

**1.00 GENERAL****1.01 DESCRIPTION**

- A. The CONTRACTOR shall furnish all labor, materials, and equipment required to construct water main, and all necessary appurtenant work as herein specified. The water main shall be installed in the locations as shown on the Plans and shall meet the line acceptance tests.

**1.02 TESTING****A. General**

1. The CONTRACTOR shall furnish all equipment and personnel to conduct system acceptance tests as specified herein. All tests shall be conducted under the supervision of the ENGINEER or Ann Arbor Township personnel. No acceptance tests shall be conducted until the entire system is constructed or just prior to placing the system in service, providing the water main has been installed and backfilled for not less than 30 days.
2. All water mains, branches, and valves shall be tested for pressure, leakage and disinfection.
3. Should the results of any test fail to meet the criteria established in this Specification, the CONTRACTOR shall at his own expense, locate and repair rejected section and retest until it is within specified allowance.
4. The CONTRACTOR shall provide all labor, supervision, pumps, measuring devices, power and other materials and equipment necessary for conducting acceptance tests on all piping.

**B. Preparation**

1. After the pipe has been laid and backfilled as specified, the CONTRACTOR shall fill the line, or a valve section thereof, to be tested with water in such a manner as to expel all air from the pipe. This may be done through fire hydrants at the high points; or, if no hydrant is available at such point, the CONTRACTOR shall make the taps necessary to accomplish the expulsion of all air. At the close of the test, all taps shall be satisfactorily plugged with brass plugs.
2. Only Ann Arbor Township personnel or the CONTRACTOR under direct supervision of Ann Arbor Township personnel may fill or flush lines.

**C. Sequence**

1. All water mains connected to an existing water system shall be flushed, chlorinated and bacteriologically tested prior to pressure testing. The sequence for acceptance testing shall be:
  - a. Flushing
  - b. Chlorination
  - c. Flushing
  - d. Bacteriological Testing
  - e. Pressure Testing
2. 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:
  - a. Pressure Testing

- b. Connect to System
- c. Flushing
- d. Chlorination
- e. Flushing
- f. Bacteriological Testing

D. Flushing

- 1. Mains shall be flushed with clean potable water until the water runs clear under direct supervision of Ann Arbor Township personnel or the ENGINEER.

E. Chlorination

- 1. 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. 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 twenty-five (25) parts per million. If less than twenty-five (25) parts per million residual is shown at the end of the first 24 hours period, additional chlorine shall be added until a residual of not less than twenty-five (25) parts per million at all parts of the system is shown after a subsequent 24 hour period. The chlorinated water shall then be removed from the mains and disposed of in a location approved by Ann Arbor Township. If an approved location cannot be found, dechlorination may be necessary.

F. Bacteriological Testing

- 1. Ann Arbor Township Utilities Department will take bacteriological samples of the water in the mains for analysis at a minimum 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 24 hours later. Each sample will be incubated for 48 hours.
- 2. The CONTRACTOR shall provide a sufficient number of corporation cocks and copper tubing for taking samples. Samples shall not be collected from hoses or fire hydrants.
- 3. Bacteriological testing will take place Monday -Thursday.

G. Pressure Testing

- 1. All pipe laid under this Contract shall be subjected to a hydrostatic pressure of 150 psi based on the elevation of the highest 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 over a 1 hour period is less than 0.092 gallon per inch diameter of the pipe per 1000 feet. All visible leaks must be corrected. The maximum length of water main to be tested at one time shall be 2000 feet.
- 2. 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 at the CONTRACTOR's expense and the test repeated to the satisfaction of the ENGINEER and the Ann Arbor Township Utilities Department.

- 3. If the CONTRACTOR chooses to pressure test against an existing valve he assumes the responsibility of meeting the leakage requirements. The CONTRACTOR may at his discretion provide a physical break and cutting in sleeve for pressure testing.

