

SECTION 33 14 13 (UC-000)

WATER MAINS

PART 1 GENERAL

1.01 SCOPE

- A. These Specifications shall govern the design, materials and installation requirements of the Department for construction of potable water mains pipes and fittings including fire hydrants, water services, valves and other appurtenances.
- B. The Department does not allow the use of 10-inch, 14-inch or 18-inch pipe, fittings or valves, except as may be approved for connections to existing mains.
- C. This section does not purport to cover all materials or installation procedures which may be required, whether by the nature of the proposed work, or by the Department, or by other regulatory agencies.
- D. The Department intent is to obtain a complete and working installation under this project, and any items of labor, equipment or materials which may reasonably be assumed as necessary to accomplish this end shall be supplied whether or not they are specifically shown on the Plans or stated herein.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. The work shall proceed in accordance with the following specification sections, bound herein:
 - 1. Section 02 00 00 (01011) – “Site Conditions”
 - 2. Section 01 35 26 (01016) – “Safety Requirements and Protection of Property”
 - 3. Section 01 71 23 (01031) – “Grades, Lines and Levels”
 - 4. Section 01 35 13 (01100) – “Special Project Procedures”
 - 5. Section 01 55 26 (01750) – “Maintenance of Traffic and Use of Public Streets”
 - 6. Section 33 05 98 (15065) – “Miscellaneous Materials”
- B. Water for construction shall be provided in accordance with Section 01 35 13 (01100) “Special Project Procedures”.

1.03 QUALITY ASSURANCE

- A. All material and installation shall be in accordance with the Department’s Design and Construction Standard Specifications and Details.
- B. The material and installation for this project shall be in full compliance with all

applicable Department Standards and any other applicable standards listed in Section 01 42 19, (01090) "Reference Standards". Instructions from the Water and Sewer Department designated representative in the field shall be followed by the Contractor.

1.04 DEFINITIONS

- A. See section 01 42 16 (01005), "Defined Terms"

1.05 PROJECT APPROVAL

- A. For projects not designed by The Department or its consultant, the approval of the Department shall be secured in accordance with Section UC-005 "Project Approval" prior to any construction activity.
- B. Potable water mains shall follow the Miami-Dade Water and Sewer Department Rules and Regulations (Implementing order 10-8) and Master Plan for sizing. Mains shall be constructed in accordance to the Water and Sewer Standard Details, cleaned, tested, and disinfected under the supervision of The Department designated Construction Manager, in accordance with Section 33 01 10.54 (02505) "Cleaning and Testing of Mains" and Section 33 01 10.58 (UC-175) "Disinfection of Water Mains".
- C. In addition, systems shall be designed in accordance with the requirements of the Miami-Dade County Department of Regulatory and Economic Resources (RER) Division of Environmental Resource Management (DERM), Fire Department (Miami-Dade and/or City), Florida Department of Health, and the Miami-Dade Water and Sewer Department Standards and Specifications.
 - 1. Properties shall be serviced by individual meters connected to water services from the water main.
 - 2. Fire hydrants shall be located to provide adequate fire flow protection to properties along the route of the main. Hydrant locations shall be approved by the Fire Department.
 - 3. A sufficient number of valves shall be provided on water mains to minimize inconvenience and sanitary hazards during repairs. Tee and crosses shall have a valve on each branch minus one. Valves should be located at not more than 660 foot intervals.
 - 4. Installed pipe shall be designed to be mechanically restrained to the design pressure. Lengths of restrained pipe shall be identified on the Plans.

1.06 PERMITS, INSPECTIONS AND FEES

- A. The Contractor shall obtain and pay for all permits, official inspections and all other official fees, in connection with the work, in accordance with Section 01 31 46 (01740), "Permits".
- B. Inspection by The Department personnel is required in addition to, not in lieu of, municipal and other County department inspections (if any).

- C. No installation will be accepted until it has passed all inspections, including pavement installation or replacement.

1.07 PRECONSTRUCTION CONFERENCE

- A. Prior to commencement of the work, the Contractor shall attend a Preconstruction Conference in accordance with Section 01 31 19.13 (01150) "Preconstruction Conference".

