

SECTION 331113 – WATERLINE CONSTRUCTION

PART 1 - GENERAL

1.1 REFERENCE

- A. All applicable requirements of other portions of the Contract Documents apply to the Work of this Section, including but not limited to Division 1, General Requirements.

1.2 DESCRIPTION OF WORK

- A. Water line piping, valves, hydrants and appurtenances.
- B. Water line testing and disinfection.

1.3 QUALITY ASSURANCE

- A. General: All materials shall be free from defects impairing strength and durability and be of the best quality for the purposes specified or shown on the Drawings. It shall have structural properties sufficient to solely sustain or withstand strain and stresses to which it is normally subjected and be true to detail.
- B. Manufacturer's Qualifications
 - 1. Provide piping and appurtenances that are standard products in regular production by manufacturers whose products have proven reliable in similar service for at least two years.
 - 2. Provide piping and appurtenances of the same type from a single manufacturer.
- C. The Contractor shall be responsible for making all field measurements prior to installation of his work. Any deviations in measurements between the field conditions and the Drawings shall be immediately reported to the Engineer.
- D. Testing
 - 1. Manufacturer's certified test results as defined for the type of pipe shall be stamped approved by the Contractor and forwarded to the Engineer as a Reference Submittal. No pipe shall be installed which does not meet the requirements of these Specifications.
 - 2. All pipe, joints, and fittings shall be pressure tested as required by this Specification for the type of pipe. The Contractor shall notify the Engineer and Owner, in writing, at least 48 hours prior to performing the tests.

1.4 SUBMITTALS

- A. Provide technical submittals in accordance with Section 017800, Submittals, demonstrating piping and accessories conform completely to the requirements of this Section.

B. Product Data

1. Catalog cut sheets and description of all items.
2. Construction materials.
3. Standard diameters, wall thickness and other pertinent dimensions of all sizes of piping and accessories.

C. Testing: Copies of all field test reports.

1.5 HANDLING, DELIVERY, AND STORAGE

A. General

1. Handling, delivery, and storage shall be in accordance with Section 410100 of the Project Manual and the manufacturer's recommendations.
2. In no case shall the pipe or appurtenance be dumped, dropped, or thrown.
3. Interior of piping shall be completely free of dirt and foreign matter.

PART 2 - PRODUCTS

2.1 POLYVINYL CHLORIDE (PVC) PIPE (AWWA C900)

- A. General: Polyvinyl chloride (PVC) pipe shall be pressure rated pipe with push-on gasket joints (unless otherwise noted). Products delivered under this specification shall meet the requirements of AWWA C900.
- B. Manufacturers: Pipe shall be as manufactured by Certain-Teed Products Corp., Valley Forge, Pennsylvania; Johns-Manville, New York, New York; Anesite Division, Clow Corporation, Chicago, Illinois, or approved equal.
- C. Materials: Pipe shall be made from unplasticized PVC compounds having a minimum cell classification of 12454 as defined in ASTM D 1784. The compound shall qualify for Hydrostatic Design Basis (HDB) of 4000 psi for water at 73.4°F, in accordance with the requirements of ASTM D 2837.
- D. Dimensions: Nominal outside diameters and wall thicknesses of restrained join pipe shall conform to the requirements of AWWA C900. Integral bell joint pipe shall be furnished in 4", 6", 8", 10" and 12" sizes, in Class 165(DR25), Class 235(DR18) and Class 305(DR14). Pipe shall be furnished in standard lengths of 20 feet.
- E. Joints: Where push-on joints are utilized, pipe shall incorporate a formed bell complete with a single rubber gasket conforming to ASTM F477. Where restrained joints are specified, pipe shall be joined using non-metallic couplings to form an integral system for maximum reliability and interchangeability. high-strength, flexible thermoplastic splines shall be inserted into mating, precision machined grooves in the pipe and coupling to provide full 360° restraint with evenly distributed loading. Couplings shall be designed for use at or above the pressure class of the pipe with which they are utilized, and shall incorporate twin elastomeric sealing gaskets meeting the requirements of ASTM F 477. Joints shall be designed to meet the zero leakage test requirements of ASTM D 3139.