H. Material Tests

- 1. The CONTRACTOR shall have test of pipe and strength made by an independent testing laboratory. Tests of up to 4 lengths of water pipe per hundred lengths may be required to show compliance with the specifications. All pipe delivered to the job site shall be accompanied with a manufacturer=s certificate of compliance to the specifications.
- I. All copper service leads and associated fittings shall be visually observed under line pressure for leaks.
  - 1. After the installation of the service lead including the corporation stop, curb stop and curb box, the contractor shall open the corporation stop flushing the lead and all air from said lead. The curb stop shall be closed completely after flushing and all associated joints shall be visually observed for leaks under line pressure.
  - 2. During the observation under line pressure, the copper service line and all fittings shall be kept clean and dry.
  - 3. In the case that the service is extended beyond the curb box, the copper shall be flushed to this point, then pinched, creating a stop at the end of the service. All joints shall be visually observed for leaks under line pressure.

1.03 SUBMITTALS

- A. The CONTRACTOR shall submit shop drawings or data sheets for all pipe, manholes, manhole castings, pipe to manhole connections and valves. The Contractor shall submit certification letter for all pipe proposed on the project. The letters shall contain the following: Contractor name, project name, township name, current date, certification of pipe provided and letterhead of the certifying company.

2.00 PRODUCTS

2.01 PIPE AND FITTINGS

- A. Ductile iron pipe water main shall meet all the requirements of the latest revision of the American National Standards Institute Specifications, A21.51 and the American Water Works Association (AWWA) Specification C151. All joints including joints for valves and hydrants shall be "push on." Pipe shall be furnished in 18 or 20 ft lengths, unless otherwise required. The pipe shall meet the thickness class requirements shown in the table below.

<u>Size Nominal Inside Diameter</u>	<u>Thickness Class</u>
4	54
6	54

8	54
10	54
<u>Size</u> <u>Nominal</u> <u>Inside Diameter</u>	<u>Thickness</u> <u>Class</u>
12	54
14	54
16	54
18	54
20	54
24	54

- B. Pipe shall withstand a working pressure of 125 psi plus a 100 psi surge pressure.
- C. Pipe shall be double cement-lined and seal coated with an approved bituminous seal coat in accordance with ANSI Specification A21.4 (AWWA C-104).
- D. Ductile iron or cast iron fittings shall meet all the requirements of the latest revision of the American National Standards Institute Specification A21.10 for a working pressure of 125 psi and be of the push-on joint type. Plugs, where shown on the Plans, shall be solid mechanical joint plug type. All fittings shall be manufactured in the United States.
- E. Mechanical joints, shall be in conformity with the requirements of the latest revision of the American National Standards Institute A21.11. All bolts located below grade shall be type 304 stainless steel. Bolts shall be manufactured in the United States.
- F. Push-on joints shall meet all the requirements of AWWA Specification C111. 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 when installed 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 ANSI Specification A21.11.
- G. All gaskets used in American Pipe must be American gaskets. Joint restraints in American Pipe shall be American Fast-Grip gaskets. All gaskets in American pipe shall be placed in the pipe in the presence of an Ann Arbor Township inspector.
- H. The ENGINEER or Ann Arbor Township personnel shall witness the delivery and unloading of all pipe and collect the appropriate manufacturer's certificate of compliance per Section 1.02 H above.

**2.02 VALVES**

- A. All valves installed under this Specification shall conform to the applicable requirements of AWWA C500, C504, and C509 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 to the right (clockwise) to open.
- B. Resilient-Seated Wedge Gate Valves

1. Resilient seated wedge gate valves 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 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.
2. Resilient seated wedge gate valves shall be used for all mains.
3. Resilient seated wedge gate valves shall be manufactured by Waterous, American Flow Control, Clow, or East Jordan Iron Works.

C. Swing Check Valves

1. Valves shall have a cast or ductile iron body and bolted cap with a minimum non-shock W.O.G. working pressure of 150 psi. Seats shall be bronze and shall be screwed into the valve body. The disc shall be bronze or cast iron with permanently rolled in bronze faces. The disc hinge pin shall be aluminum bronze or stainless steel riding in bronze busings, one on each side of the valve. Valves shall have ANSI 125 pound standard drill flat faced flanges unless otherwise specified or shown on the Plans. Valves shall have outside weighted arm.

D. Air Release Valves

1. Air release valves when specified shall be designed to operate under a maximum operating pressure of 300 psi and capable of venting 200 CFFAS (cubic feet of free air per second). Valves shall be cast iron with bronze internal parts and Type 304SS float.

