

approval prior to installation. All water services pipe from main connections to the meter box assembly shall be K type copper. All connections shall use flare or silver floss fittings at the discretion of the City. The minimum size service connection shall be "K" type copper, three-quarters inch (3/4") I.D.

- 203.08 Wet Taps: All wet taps require the prior approval of the Director of Public Works. Sleeve and valve assemblies shall be tested at one hundred fifty (150) pounds per square inch for ten (10) minutes before the actual tap is made.

Wet taps shall employ a Mueller No. H-615 cast iron mechanical joint sleeve, a fabricated steel with epoxy coating as manufactured by Rockwell International or other fitting specifically designed for this purpose as approved by the Director of Public Works or the City Engineer.

- 203.09 Large Meter Installations: Water meters one and one-half inches (1½") and larger shall be installed with a by-pass in order to isolate the meter for repairs. Plans for the installation of three inch (3") and larger meters will be submitted to the City Engineer for review and approval.

204.00 CONSTRUCTION STANDARDS

- 204.01 Installation of Water Mains, Fittings, and Appurtenances: All installations of public or private water systems shall be made in accordance with the American Water Works Association Standards C600 or latest revision for "Installation of Ductile-Iron Water Mains" and with any special applicable supplementary instructions issued by the manufacturers of the equipment being installed. Pertinent parts of AWWA Standards C600 shall also be applicable as shall manufacturers' instructions for installation of copper pipe, or other pipe material specified by the City.

204.02 Excavation, Bedding & Backfill:

- A. Clearing: The site shall be cleared of all lumber, tree stumps, brush and rubbish, which shall be removed or disposed of off-site by the landowner in accordance with applicable law.
- B. General: During excavation operations, material suitable for backfilling shall be piled in an orderly manner a sufficient distance from the banks of the trench to avoid overloading and to prevent

slides or cave-ins. All excavated material not suitable and/or required for backfill shall be removed and disposed of in an approved manner. Such grading shall be performed in a manner which prevents water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by methods approved by the Director. All excavations shall be made by open cut unless otherwise specified.

- C. Trench Excavation: The width of the trench at any point below the top of the pipe shall not exceed the structural design assumption width. The width of the trench above the top of the pipe may be as wide as necessary for sheeting and bracing and the proper performance of the work. All trench walls shall be kept as nearly vertical as is possible. Excavation at valve vaults and similar structures shall be sufficient to leave at least twelve inches (12") clear between their outer surfaces and the embankment or sheeting. Minimum clearance between the side of trench and pipe shall be six inches (6").
- D. Pipe Installed in Trenches: Pipe to be located at elevations below the existing ground level shall be installed in trenches with Class A,B, or C pipe bedding as shown in Plate II-U. Granular material under and around the pipe shall be placed in six-inch (6") layers and compacted by rodding, spading or with approved vibratory equipment to obtain not less than eighty percent (80%) relative density as determined by ASTM Method D2049.
- E. Pipe Installed in Embankment: Pipe to be located at elevations above the existing ground level shall be installed in trenches excavated after embankment has been constructed to a minimum elevation of one foot (1') above the proposed top of pipe.
- F. Pipe Bedding Material: The pipe shall be bedded from the trench subgrade to the pipe springline in granular material consisting of gravel, crushed gravel, or crushed stone meeting the requirements of ASTM Designation C33, Gradation 67 (3/4-inch to No. 4).
- G. Foundation in Poor Soil: Whenever the soil at the trench subgrade elevation is soft, unstable or saturated with water, such unsuitable material must be removed and the trench sub-grade stabilized with a granular stabilization material. Maximum size of granular material shall be two inches (2"). Depth of stabilization shall be as necessary to construct a firm subgrade for pipe bedding material. Concrete cradle shall be provided when necessary to bridge highly unstable soils.