- F. Workmanship: Pipe shall be homogeneous throughout and free from voids, cracks, inclusions and other defects, and shall be as uniform as commercially practicable in color, density and other physical characteristics.
- G. Quality Control: Every pipe shall pass the AWWA C900 hydrostatic proof test requirements of 4 times the pressure class for 5 seconds.
- H. Marking: Pipe shall be legibly and permanently marked in ink with the following minimum information:
 - 1. Nominal Size (for example, 4")
 - 2. PVC
 - 3. Dimension Ratio (for example, DR25)
 - 4. AWWA pressure class (for example, PC165)
 - 5. ANSI/AWWA C900-07 (or latest edition)
 - 6. Manufacturer's name or trademark and production record code
 - 7. Seal (mark) of the testing agency verifying the suitability of the pipe material for potable water service
- I. Markings of pipe-printing shall be color coded for pressure class identification. Pipe shall be furnished with a minimum of one (1) contrasting color circumferential stripe painted on the plain end or uncoupled end of each length to allow field checking of pipe construction joints.
- J. Each lot shipment of pipe and related materials shall include a shipment itemized check list for recording damages and/or deficiencies.
- K. All PVC material for pipe shall be light gray, light blue or white in color to minimize material heat gain.

2.2 DUCTILE IRON PIPE

- A. Ductile iron pipe shall conform to AWWA C151 with wall thickness provided in accordance with AWWA C150 for the depth of cover shown on the Drawings using a minimum rated working pressure of 350 psi and Laying Condition 4; minimum Pressure Class 350, unless otherwise shown or specified.
- B. Pipe shall have standard asphaltic coating on the exterior
- C. Pipe shall have a standard thickness cement mortar lining in accordance with ANSI/AWWA C104/A21.4.
- D. The class or nominal thickness, net weight without lining, and casting period shall be clearly marked on each length of pipe. Additionally, the manufacturer's mark, country where cast, year in which the pipe was produced, and the letters "DI" or "Ductile" shall be cast or stamped on the pipe.
- E. Push-on and mechanical joint ends shall conform to AWWA C110 with gaskets conforming to AWWA C111.

- F. Flange joints shall conform to AWWA C110 with gaskets and bolts conforming to AWWA C110, Appendix A.
- G. Restrained joints for push-on joint piping shall be the equal of TR Flex by U.S. Pipe and Foundry Co., Flex-Ring by American Cast Iron Pipe Co., or Tyton Joint with Field Lok Gasket instant joint restraint by U.S. Pipe and Foundry Co.
- H. Restrained joints for mechanical joint piping shall be the equal of Megalug by EBBA Iron, Inc.; MJ Gripper Gland by U.S. Pipe and Foundry Co.; or Lok-Fast Joint by American Cast Iron Pipe Co.

2.3 D.I. FITTINGS AND ACCESSORIES

- A. All fittings shall be ductile iron unless otherwise specified. Fittings shall have mechanical joints unless otherwise noted. Ductile iron standard fittings shall conform to AWWA C110 and compact fittings shall conform to AWWA C153. Pressure rating shall be 250 unless otherwise noted.
- B. All lining and coating for fittings shall be as specified for ductile iron pipe.
- C. Fittings shall be as manufactured by U.S. Pipe and Foundry Co., American Cast Iron Pipe Co., Clow Corp. or approved equal.
- D. Mechanical and push-on joint fittings shall conform to AWWA C111/ANSI 21.11.
- E. Flange joint fittings shall conform to AWWA C110 with gaskets and bolts conforming to AWWA C110, Appendix A.
- F. Long radius elbows, reducing elbows, reducing-on-the-run tees, side outlets, eccentric reducers and laterals supplied as flanged fittings shall conform to ANSI B16.1.
- G. All flanged joint fittings shall be furnished with 1/8 inch thick rubber gaskets. The bolts shall have American Standard heavy unfinished hexagonal head and nut dimensions all as specified in American Standard for Wrench Head Bolts and Nuts and Wrench Openings (ANSI B18.2). Material for bolts and nuts shall conform to ASTM A307 Grade B.
- H. Anchor pipe and fittings shall consist of plain end MJ pipe fittings furnished with integral fixed or split rotatable ring follower glands. A mechanical joint anchoring tee may be substituted for a mechanical joint tee with anchoring piece.

2.4 GATE VALVES

- A. All gate valves installed under this contract shall be resilient wedge gate valves and shall be of the same class as the pipe on which they are installed. Valves shall have joint ends compatible with type of pipe used, non-rising stems, 2" square operating nut and shall open "left".