E. Corporation Stops

1. Corporation stops used for insertion into mains shall be Ford FB600 Ball Corp – AWWA/CC Taper Thread Inlet by Flared Copper Outlet, or equal. All stops shall have bronze cast bodies, keys, stem washers and nuts. Inlet threads shall conform to the latest revision of AWWA C800.

F. Valve Boxes

1. Valve boxes 5-1/4" 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. The base shall not rest upon the valve assembly. All valve boxes shall be Tyler Pipe 6860 Item D with a number 6 base or Bibby V620-D.

## 2.03 GATEWELLS

- A. Gatewells shall conform to the current ASTM specifications for precast reinforced concrete manhole sections, serial designation C478. Section joints shall be rubber gasketed and conform to ASTM C990-96. Cone sections shall be straight side type, with an offset step configuration.
- B. All gatewell component parts shall have the name of the manufacturer stenciled on the inside. The lettering or logo shall be a minimum of 4-inches high.
- C. Gatewells constructed over an existing water main shall have a doghouse mudded to an 8-inch thick cookie. All other gatewells shall have precast integral base sections.

- D. Mortar for plastering gatewells shall be made of one part Portland cement and two parts fine aggregate.

#### **2.04 GATEWELL FRAMES AND COVERS**

- A. Gatewell frames and covers shall weigh not less than 350 lbs. Each frame and cover shall have machined bearing surfaces and shall be suitably notched for convenient removal of the cover. Each cover shall have the letters "WATER" integrally cast into the cover.
- B. Frames and covers shall be East Jordan 1040Z, with Type A cover.
- C. All gatewell frames and covers shall be coated by the manufacturer with coal tar pitch varnish or other asphaltum coating reviewed by the ENGINEER.

#### **2.05 MANHOLE STEPS**

- A. Steps shall be plastic coated steel. They shall be M.A. Industries PS1-PF or PS1-B, or approved equal.

#### **2.06 GATEWELL CONNECTIONS**

- A. Water pipe (6-inch to 24-inch) to manhole connections shall be through: 1) a flexible rubber boot which shall be securely clamped into a core-drilled pipe port. Pipe ports shall be core-drilled at the point of manhole manufacturer and shall be accurately located within 1/2-inch of proposed sewer 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 flexible pipe to manhole connections shall be installed per the manufacturer's specifications.
- B. 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.
- C. Water pipe over 24 inches to gatewell connections shall be in accordance with details shown on the Plan.

#### **2.07 Gatewell Adjustments**

- A. All final grade adjustment of gatewell covers and frame assemblies shall be completed utilizing injection molded High Density Polyethylene (HDPE) adjustment rings as manufactured by LADTECH, INC. or approved equal. The adjustment rings shall be manufactured from polyethylene plastic as identified in ASTM Designation D 1248. Brick adjustments are not acceptable.
- B. All adjustment for matching road grade shall be made utilizing a molded indexed slope ring.
- C. Each adjustment ring shall be sealed with a 3/16 to 1/4 inch bead of butyl rubber sealant per the manufacturer's instructions. Sealant shall meet ASTM specification C-990.
- D. All castings and adjustment rings shall be sealed to the structure with an external Infi-Shield Uni-Band seal manufactured by Sealing Systems, Inc., or approved equal. The seal shall be continuous bands, made of high quality Ethylene Propylene Diene Monomer (EPDM) rubber with a minimum thickness of 60 mils. Each unit shall have a 2-inch wide mastic strip on the top and

bottom of the band. The mastic shall be non-hardening butyl rubber sealant, with a minimum thickness of 3/16-inch, and shall seal to the cone of the gateway and over the lip of the casting.