- H. Backfill: All material used for backfilling of trenches shall be free of excessive amounts of deleterious materials such as all organic matter, frozen clods and sticky masses of clay and gumbo which are difficult to properly compact. Any rock materials used for backfill shall be no longer than four inches (4") in greatest dimension, and shall not be placed within twelve inches (12") of the installed pipe in any direction. Material as specified for pipe bedding may be substituted for backfill material defined above from top of pipe bedding to twelve inches (12") above top of pipe.
1. Backfill shall be placed in six-inch (6") layers from top of pipe bedding to a point at least twelve inches (12") above the top of pipe. Above this point, backfill shall be deposited in layers of a thickness which will permit compaction to a density as specified hereinafter.
 2. The layers of material shall be compacted to a density of at least ninety percent (90%) of the maximum density as determined by the AASHO Standard Test (AASHO Designation T99) wherever the pipe is installed in open fields or in areas which carry no vehicular traffic. The top portion of the backfill areas which are to be resodded shall be composed of topsoil at least six inches (6") in depth and level with the adjoining sodded areas.
 3. The layers of material shall be compacted to a density of at least ninety-five percent (95%) of the maximum density at optimum moisture content as determined by the AASHO Standard Test (AASHO Designation T99) under all pavements and for future pavements. Pavement shall not be restored over trenches until the backfill material has been tested and determined to be satisfactory according to the tests. Pavement restoration shall be in accordance with Section 204.12 of this PFM.
- I. Sheeting and Bracing: All trenches and excavation shall be properly sheeted and braced for the safety of personnel and/or protection of the work; and/or to maintain the maximum trench widths permitted; and/or to prevent the disturbance or settlement of adjacent foundations or structures.

When so required by the City, sheeting shall be left in place by cutting off the exposed portions no higher than one foot (1') below finished surface grade and no lower than one foot (1') above the top

of the pipe. The requirement of sheeting and/or bracing left in place shall not create an obligation or liability of the City in any manner.

- 204.03 Blasting: Blasting, where required, shall be done with care in accordance with all applicable Federal, State, and local laws, ordinances, and regulations, and shall not be done within a distance of twenty-five feet (25') from previously laid pipe line or a previously installed structure if, in the opinion of the City, the safety or soundness of existing facilities are in any manner endangered.
- 204.04 Bends and Elbows: All bends and elbows of six-inch (6") I.D. or larger shall be installed with suitable concrete thrust blocks poured in place with the concrete deposited against firm, undisturbed earth.
- 204.05 Testing and Sterilizing Main During Construction: Not more than 4000 feet of main shall be installed without testing and sterilization. Contractor shall not proceed with construction until such portion of main has been approved by the City.
- 204.06 Flushing of Mains: All lines shall be thoroughly flushed through the blow-offs and/or hydrants provided in accordance with AWWA C601 immediately prior to testing for final acceptance by the City. Water used will be estimated by the City and charged at cost to the developer or contractor installing the main.
- 204.07 Acceptance Tests: The City shall be permitted access to the construction work at any time for inspection of the work and construction methods. Work not conforming to the requirements of this PFM and the approved plans shall be adequate basis for rejection of project until the non-conforming work is corrected to the satisfaction of the City.
- A. Hydrostatic Testing of Water Mains: Water mains shall be tested by the procedure outlined in American Water Works Association Standard C600, or latest revision, Section 13 - Hydrostatic Tests, with the following modifications:
1. Pressure tests shall be conducted at one hundred fifty percent (150%) of normal operating pressure as specified by the City.
 2. Leakage tests shall be conducted at the maximum operating pressure for the locality as specified by the City.