- B. Approved Manufacturers: US Pipe & Foundry, Mueller Co., or Kennedy Valve Mfg. Co. or approved equal.
- C. Valves shall conform to AWWA C509 and shall incorporate an iron body, bronze-mounted, and parallel seat. Valve seals shall be O-ring type in lieu of a stuffing box. Valve stems shall be manganese bronze, non-rising type.
- D. Gate valves 4-inch and larger shall be cast iron with bronze gate rings.
- E. All gate valves 2 1/2" and smaller shall be of an Engineer approved manufacture and suitable for the service required. All valves shall have openings through the body of the same circular area as that of the pipe to which they are attached. All valves shall be designed to take the full unbalanced pressure upon either face.
- F. Except as otherwise stated or indicated upon the plans, underground valves shall be fitted with standard, two-inch square operating nut. All valves in interior or above ground piping shall be fitted with hand wheels and shall have flanged or screwed ends depending upon the size of pipe with which they are being used, or as shown on the plans. Underground valves will be provided with boxes, covers and operating nuts extended to grade. All underground valves shall have cast iron bodies.
- G. All hand-operated gate valves shall open by turning counter clockwise (left). The direction of opening shall be indicated by an arrow on hand wheels and on operating nuts.
- H. All submerged valves shall be furnished with "o" ring packing.
- I. All gate valves shall be designed for a minimum working pressure equivalent to that of the connecting pipe.
- J. The valve body and bonnet shall be coated with fusion bonded epoxy, interior and exterior, in accordance with AWWA C550. The coating material shall comply with NSF Standard 61.
- K. All valves shall have the manufacturer's name, pressure rating and year of manufacture cast into the body.

2.5 HYDRANTS

- A. Hydrants located at water storage tanks shall be Clow Eddy F-2640 hydrant or approved equal with 5-1/4 inch main valve, compression shutoff, two 2-1/2 inch and one 4-1/2 inch nozzles with three chains and No. 2 nut. Shoe connection shall be 6-inch MJ.
- B. Hydrant shall open left (counter clockwise). Hydrants shall be built for 4 1/2 feet bury and be painted red in reflective paint.
- C. Approximately 1/2 cubic yards of coarse gravel shall be placed from the bottom of the trench up the hydrant barrel. Brace with solid concrete block not concrete.
- D. Provide restrained joint system from hydrant to hydrant valve to hydrant tee.

- E. Hydrant valve shall be gate valve. Hydrant shall be installed using MJ by swivel tee and 6-inch by 13-inch swivel by swivel adapter.
- F. Hydrant steamer nozzle shall be equipped with a Storz Adapter.

2.6 CONCRETE BLOCKING

- A. Concrete blocking will be placed at all tees, bends, and valve locations unless otherwise noted. Blocking shall be placed in accordance with the details shown in the Drawings.
- B. Concrete shall be ready mix concrete with a minimum compressive strength of 2,500 psi at 28 days.

2.7 VALVE BOXES

- A. Valve boxes shall be supplied for all buried valves.
- B. The assembly shall consist of three (3) pieces and a cover. The cover shall be marked "Water". The valve box shall be screw-type, cast iron with 5-1/4-inch shaft. A round base that will enclose the valve bonnet shall be furnished with 6-inch and 8-inch valves. An oval base shall be supplied with valves larger than 8-inches.
- C. The valve box shall be supported at the base on concrete blocking to stabilize the assembly.

2.8 UTILITY MARKING TAPE

- A. Three (3) inch wide detectable utility marking tape bearing the word "CAUTION...WATERLINE" permanently printed on the tape. Tape shall be blue as specified by the APWA color code.

2.9 SERVICE SADDLES AND CORPORATION STOPS

A. Service Saddles

1. Service saddles shall be permanently hinged type, of brass with brass screws, confined "o" ring seal and AWWA thread outlet. Service saddles shall be of a design which accurately fit plastic pipe (O.D.) to provide a positive seal between plastic main and saddle at a minimum working pressure of 200 psi. Approved manufacturers/models include: Ford S90.
2. The service saddles shall be marked to indicate size of plastic main (O.D.) and outlet size on body and strap.

B. Corporation Stops

1. Corporation stops shall be brass, designed and manufactured in accordance with AWWA C800, latest edition and shall be individually inspected and tested for leaks

at the factory prior to shipment. Corporation stops shall be of a design with will permit use with drilling machines of current design.

2. Corporation stops shall be plug type furnished with AWWA inlet thread and grip joint outlet for PE tubing, Ford Type F1000.