## 2.08 SERVICE LEADS

- A. Pipe for service leads 1-inch to 2-inch shall be soft annealed Type K copper.
- B. Curb Stops: One inch curb stops used for service connections shall be Ford B22-444 ball valve, or approved equal. Curb stops 1-1/2" shall be Ford B22-666, ball valve, or approved equal. Two-inch curb stops shall be B44-777, 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 for 1-inch and 1-1/2-inch. Compression fittings shall be used for 2-inch.
- C. Curb Boxes: Curb boxes used for service connections shall be the "Minneapolis Pattern" type. All curb boxes shall have an I.D. screw type adjustment and shall be furnished complete with cover, rod, and 27/32" pentagon bolt(s). All curb boxes shall be coated inside and out with a tar base enamel. The minimum bury shall be 5'-0" (60") and the maximum 6' (72"). All curb boxes shall be Ford model EM2-60-47-54R, or approved equal.
- D. Couplings:
  - 1. One-inch and 1-1/2-inch couplings used for service connections located outside the pavement or more than 10 feet from a building shall be Ford C22-44 or C22-66 or McDonald 4758, or equal. They shall have a three part union, and both inlet and outlet connections shall be able to receive the flared end of the copper service pipe for 1-inch and 1-1/2-inch. Two-inch couplings located outside the pavement or more than 10 feet from a building shall be Ford C44-77 or McDonald 4758-22, or equal, and be a compression or flare type fitting. All parts shall be cast from bronze.
  - 2. All service connections between two copper service pipes (two-inch or less in diameter) located under the pavement or within 10 feet of a building shall be connected using wrought copper, solder-sweat type couplings conforming to ASME B16.18 or ASME B16.22. Fittings shall bear made in USA labels. Joining of copper piping shall be a solder-sweat connection using lead free Silfos. The use of 95-5, Tin-Antimony or equivalent solders will not be allowed.

## 2.09 HYDRANTS

- A. 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 5 ¼ " valve opening and 6" push-on joint inlet. Hydrants shall have two 2 ½ " (O.D.) hose connections with National Standard and one 5" storz connection. All hydrants shall have City of Ann Arbor standard thread pattern.
- B. Fire hydrants shall have inside barrel dimension of not less than 7.375" I.D. from top to bottom. The 1 3/8" pentagon operating nut shall open left (counter clockwise).
- C. All nozzles shall be on a removable head with a flange so that they may be rotated by changing the position of the flange.
- D. 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.

- E. 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.
- F. The hydrants shall be Waterous Pacer WB-67-250, Waterous TVG – 5 5/4 or EJIW Watermaster 5BR250 with push-on joint connections and break flange barrel.
- G. Hydrant bolts located below grade shall be type 304 stainless steel. All bolts shall be manufactured in the United States.

## 2.10 TAPPING SLEEVES AND VALVES

- A. Tapping sleeves, when specified, shall be full length of heavy-duty stainless steel construction designed for use with the type of pipe to be tapped. Tapping sleeve body shall be 18-8 type 304 stainless steel. Flange shall be CF8 cast stainless steel. Bolts shall be 304 stainless steel. Gasket shall be full circumferential SBR compounded for water service. Tapping sleeve shall contain a test plug to assure seal prior to tapping. Tapping sleeve shall be JCM Industries type 432, Romac Industries type SST, Ford type Fast or PowerSeal 3490AS or Dresser 630, or approved equal.
- B. Tapping valves shall meet the specifications for gate valves except that the valve shall have a flange compatible with the tapping sleeve. Tapping valves shall be Waterous resilient wedge or equal.
- C. The tapping sleeves and valves shall be subjected to a hydrostatic pressure of 200 psi. The sleeves and valves shall be maintained under the test pressure for a minimum continuous period of 5 minutes by pumping potable water into the sleeve. Upon any visual leakage observed by the ENGINEER, the tapping sleeve and valve shall be adjusted or removed and replaced and the test repeated at the CONTRACTOR=s expense to the satisfaction of the ENGINEER.

## 2.11 TRACER WIRE

- A. Wire to be used for tracer purposes shall be #12 THNN solid single strand copper with blue insulation.
- B. Connections shall be made using 3M DBR-09964 wire connectors, or equal.

## 2.12 POST INDICATORS AND VALVES

- A. Post indicators, when specified, shall be American Flow Control series A240 or Clow series 2945A with aluminum plates indicating AOPEN@ or ASHUT@. Post indicators shall open left.
- B. Post indicator valves shall be Waterous Series 500, American Flow Control Model 2500, or Clow model F-6112. All valves shall open left.
- C. Post indicators and their corresponding valves must be made by the same manufacturer.
- D. Bollards must be placed to protect post indicators, when specified by the ENGINEER.

