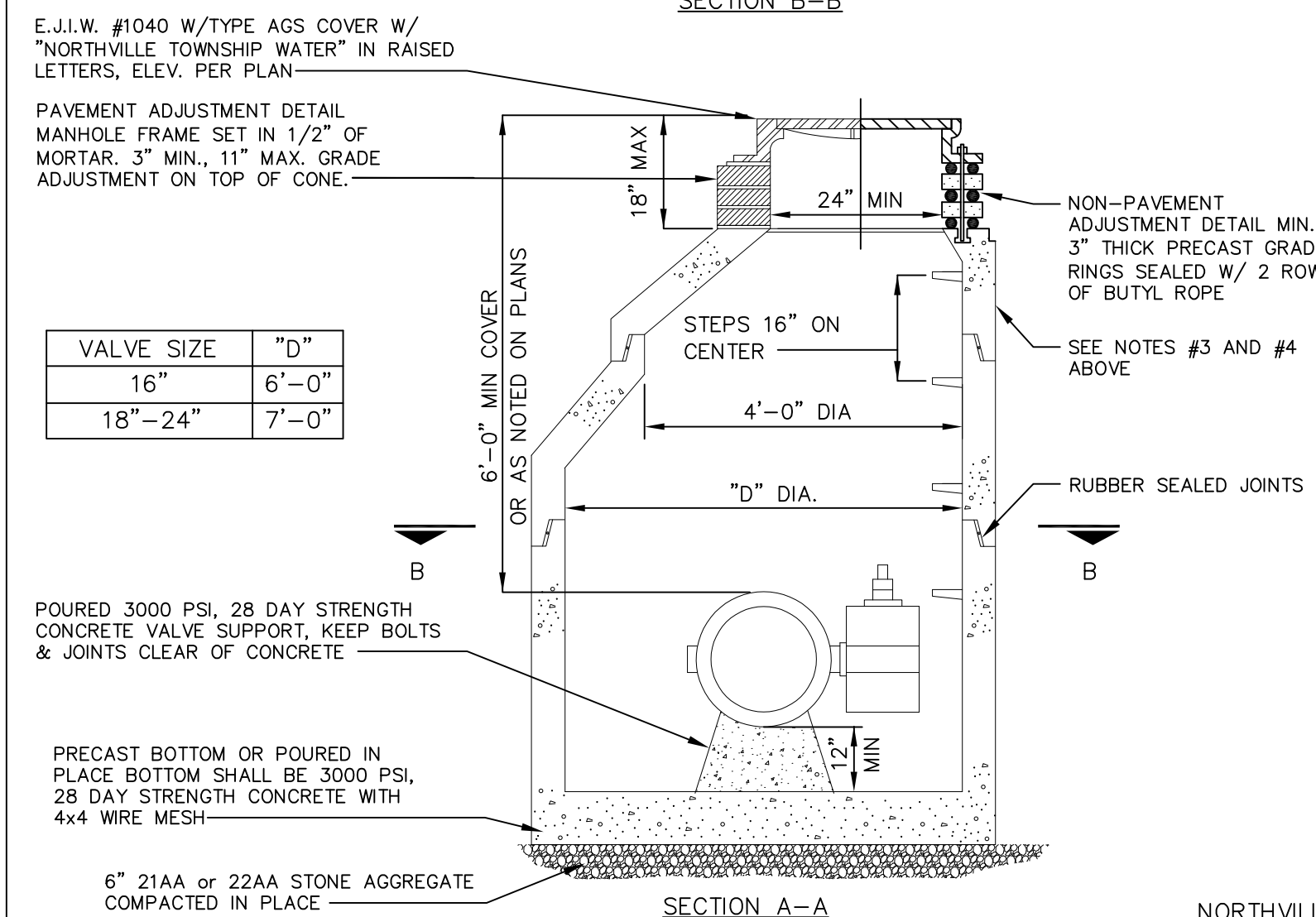