- 204.08 Repairs: Water mains not meeting requirements of this PFM shall be replaced or repaired to the satisfaction of the City. Defective materials shall be completely removed and replaced with new materials.
- 204.09 Disinfection of Water Lines: The Developer shall sterilize the lines and have them tested for bacteria before requesting connection for service. The sterilization will be in accordance with the latest revisions of AWWA Standard C601. At least two (2) consecutive (24-hour interval) satisfactory bacteriological samples must be obtained from the distribution system before the system can be placed into service. Corporation cocks shall be provided for sterilization at locations designated by the City.
- 204.10 Protection of Existing Improvements: During construction operations, care shall be exercised by the parties performing the work to protect, brace, support and maintain all underground pipes, conduits, drains and other underground structures uncovered or otherwise affected by the construction work being performed. All pavement, surfacing, driveways, curbs, walks, buildings, utility poles, guy wires and other surface structures, together with all sod and shrubs in yards and parking lots crossed by or adjacent to the water main under construction shall be maintained and, if removed or otherwise damaged, shall be replaced or restored to their original condition. All replacements of such underground and surface structures or parts thereof shall be made with new materials. All damage resulting from construction operations to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges or other public or private property or facility, regardless of location or character, shall be the responsibility of the landowner, its contractor and subcontractors. Satisfactory arrangements shall be made without delay with the owner or owners of, or the agency or authority having jurisdiction over, the damaged property, surface, structure or facility concerning its repair or replacement and payment of costs incurred in connection with said damage.
- 204.11 Safety of Public:
- A. Maintenance of Traffic: Construction operations shall be scheduled by the landowner and contractor so as to interfere as little as possible with public travel, whether vehicular or pedestrian. Whenever it is necessary to cross, use or interfere with roads, driveways or walks, whether public or private, suitable and safe bridges, detours or other temporary expedients for the

accommodation of public and private travel shall be promptly provided and continuously maintained. The landowner is responsible for obtaining all permits, easements, licenses and other permission for crossing, using or interfering with the property of others and for providing satisfactory notice to owners before exercising any rights under such approvals.

B. Barricades and Lights:

1. All streets, roads, highways and other public thoroughfares which are closed to traffic, under the authority of a proper permit, shall be protected by means of effective barricades being located at the nearest intersecting public highway or street on each side of the blocked section of such public thoroughfare.
2. All open trenches and other excavations shall be provided with suitable barriers, signs and lights to the extent that adequate protection is provided to the public against accident by reason of such open construction. Obstructions, such as material piles and equipment, shall be provided with similar warning signs and lights.
3. All barricades and obstructions shall be illuminated by means of acceptable warning lights at night and all lights used for this purpose shall be kept burning from sunset to sunrise. Materials stored upon or alongside public streets, roads and highways shall be placed and the work at all times shall be conducted so as to cause the minimum obstruction, danger and inconvenience to the traveling public.
4. All barricades, signs, warning lights and other protective devices shall be installed and maintained in conformity with applicable laws, regulations, codes and ordinances and, where within public thoroughfare rights-of-way, as required by the authority having jurisdiction.

C. Operations Along Streets and Highways:

1. No equipment, pipeline or excavated materials shall be stored on the pavement or on shoulders of uncurbed roads or in ditches or at other locations which may obstruct traffic or drainage.

2. Construction operations shall be confined to an area no more than one thousand feet (1,000') of work under construction with a maximum open trench of three hundred feet (300'). The term "work under construction" shall include, without limitation, all operations between start of excavation of the trench to final tamping of backfill and/or restoration of pavement to public use. Traffic shall not be obstructed in more than one lane during construction operations. The length of one-lane traffic shall be limited to three hundred feet (300'). Two (2) flagmen, at minimum, shall be provided to control traffic. Sufficient advance warning signs of construction shall be provided. All obstructions shall be removed and the pavement cleaned at all road crossings at the end of each day's operation.
 3. All pipe strung along the right-of-way shall be blocked to prevent movement.
- D. Construction Operations Within Highways and Streets: Where water main will be installed in existing paving, the trench shall be backfilled with 21-A material tamped to ninety-five percent (95%) compaction. The backfill shall be completed with minimum rolled 3" BM-2 and 1 1/2" SM-2A asphalt material. The Director of Public Works shall be notified prior to commencing any work within the right-of-way.
- 204.12 Cleanup and Restoration: The City will not accept any construction where public or private property has not been restored to a condition at least equal to its condition immediately before commencement of construction. All debris, rock or other waste shall be removed and deposited by the landowner - off-site in accordance with applicable laws at approved locations and, where required by the City, covered with twelve inches (12") of earth.

END OF SECTION