## 2.13 BOLLARDS

- A. Bollards shall be 4-inch diameter galvanized schedule 40 steel posts 36 to 48 inches high with a minimum depth of 24 inches. The posts shall be set in and filled with 3000 psi concrete. Bollards protecting hydrants and PIVs shall be painted red.

**2.14 POLYETHYLENE WRAP**

- A. Polyethylene wrap shall be 8 mil thick (black) polyethylene conforming to the most recent AWWA standard specification for Polyethylene Encasement for Ductile Iron Pipe, AWWA C105/A21.5. The wrap shall overlap the joint by 12 inches to either side and be secured to the pipe with polyethylene adhesive tape. All pipe and fittings shall be wrapped and taped in locations specified by the ENGINEER.

**3.00 EXECUTION**

**3.01 EXCAVATION AND BACKFILL**

- A. All excavation and backfill 12 inches above the crown of the pipe shall conform to Section 2.04, Earthwork, of these specifications.

**3.02 BEDDING**

- A. Ductile iron pipes shall be fully enclosed in polywrap and laid on a compacted sand cushion, 4 inches thick. Sand shall conform to fine aggregate 2NS as defined in 2003 MDOT 902.08.
- B. 2NS sand bedding material shall be placed around and above the main to a height of 12 inches above the main.
- C. Sand shall be compacted on top of 12 inches above the pipe to not less than 95 percent of the maximum unit density as determined at optimum moisture content.

**3.03 PIPE INSTALLATION**

- A. Any pipe damaged in transport or handling shall be rejected and removed from the site of the work.
- B. 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 belt 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 ENGINEER.
- C. All pipe and fittings shall be carefully lowered and moved into position in the trench or vault in a controlled manner such as will prevent damage to the pipe and its coating and lining.
- D. In assembly of push-on or shove type joints, the bell socket recess and the gasket shall be wiped clean and the gasket placed properly in position. A thin film of lubricant shall then be applied to the surface of the gasket to come into contact with the entering pipe. The plain end of the entering pipe shall be cleaned and then entered and forced home to the base of the socket. Where pipe is cut, the entering end shall be beveled before being inserted in the joint. Where time permits drying, the cut and beveled ends shall be coated with coal tar enamel.
- 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.

- F. Each pipe shall be laid accurately to the line and grade shown on the Plans. Whenever it is necessary to deflect pipe from a straight line, either in the horizontal or vertical plane, to avoid obstructions, or where long radius curves are permitted, the amount of deflection allowed shall not exceed that required for satisfactory jointing and shall be reviewed by the ENGINEER. In no case shall deflection of joints exceed the manufacturer's recommended maximum deflection.
- G. The CONTRACTOR shall not be entitled to any additional compensation because depth is more than specified at certain locations or due to clearances at manholes, or due to unforeseen obstacles, or occasioned in order to avoid undue changes in grade.
- H. The trench shall be backfilled closely behind the pipe laying. Unless otherwise directed or permitted by the ENGINEER, the backfilling shall follow and be completed to the top of the trench to within two lengths behind pipe laying.
- I. Locking gasketed joints designed to hold the pipe to proper line and grade against internal static and dynamic forces and external loads shall be provided at all tees, wyes and plugs, and wherever the pipe is deflected from a straight line and the resultant forces are not self-contained through the use of flanges, anchor ties and the like. Concrete thrust blocks or anchorage shall be 3000 PSI concrete.
- J. Air release valve and manhole shall be constructed where shown on the Plans. All castings and manholes shall be as specified under gatewells. Gatewells shall be constructed in accordance with the details shown on the Plans.
- K. Hydrants shall be provided at dead-end mains where specified by the ENGINEER.