1.08 SUBMITTALS

- A. The contractor shall submit all shop drawings in accordance with Section 01 33 23 (01340) "Shop Drawings"
- B. The Contractor shall furnish "As-Builts" in accordance to Section 01 78 40 (01725) "Donation Project As-Builts" and to Section 01 78 39 (01720) "Project Record Documents", whichever applies to the project.
- C. The contractor shall submit operating and maintenance instructions and all other submittals in accordance with Section 01 78 23 (01730) "Operating and Maintenance Data"
- D. Where the specifications require test certification or certification that certain products or material furnished are as specified, the contractor shall deliver such certification to the Department. No material or equipment shall be approved for use in the work until individual certification has been received.
- E. Final as-builts shall be submitted to the Department at the time of final pressure testing and disinfection.

1.08 SAFETY REQUIREMENTS

- A. See Section 01 35 26 (01016) "Safety Requirements"
- B. In the instance of men working within the manholes, the Contractor shall provide safety provisions to cover any possible consequences of structural failure and/or flooding. Such provisions might take the form of, but not be limited to, ladder nearby and in position to permit rapid egress; safety harness; stand-by pumping equipment; extra air supplies; and such other measures as the situation and good construction practices might indicate.
- C. Contractor shall avoid any tampering with active Department facilities, such as operating valves on active mains. Any work on active mains shall be coordinated with the appropriate Departmental personnel.

PART 2 - PRODUCTS

2.01 PIPE MATERIAL

- A. All material for use in the project shall be new and of recent manufacturing and shall be the products of reliable manufactures or suppliers who, otherwise specified, have been regularly engaged in the manufacture of such materials and equipment for at least five years. And that comply with The Department standards & specifications, permitted plans and shall use any or all of the following materials:
1. Ductile Iron Pipe in accordance with Section 33 14 00 (15060) "Piping and fittings" can be used at any locations and from sizes 4" to 54".
 2. Poly Vinyl Chloride Pipe (PVC) in accordance with Section 33 05 31.16 "PVC C900 water main"; can be used at locations with salt intrusion protection requirements with low heavy traffic loading conditions and from sizes 4" to 16".
 3. High Density Polyethylene pipe (HDPE) in accordance with Section 33 05 07.13 (15080) "Horizontal Directional Drilling"; can be used at locations when directional drilling is needed and from sizes as needed and approved by the Engineer.
 4. Concrete pipe in accordance with Section 33 05 39 "Concrete water main"; as approved by the Engineer.
 5. Steel pipe in accordance with Section 33 05 24.01 (15075) "Aerial Crossings" and 33 14 00 (15060) "Piping and fittings"; can be used at locations when aerial crossings and steel casings are needed and from sizes as needed and approved by the Engineer.
- B. On areas where there is information that indicates presence of contamination, pipe material shall be Ductile Iron and in accordance with sections 33 14 00 (15060) "Piping and fittings" and 02 61 00 (01018) "Environmental Contamination"

2.02 WATER SERVICES

- A. See section 33 14 17 (UC-075) "Water Service Installations"

2.03 CASTINGS

- A. Unless otherwise indicated, all materials, workmanship and practices shall be in accordance with the current edition of the ASTM A48, "Gray Iron Castings", Class 35B. Proof Loading: AASHTO M306 Loading.
- B. Castings shall be in compliance with Section 33 05 81 (05550) "Castings"

C. MANHOLE FRAMES AND COVERS

1. Manhole frames and covers shall be Department Type "A" with roadway cover, U.S.F.F. No. 310 or approved equal. (See Miami Dade Water and Sewer Department's Standard Detail SS 4.0) The covers shall be cast labeled "Water" and in compliance with Section 33 05 81 (05550) "Castings".

D. METER BOX COVERS

1. Cast iron meter covers shall have the words "WATER METER" plus the manufacturer's name permanently marked on the top surface of the cover. The letter size may range from 3/8 inch to 3/4 inch with the larger size covers having the larger size letters. The letters on the cast iron covers shall be slightly raised. Covers shall have a non-skid surface pattern, shall be furnished with cast iron meter-reading lids and in compliance with Section 33 05 81 (05550) "Castings".

E. VALVE BOXES AND COVERS

1. Valve boxes for use with all main line valves, air release devices and flushing valve outlets shall be WASD No. 3. Valve boxes for use with fire hydrants, service lines, by-pass valves and fire line valves shall be WASD No.2. Valve box covers shall be cast labeled with the letter "W", shall have a roadway type surface, shall be non-rocking, and in compliance with Section 33 05 81 (05550) "Castings".