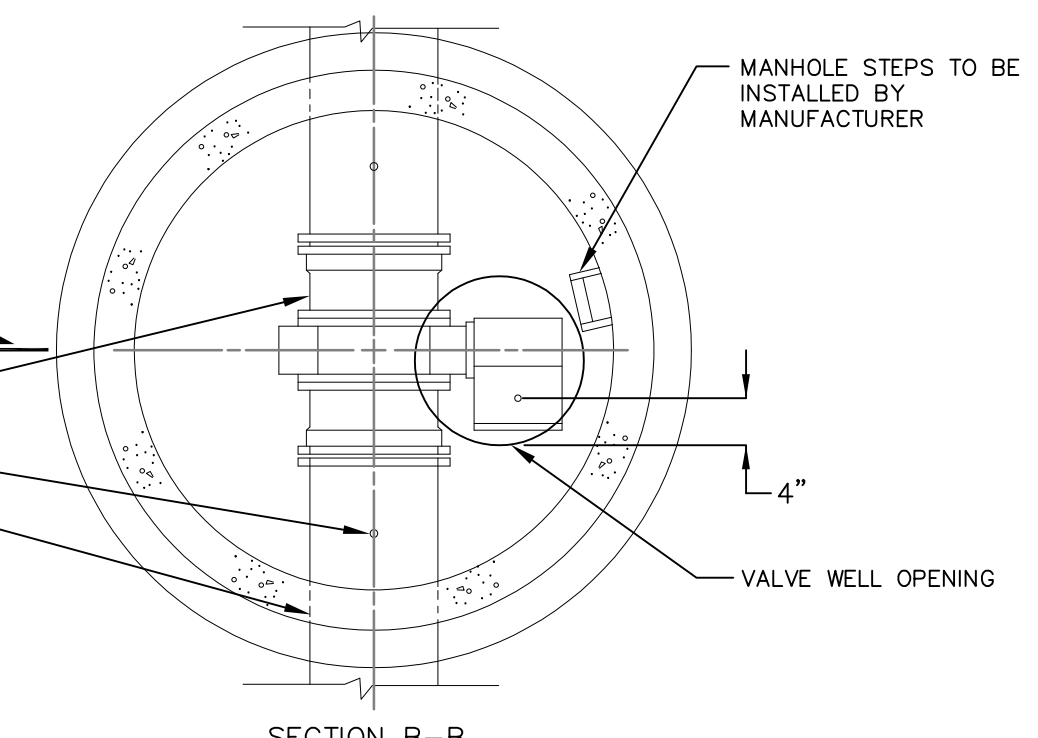