### 3.04 CONNECTION TO EXISTING MAINS

- A. When making a dry connection to an existing main, the existing main to which a connection is to be made shall be isolated by the closing of the necessary existing valves, and the water from the existing main shall then be pumped out or removed by other means so the connection may be made in the dry. After the connection has been acceptably made, the portion of the new line to the nearest valve shall be satisfactorily tested and disinfected, along with the drained portion of the existing main, before the isolated existing main is placed back in service, except as the ENGINEER may otherwise direct. In as much as residents served by this isolated main will be temporarily out of water during this period, the work shall be executed as rapidly as possible, and the time of, and the procedure in, making such connections shall be subject to the review of the ENGINEER. Such work may be required to be done at night in order to minimize inconvenience of water users. The CONTRACTOR shall not be entitled to any additional compensation because of night work or other special requirements in work under this Section.
- B. The CONTRACTOR shall make particular effort, prior to bidding, to ascertain whether or not valves in the existing mains to be connected to the new mains are so located as to provide isolation. If valves are not found to be adequate, then the CONTRACTOR shall utilize other means to make the connections with a minimum of interruption to service.
- C. When making a wet tap connection to an existing main, a tapping sleeve designed for the type of pipe being tapped shall be utilized and the tap shall be made in accordance with the manufacturer of the tapping equipment.
- D. Wherever adapters are required to properly connect the pipe with existing pipe or other material or manufacturer, the nominal I.D. of adapters shall be the same size as the nominal diameter of

pipe connected thereto. Adapters shall also be furnished and used as required by the manufacturer for connection to fittings.

### 3.05 SERVICE LEADS

- A. Service leads shall be installed where shown on the Plans. All service taps shall be the "wet" method type and no tap shall be made until the acceptance test has been conducted and the line is under pressure.
- B. When crossing a paved street, the service lead shall be jacked under the pavement. Augering and/or jacking requirements on paved streets for the installation of pipe less than 2-1/2" outside diameter shall be made by a "compactor" type machine or similar method without removing existing soil, if soil conditions permit.
- C. Depth of bury for all service leads shall be between 5 and 7 feet from finish grade.

### 3.06 HYDRANTS

- A. Fire hydrants shall be constructed in accordance with the details shown on the Plans. Finish grade level to center of nozzle caps shall measure between 24 and 30 inches. A maximum of one hydrant barrel extension and one operating stem extension may be used to accommodate changes in grade. Under no conditions shall extended hydrant have more than one coupling in the operating stem. Pumper connections shall point toward the street.
- B. Fire hydrants shall be installed with barrel vertical and properly based. Concrete thrust blocks shall be placed behind the hydrant, tee, and every bend. Hydrant shall be set in 1 yard of coarse gravel for drainage purposes. Drain holes shall be plugged as directed by the manufacturer.
- C. Fire hydrant and gate valve shall be set apart 30 inches. Gate valves and valve box shall be as specified under the valve paragraphs of this Section.

### 3.07 TRACER WIRE

- A. Tracer wire shall be installed along the top of all water mains at a height of not more than 6 inches above the pipe. Wire shall be extended to all hydrants, service leads, blowoffs, dead ends, buildings and post indicator valves. Tracer wire shall be brought to grade, leaving enough excess material to avoid loss or damage to wire during construction and subsequent activities.
- B. When tracer wire is to be run along short offsets (less than 20 feet), a loop of wire shall be utilized to loop to the end of the offset, bring the loop to grade and terminate it in an approved manner. For service leads and offsets of more than 20 feet in length, a splice may be utilized to make this connection at the main, following manufacturer's instructions. The tracer wire shall then be installed and terminated in an approved manner.
- C. Tracer wire terminations shall be made by one of the following methods:
  - 1. Tracer wire shall be terminated at hydrants by securing the wire to the nozzle chain at the hydrant, leaving excess material for future hydrant maintenance.
  - 2. Terminations at valve/curb boxes, post indicators valves and blow-offs shall be made with 2 wraps of the wire at grade around the box or pipe, leaving excess material for future trimming following landscaping activities.
  - 3. Gatewell terminations shall be made by running the tracer wire through the pipe opening in the wall, down to and across the floor to the steps, up the wall and secure to the top step

leaving the stub accessible at the casting. Wire shall be run through the gatewell such that it does not create a hazard.

4. Terminations shall be made above grade at buildings near the water meter or as directed by the Ann Arbor Township Utilities Department.
- D. When connections are made to existing water mains which do not have tracer wire, the following method most applicable to the field condition shall be used.
1. When connection is made at/near a valve or hydrant, the connection shall be made in the same manner as the termination at said structures in Item C(2) above.
  2. When connection takes place in a gatewell, the same procedure shall be used as in termination at a gatewell (see Item C(3) above).
  3. If no valve or hydrant is available, the upper section only of a valve box shall be set with the tracer wire stubbed up inside.

END OF SECTION