2.04 BRICK

- A. Concrete brick shall conform to ASTM Standard C55 "Concrete Building Brick". Clay brick may be substituted for concrete brick. Clay brick shall conform to ASTM Standard C62, "Building Brick (Solid Masonry Units Made from Clay or Shale)".
- B. Bricks shall have true edges and sharp corners and shall have been cured for at least 14 days before being placed.

2.05 CONCRETE, MORTAR AND GROUT

- A. See section 03 00 00 (UC-033) "Concrete, mortar and grout"

2.06 FIRE HYDRANTS

- A. See section 40 05 81.13 (15330) "Fire hydrants"

2.07 VALVES

- A. See section 40 05 58 (15100) "Valves General"
- B. See section 40 05 63 (15105) "Ball Valves"
- C. See section 40 05 64 (15110) "Butterfly Valves"
- D. See section 40 05 65.23 (15115) "Check Valves"
- E. See section 40 05 61.23 (15120) "Gate Valves"
- F. See section 33 14 51 (15130) "Miscellaneous Valves"

2.08 TAPPING SLEEVE AND VALVE

- A. See section 40 45 76.13 (15102) "Tapping Sleeves and Tapping Valves"

PART 3 EXECUTION

3.01 CONSTRUCTION METHODS

- A. Set-up and Verification: The Contractor's Florida Licensed Professional Surveyor and Mapper is required to recover the design baseline and verify the elevations and coordinates on a regular basis as needed.
- B. The Contractor is required to have a level instrument setup next to the construction site in order to control the vertical alignment of the pipe installation prior to trench backfilling. The level shall be setup daily for use by the surveyor, Contractor's foreman and Department Engineer/Inspector. Any underground construction work that does not have a level properly setup will be stopped by the Department Engineer/Inspector.
- C. The Contractor is required to have a survey crew record the field information on a daily basis when there is underground pipe installation. The survey crew shall be on-site as needed to record and verify the information before it is covered. Any underground construction work that does not have the information recorded by a survey crew will be stopped by the Department Engineer/Inspector. The Engineer/Inspector has the authority to order re-excavation of work that was covered without accurate survey measurements.
- D. The ends of existing mains shall be temporarily capped or plugged and anchored to keep them clean and the joints from blowing apart from internal pressure until the new main can be connected to them.
- E. Where existing paving is damaged or removed by the Contractor, temporary paving as specified in Section 32 12 16 (02745) "Pavement removal and Replacement" shall be placed the same day as the ditch backfill and it shall be replaced with permanent paving, where shown on the Plans, within thirty (30) days or in accordance with the local governing agency having jurisdiction.
- F. In addition to specific construction methods specified elsewhere, the following general requirements shall apply to the work under this project.
 - 1. Pipe and fittings shall at all times be handled with great care to avoid damage. In loading and unloading, they shall be lifted with cranes or hoists or slid or rolled on skidways in such manner as to avoid shock. Under no circumstances shall this material be dropped or allowed to roll or slide against obstructions. Pipe and other material shall be distributed along the right-of-way in advance of installation only to the extent approved by the Department. Such materials shall be so placed as to keep obstruction to traffic at a minimum.
 - 2. Any work within the pipe and fittings shall be performed with care to prevent damage to the lining. Damaged lining shall be repaired, or the pipe section or fitting replaced as required by the Department. No cables, lifting arms, hooks or other devices shall be inserted into the pipe or fitting. All lifting, pulling or pushing mechanisms shall be applied to the exterior

- of the pipe or fitting.
 - 3. The Contractor's attention is called to the fact that connections to existing mains will probably involve the removal of a concrete anchor and cast iron plug; also, that the existing mains may be cast iron with poured lead Sulphur compound, or rubber gasket type joints, concrete with flanged outlet connections, galvanized iron with threaded joints, or others. The Contractor should be equipped with the proper tools and equipment to make connections to any one or more of these existing mains.
 - 4. Where required by the Department and at his discretion, the Contractor shall eliminate dust annoyance to adjacent property owners by sprinkling his work area with water or by other approved means.
- G. When mains are to be installed within existing street areas, the Contractor shall limit the amount of ditch open at any one time to one block (approximately 600 feet). The work in each block, including excavation, pipe laying, backfilling and temporary paving shall be completed before proceeding with the work in the next block.
 - H. Boring and jacking operations and trenches remaining open to facilitate the repair of existing underground utilities damaged by the Contractor during excavation shall not be deemed a portion of the allowable 600 feet of open trench, unless otherwise decided by the Department at its discretion.
 - I. When mains are to be installed within existing street areas, the Contractor may employ more than one installation crew on the Project but not less than 1200 feet shall separate any two open trench sections as defined hereinbefore.