2.10 SERVICE LINE

- A. Service line shall be high performance, high molecular weight, high density polyethylene pipe. PE tubing shall conform to AWWA C901, latest revision. Diameter ratio shall be as required to meet nominal CTS (copper tube size). Tubing shall be rated for a maximum working pressure of 200 psi.
- B. Where service line pressures exceed 200 psi, copper tubing, Type K, shall be utilized in lieu of polyethylene tubing.
- C. In addition to service line, appropriately sized insert stiffeners shall be provided to permit use of polyethylene pipe with the various service materials specified herein.

PART 3 - EXECUTION

3.1 EXECUTION

- A. Size, Type and Joining: All materials shall conform to the size and type shown on the drawings or called for in the specification. In joining two dissimilar types of pipe, standard fittings shall be used when available. In the event fittings are not available, the method of joining shall be selected by the Contractor and submitted for review by the Engineer.
- B. Installation Standards: Except where noted or specified, all underground waterline shall be laid in accordance with AWWA C600 or AWWA C605 for ductile iron or PVC pipe, respectively. All clearances and separations between water lines and sewer lines shall be in accordance with OEPA guidelines.
- C. General Excavation:
 1. Contractor shall do all excavation, undercutting, dewatering and backfilling necessary for work under this contract unless otherwise noted.
 2. Work shall conform to other sections of Division 2 except where modified by this section.
 3. The width of trench below the top of the pipe shall not exceed the nominal diameter of the pipe plus 2 feet for all pipelines.
 4. Where the maximum trench width is exceeded, the pipe shall be placed in a concrete cradle or a stronger pipe shall be used as necessary. If the maximum trench width is exceeded for any reason other than by request of the Engineer, the concrete cradle or the stronger pipe shall be placed at the Contractor's expense.
 5. Excavation shall include all necessary clearing of excavated areas, tree removal, all grubbing, all wet, dry, fill and rock excavation, the removal of pavement and all incidental work thereto.

6. Contractor shall excavate whatever materials are encountered as required to place the pipe and appurtenances at the elevations noted.
7. The trench shall be constructed in accordance with Section 312316.13 – Trench Excavation, Bedding and Backfill.
8. Excavations at the crossing of all underground utility services in place shall be as narrow as practicable.
9. Unless otherwise noted, all existing underground services shall be protected from damage and maintained in service at their original location and grade during the process of the work. Any damage to underground services shall be replaced or repaired at no cost to the Owner or to the owner of the service. The present underground services shown on the drawings are located in accordance with available data. Encountering these services at a different location or encountering services not shown shall not release the Contractor from the previous stated conditions.
10. Any service connections encountered which are to be removed shall be cut off at the limits of the excavation and capped in accordance with the requirements of owners of such connections.
11. Excavated material that is unsuitable or not required for filling shall be wasted.
12. Materials to be used for fill and suitable for this purpose shall be deposited where required, except that no fill shall be placed where trenches for sewers, water lines or other services will be located until after the trench work is completed.
13. Contractor shall provide adequate shoring, sheet piling and bracing to prevent earth from caving or washing into the excavation, and shall do all shoring and underpinning necessary to properly support adjacent or adjoining structures. All shoring, sheet piling and underpinning must be maintained until permanent support is provided.

D. Laying Pipe:

1. Piping shall be installed in accordance with the manufacturer's published instructions, modified only as may be directed herein or by the Engineer. All pipe installations shall comply with applicable paragraphs contained as part of these construction specifications.
2. Pipe Bury Depth - normal laying depth shall be 48" of cover depth minimum regardless of pipe diameter. Where rock is encountered, the minimum cover over top of the pipe shall be 48". Where rock is encountered on the trench bottom at the normal laying depth, a minimum of 6 inches of granular bedding shall be required.
3. All piping shall be assembled in accordance with the layout shown on the plans with only such modifications as may be necessary to conform to the final detail dimensions or location of existing water mains, hydrants, existing utilities, tanks, valve vaults, booster stations, valves, county roads, highway and stream crossings, etc. In crossing under ditches and streams the minimum depth of the trench required for the project shall be maintained. Standard fittings shall be used if required to depress the pipe but in no case shall the approach to the crossing be laid at a steeper angle than forty-five (45) degrees with the horizontal.
4. All pipe installed under this contract shall be installed in accordance with the applicable sections of AWWA C600 or AWWA C605 for ductile iron and PVC pipe, respectively. Type B laying conditions shall be maintained for both ductile iron and PVC installations. Trench width at the top of the pipe shall not exceed the

pipe diameter plus 2 feet unless approved by the Engineer. Minimum trench width shall be 1 foot greater than the maximum outside pipe diameter. Pipe shall be laid directly on a bedded trench bottom containing coupling or bell joint holes with trench shaped to provide continuous contact with the pipe between coupling or bell joint holes as recommended by the pipe manufacturer or as directed by the Engineer.