VALVE SIZE	D
10" & UNDER	5'-0"
12"	6'-0"

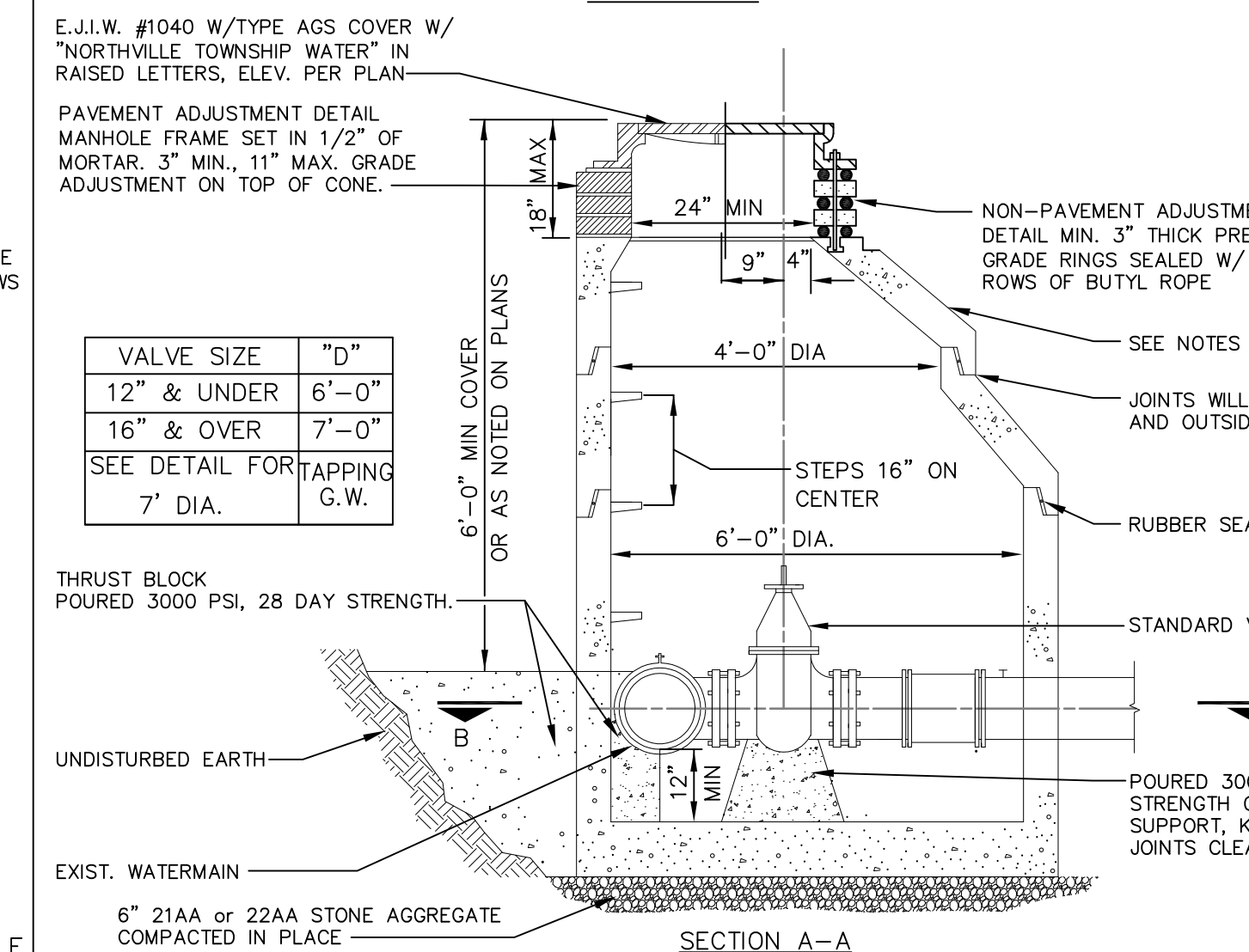