3.02 EXCAVATION AND COMPACTED BACKFILL

- A. See section 31 23 33 (02315) "Trenching & Backfilling for piping systems"

3.03 WATER SERVICE INSTALLATIONS

- A. See Section 33 14 17 (UC-075) "Water Service installations".

3.04 INSTALLATION OF PIPE AND FITTINGS

- A. The centerline of the pipe shall not vary by more than two inches from the location shown on the Plans and the top of the pipe shall not vary by more than two inches from the established grade, except at points where this tolerance must be changed to clear obstructions or make connections. Deviation from this location will be permitted only upon approval from the Department.
- B. Upon satisfactory excavation of the pipe trench and completion of the pipe bedding, up to the level of the outside bottom of the proposed pipe barrel, recesses for the pipe bells, or couplings, shall be excavated by hand digging. When the pipe is laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support and no pressure will be exerted on the pipe joints from the trench bottom. Placing and compacting the bedding up to

the level of the lower one-third of the pipe barrel shall immediately follow the installation of the pipe.

- C. The interior of the pipes shall be thoroughly cleaned of all foreign matter before being gently lowered into the trench and shall be kept clean during laying operations by means of plugs or other approved methods. During suspension of work for any reason at any time, a suitable stopper shall be placed in the end of the pipe last laid to prevent mud or other foreign material from entering the pipe. Any pipe found defective shall be immediately removed and replaced with sound pipe.
- D. Lines shall be laid straight and depth of cover shall be maintained as shown on the Plans. Grades or pipe centerline elevations are shown on the Plans. The Contractor will be permitted to use surveying instruments to maintain alignment and grade. At least one elevation shot shall be taken every one hundred feet (100') or portion thereof and deviation along the pipeline.
- E. All bends, tees and plugs shall be mechanical restrained at a minimum according to standard GS 2.0. Encasement type thrust anchors and collars shall be placed where indicated on the Plans. The bearing area and/or volume of concrete in the anchors and blocks shall be as shown on the Plans.
- F. All bolts, nuts, gaskets and other joint materials for use in the pipeline shall be properly protected.
- G. Gaskets shall be properly stored, and care shall be exercised to keep them away from heat, light, oil, gasoline or other petroleum products. Gaskets shall be kept clean at all times and not handled with greasy or dirty hands. Gaskets shall be installed just prior to installation of pipe.
- H. The joints of all pipelines shall be properly homed. The particular joint used shall be approved by the Engineer prior to installation.
- I. Unless otherwise directed, pipe shall be laid with the bell ends facing in the direction of laying; and for lines on an appreciable slope, the bells shall, at the discretion of the Engineer, face upgrade.
- J. Push-on, restrained push-on and mechanical joints in ductile iron pipe and fittings shall be made in accordance with the manufacturer's standards except as otherwise specified herein. Joints between push-on and mechanical joint pipe and/or fittings shall be made in accordance with AWWA Standard C600, "Installation of Ductile Iron Water Mains and Their Appurtenances", except that deflection at joints shall not exceed one half of the manufacturer's recommended allowable deflection, or one-half of the allowable deflection specified in AWWA C600, whichever is the lesser amount.
- K. Before laying push-on, restrained push-on and mechanical joint pipe and fittings, all lumps, blisters and excess bituminous coating shall be removed from the bell and spigot ends. The outside of each spigot and the inside of each bell shall be

wire brushed and wiped clean and dry. The entire gasket groove area shall be free of bumps or any foreign matter which might displace the gasket. The cleaned spigot and gasket shall not be allowed to touch the trench walls or trench bottom at any time. Vegetable soap lubricant shall be applied in accordance with the pipe manufacturer's recommendations, to aid in making the joint. The workmen shall exercise caution to prevent damage to the gasket or the adherence of grease or particles of sand or dirt. Deflections shall be made only after the joint has been assembled.