5. If, in the course of construction, ground water is encountered, the Contractor shall reduce the water level to the invert of the main or bottom of the structure. The Contractor shall maintain this dewatered condition until the area around the structure has been backfilled to existing grade. No pipe shall be laid in water, or when the trench conditions or the weather is unsuitable for such work, except by permission of the Engineer. At times when pipe installation is not in progress, the open ends of the pipe shall be closed by approved means and no trench water shall be permitted to enter the pipe. It shall be borne in mind that precautions must be taken to prevent empty pipe from floating, should the trench become flooded before backfilling has been completed.
6. Prior installation the interior of each piece of pipe and each fitting shall be inspected and any dirt and debris shall be removed. Swabbing may be required. After installation, inspect again and remove any accumulated dirt and debris.
7. Each piece of pipe shall be lowered into trench and installed separately. All pieces of pipe shall be laid in the trench so that it is firmly supported on the bedding material throughout its length.
8. As shown on the plans, or as directed by the Engineer, the Contractor shall provide concrete anchors or thrust blocks (against undisturbed earth), joint harness, and concrete encasement where required. This work shall be included in the unit prices bid for installing pipe, fittings, and appurtenances.
9. Pieces of pipe or fitting which are known to be defective shall not be laid or placed. Any defective piece of pipe or fitting discovered after the piping is laid shall be removed and replaced with satisfactory pipe or fitting. In case a length of pipe is cut to fit in a line, it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe. Cuts shall be made with proper tools for cutting the pipe. In the event the pipe is damaged as a result of the pipe being cut, the affected joint shall be rejected.
10. Bed the pipe as indicated and specified in Section 312316.13.
11. Material used for backfilling trenches over the pipe shall be free from any rock or debris that may be a potential source of damage to the pipe. Where material originally excavated from the trench is deemed unsuitable, the contractor shall obtain other suitable material for use as backfill.
12. Contractor shall provide, operate and maintain all pumps or other equipment necessary to drain and keep all excavation pits and trenches and the entire subgrade area free from water under any circumstances that may arise.
13. All trees, shrubs and improved areas outside of the excavation shall be protected from damage.
14. Where indicated water line shall be installed with tracer wire.
15. Pipe must be kept clean of mortar, cement, clay, sand or other material. Prior to installation the interior of each piece of pipe and each fitting shall be inspected and any dirt and debris shall be removed. Swabbing may be required. After installation, the pipe and fittings shall be inspected again and any accumulated dirt and debris removed.

E. Restrained Joints:

1. Except where noted or indicated, all bends, caps, plugs, tees and other fittings shall be restrained with flexible restrained joints. In addition, restrained joints shall be utilized for a minimum of one joint or 20 feet, whichever is greater, to each side of the fitting. Restrained joints shall be provided regardless of the use of concrete thrust blocking.
2. Mechanical joints for ductile iron pipe shall be restrained by Megalug 1100 or 1100SD Series by EBAA Iron Sales, Inc., a comparable product manufactured by Star Pipe Products, or an equal restraining system.
3. Ductile iron push-on joint pipe shall be restrained by Lok-Ring Joint by American Ductile Iron Pipe, TRFLEX by U.S. Pipe, or equal.
4. Joints in AWWA C900/C905 PVC pipe shall be restrained by Megalug 2800 Series by EBAA Iron Sales, Inc., a comparable product manufactured by Star Pipe Products, or an equal restraining system.
5. Joints between AWWA C900/C905 PVC pipe and mechanical joint ductile iron fittings shall be restrained by Megalug 2000PV Series by EBAA Iron Sales, Inc., a comparable product manufactured by Star Pipe Products, or an equal restraining system.