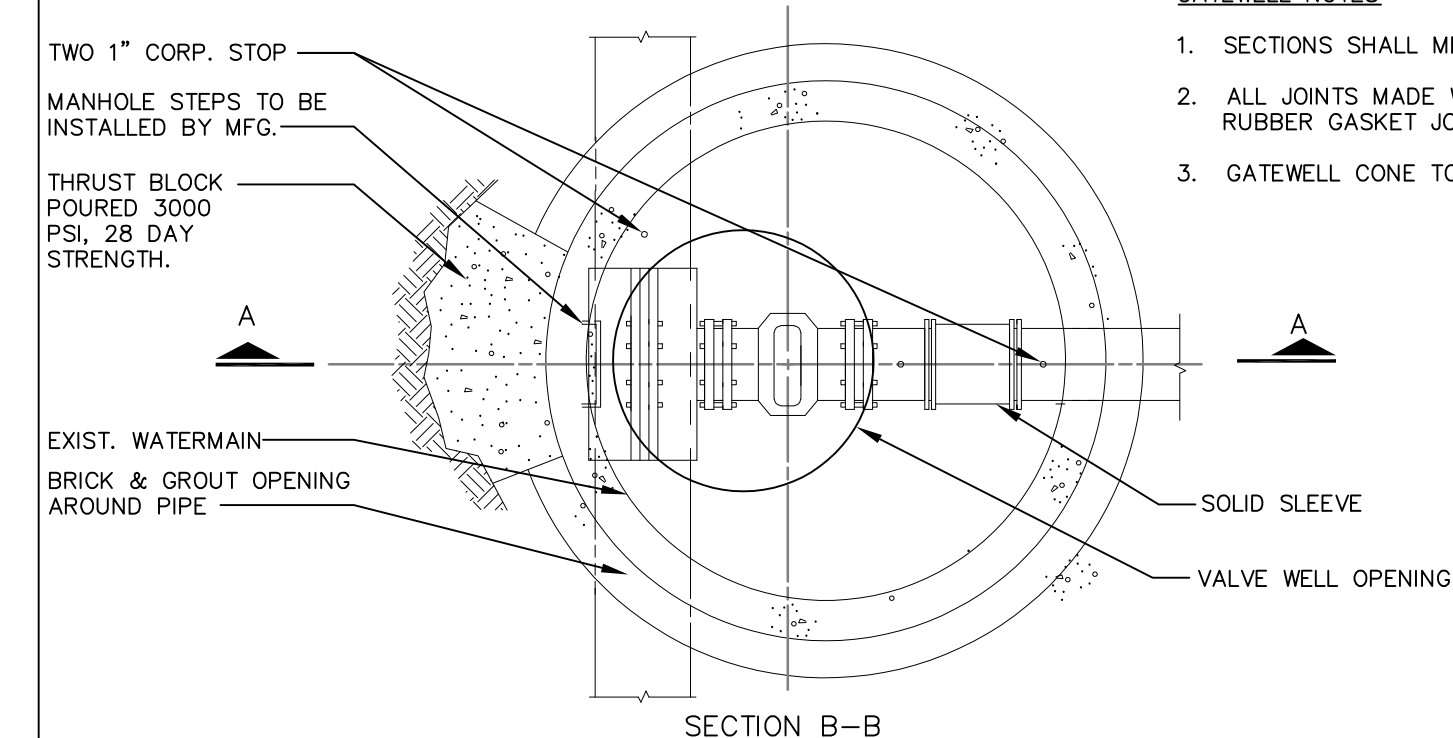