- L. Flanged joints shall be used only where indicated on the Plans. Before making up flanged joints in the pipeline, the back of each flange under the bolt heads and the face of each flange shall have all lumps, blisters and excess bituminous coating removed and shall be wire brushed and wiped clean and dry. Flange faces shall be kept clean and dry when making up the joint, and the workmen shall exercise caution to prevent damage to the gasket or the adherence of grease or particles of sand or dirt. Bolts and nuts shall be tightened by opposites in order to keep flange faces square with each other, and to ensure that bolt stresses are evenly distributed.
- M. Bolts and nuts in flanged and mechanical joints shall be tightened in accordance with the recommendations of the pipe manufacturer for a leak-free joint. The workmen shall exercise caution to prevent overstress. Torque wrenches shall be used until, in the opinion of the Engineer, the workmen have become accustomed to the proper amount of pressure to apply on standard wrenches.
- N. Cutting of ductile iron pipe for inserting valves, fittings, etc., shall be done by the Contractor in a neat and workmanlike manner without damage to the pipe, the lining, or the coating. Pipe shall be cut with a mechanical pipe saw. After cutting the pipe, the plain end shall be filed to remove all sharp edges and burrs.
- O. The pipe shall be restrained at reaction points as specified and shown on the Plans. The pipe manufacturer shall instruct the Contractor in the making of such joints. In addition, mechanical restraint per standard GS 2.0 at minimum shall be placed at all bends, tees, plugs and other fittings. Encasement-type thrust anchors and collars shall be placed where indicated on the Plans.
- P. Taps into ductile iron pipe for corporation stops shall be AWWA tapered thread only, and the Contractor shall provide suitable equipment for this purpose as approved by the Department.
- Q. Any work within the pipe shall be performed with care to prevent damage to the lining. Damaged lining shall be repaired as recommended by the pipe manufacturer or the pipe section replaced as required by the Engineer. No cables, lifting arms or other devices shall be inserted into the pipe. All lifting, pulling, or pushing mechanisms shall be applied to the exterior of the pipe barrel.
- R. Unless otherwise approved by the Engineer, the pipeline shall be cleaned by pigging at intervals not to exceed 30 lengths of pipe. Cleaning methods shall meet the Engineer's approval, and must be sufficient to remove silt, rocks, or

other debris which may have entered the pipeline during its installation.

- S. Polyethylene encasement of ductile iron pipe and fittings, riser pipe and valves, if required by the Department, shall be installed in accordance with ANSI/AWWA C105/A21.5, "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids" Method A or B.
- T. Polyethylene encasement of valves and ductile iron riser pipes, if required by the Department, shall be installed in accordance with ANSI/AWWA C105/A21.5, "Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids" Method A, B or C.
- U. Lines shall be laid straight and depth of cover shall be maintained as shown on the Plans. Grades or pipe centerline elevations are shown on the Plans. The Contractor shall be permitted to use surveying instruments to maintain alignment and grade. At least one elevation shot shall be taken on each length of pipe and recorded. No abrupt changes in direction or grade will be allowed.

3.05 CLEANING, TESTING AND DISINFECTION

- A. See sections 33 01 10.54 (UC-170) "Cleaning and Testing of Mains" and 33 01 10.58 (UC-175) "Disinfection of Water Mains"

3.06 PAVEMENT RESTORATION

- A. See section 33 12 16 (02745) "Pavement Removal and Replacement"

3.07 SYSTEM IDENTIFICATION

- A. All pipe and fittings shall be clearly identified as water mains. The standard color is Cyanine Blue (Carboline, Color No. 2127) for all above ground water system piping and appurtenances.
- B. Buried pipes shall be color coded with a blue paint as stated in the Florida Administration Code, Subparagraph 62-555.320(21)(B)3 and as required by the Florida Department of Environmental Protection. If paint is applied during installation of the pipe, the paint shall be applied in a continuous line that runs parallel to the axis pipe and that is located on the top of the pipe. For pipes with an internal diameter of 24-inches or greater, paint shall be applied in continuous lines along each side of the pipe as well as along the top of the pipe.

END OF SECTION