3.2 TESTING

- A. All testing must be witnessed by the Engineer. Non-witnessed testing will not be accepted. Contractor shall provide engineer with 48-hour notice prior to commencing with testing.
- B. The Contractor shall make all valves tight under their working pressure after they have been installed and before they are placed in operation. Any defective parts shall be replaced at the Contractor's expense.
- C. All valves shall be pressure tested in conjunction with their adjoining piping.
- D. All water lines shall be disinfection tested in accordance with AWWA C 651.
- E. Pressure Testing:
 1. A hydrostatic test as required in applicable sections of AWWA C600 or AWWA C605 for ductile iron or PVC pipe, respectively, shall be applied to the whole or individually isolated sections of the water lines and hydrant leads.
 2. The test pressure shall be maintained at 150 psi or one and a half times the working pressure (whichever is greater), in any section being tested. The duration of each pressure test shall be at least 2 hours.
 3. The Contractor shall furnish and Owner verifies gauges for the test. Furthermore, the Contractor shall furnish all materials, make all taps required and furnish a pump, piping, all other equipment and all assistance necessary for conducting the tests. Gauges provided by the Contractor shall only be used for potable water or be new.
 4. Before applying the specified pressure, all air shall be expelled from the pipe. To accomplish this, taps shall be made by the Contractor at points of highest elevation or as required. Taps shall be of the sizes as shown on the drawings, or as directed by the Engineer.

F. Leakage Testing:

1. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.
2. No pipe installation will be accepted until this leakage (evaluated on a pressure basis of 150 psi) is less than 1.99 U.S. gallons per hour per 100 joints of 12-inch nominal diameter pipe and corrected for the other sizes of pipe as provided in the AWWA Specification.

- G. Any testing performed against existing valves shall be at the Contractor's risk and in strict compliance with the requirements of the Owner. If unable to achieve the required test, the Contractor shall disconnect from the existing valve, plug the line and retest until satisfactory results are obtained. Any damage caused to existing facilities shall be repaired at the Contractor's expense.

3.3 DISINFECTION

- A. After satisfactory hydrostatic testing, the completed pipe shall be chlorinated in accordance with AWWA C651, latest edition. All labor, material, and equipment including chlorination taps and blow-off taps necessary to complete the work shall be furnished and paid for by the Contractor. Taps shall include tapping valves, sufficient tubing or pipe to extend outside the trench, and operable valve above ground. Blow-offs shall be installed as required. The time and section of line to be chlorinated shall be approved by the Engineer.
- B. Upon completing the chlorination and the subsequent flushing of the line, the Contractor shall take the necessary water samples from the pipe for testing by an approved laboratory. Engineer must be present to witness the samples being taken. Testing shall be performed in accordance with Ohio Environmental Protection Agency rules and regulations, copies of which are available from the Ohio Environmental Protection Agency. A certified copy of the test results shall be sent to the Owner. The cost of testing shall be borne by the Contractor.

3.4 CONNECTIONS

- A. Contractor is responsible for connecting to existing pipe where indicated in the Drawings.
- B. Expose and determine the type and diameter of existing pipe and ensure that the proper fittings gaskets necessary for interface are available in advance of initiating work on the connection.
- C. The Contractor shall be responsible for the valving off the existing main, flushing, and bleeding air from the existing line once the connection is made. The existing line shall not be valved off until the Contractor has all necessary equipment and materials at the site to make the proper connection. All work shall be performed in coordination with the Owner.

3.5 VALVE TESTING

- A. The Contractor shall make all valves tight under their working pressure after they have been installed and before they are placed in operation. Any defective parts shall be replaced at the Contractor's expense.
- B. All valves shall be pressure tested in conjunction with their adjoining piping.

3.6 VALVE INSTALLATION AND STORAGE

- A. The valves and appurtenances shall be installed in accordance with the installation manual furnished by the valve manufacturer. Extreme care shall be used in the handling, storage and installation of these valves to prevent damage or distortion of the equipment and to insure proper performance.

3.7 UTILITY MARKING TAPE INSTALLATION

- A. Install detectable utility marking tape above all plastic pipelines, eighteen (18) to twenty-four (24) inches below final grade.

3.8 SERVICE LINE INSTALLATION

- A. Service line shall be installed where required to interface the pressure transducer installation at the tank to the inlet water line.

3.9 SPARE PARTS AND TOOLS

- A. Repair or service parts for one of each type and size of valve and hydrant supplied shall be furnished and stored as directed by the Owner.
- B. The equipment shall include, in general, the following items:
 - 1. Special tools required for maintenance or operation of valves.
 - 2. Gaskets, rings, seals, packing, lubricants, bolts, washers, operation manuals, drawings, etc., required to maintain valves in proper operating service.

END OF SECTION 331113