NORTHVILLE WM-4 REV. 01/13

- GATEWELL NOTES
- SECTIONS SHALL MEET ASTM C478.
 - ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS.
 - FOR 6" GATEWELL, CONE TO BE ECCENTRIC TYPE.
 - FOR 7" GATEWELL PROVIDE FLAT TOP WITH OFFSET OPENING.



NORTHVILLE WM-5 REV. 12/13



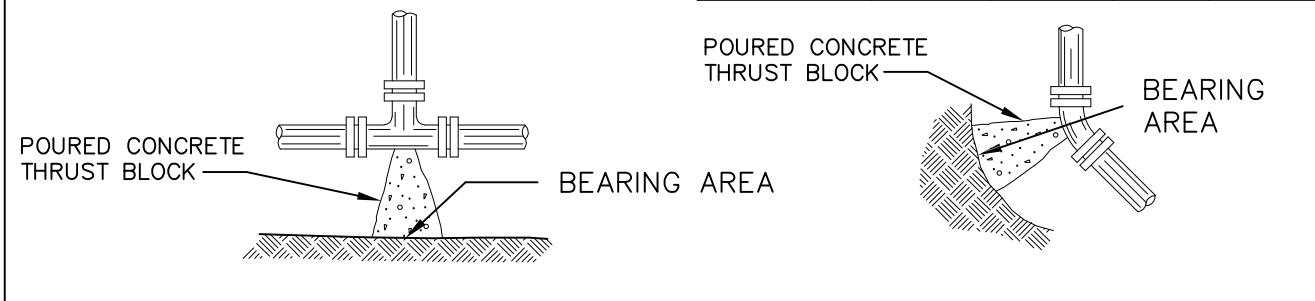
NORTHVILLE WM-6 REV. 12/13

TEES, CROSSES & HYDRANTS

PIPE DIA. INCHES	BEARING AREA SQUARE FEET
4	1.5
6	2.9
8	4.8
10	7.1
12	10.0
16	17.1
18	21.0
20	26.0
24	36.0

ELBOWS

PIPE DIA. INCHES	BEARING AREA SQUARE FEET			
	90°	45°	22 1/2°	11 1/4°
4	2.1	1.1	0.6	0.3
6	4.1	2.2	1.1	0.6
8	6.8	3.7	1.9	0.9
10	10.1	5.5	2.8	1.4
12	14.1	7.6	3.9	2.0
16	24.2	13.0	6.7	3.3
18	30.0	16.3	8.3	4.2
20	36.8	19.9	10.1	5.1
24	52.0	30.0	20.2	6.0



- NOTES:
- CONCRETE FOR ALL THRUST BLOCKS SHALL BE 3000 PSI, 28 DAY STRENGTH MIN.
 - ALL THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED EARTH
 - BOLTS, FITTINGS & JOINTS SHALL BE KEPT CLEAR OF CONCRETE
 - A BEARING CAPACITY OF 2000# PER FOOT WAS USED IN DETERMINING THE MINIMUM "BEARING AREAS" IN THE ABOVE TABLE
 - THE CROSS SECTION OF THE THRUST BLOCKS SHALL BE SQUARE
 - ENGINEERS ARE REQUIRED TO CALCULATE THE THRUST RESTRAINED PIPE LENGTH FOR THEIR INDIVIDUAL SITE & FITTINGS. CALCULATIONS SHALL CONFORM TO DIPRA DESIGN FOR THRUST RESTRAINT.

SOIL CHARACTERISTICS

SOIL CHARACTERISTICS	FACTOR
(A) LOOSE COARSE OR MEDIUM SAND; COMPACT FINE SAND; COMPACT SAND-CLAY SOILS; STIFF CLAY	0.33
(B) FIRM FINE SAND; COMPACT INORGANIC SILT; FIRM SAND-CLAY SOILS; MEDIUM CLAY	0.50
(C) LOOSE FINE SAND; FIRM INORGANIC SILT	0.67
(D) LOOSE SAND-CLAY SOILS; LOOSE INORGANIC SILT	1.00

"BEARING AREA" x FACTOR = ACTUAL BEARING AREA
2.1 x .5 = 1.05 SQ. FT.
BASED UPON 150# TEST PRESSURE

THRUST BLOCK

NORTHVILLE WM-3 REV. 12/13

3 WORKING DAYS BEFORE YOU DIG CALL MISS DIG 1-800-482-7171 FOR FREE LOCATION OF PUBLIC UTILITY LINES

REV. 8	12/13	REVISED THRUST BLOCK SPECIFICATION
REV. 7	01/13	REVISED THRUST BLOCK SPECIFICATION
REV. 6	02/09	REVISED HYDRANT SPECIFICATION
REV. 5	08/08	UPDATED TRENCH DETAIL FOR TRACE WIRE
REV. 4	08/07	UPDATED PER TOWNSHIP
REV. 3	2/98	REVISED HYDRANT SPECIFICATION
REV. 2	11/96	ADOPTED WCDPS TRENCH REQUIREMENTS
DRAWN BY: C.J.M.G., J.L.P.		CHECKED BY: K.C.M., T.M.M.



CHARTER TOWNSHIP OF NORTHVILLE

WATER MAIN DETAILS

STANTEC
3754 RANCHERO DRIVE
ANN ARBOR, MI 48108
(734) 761-1010
stantec.com

W-3

REVISION 8