HISTORIC
FRANKLIN
TENNESSEE

City of Franklin, TN
Water Management Department
Design Criteria for
Water Infrastructure

124 Lumber Drive Franklin, TN 37064
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HISTORIC FRANKLIN TENNESSEE

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Part 1 - SUBMISSION OF ENGINEERING DOCUMENTS

1.1. GENERAL - All reports, final plans and specifications should be submitted to the City of Franklin Water Management Department for review. Preliminary plans and the engineer's calculations should be submitted for review prior to the preparation of final plans when the project will significantly change or alter the distribution system. No approval for construction will be issued until final, complete, detailed plans have been submitted to the City of Franklin Water Management Department (COF WMD) and found to be satisfactory in compliance with the COF WMD design criteria and Technical Specifications for Utility Installation. All submittals must be signed by a professional engineer licensed to practice in the State of Tennessee. Documents submitted for formal approval shall include but not be limited to:

a. summary of the basis of design,

b. hydraulic calculations and profiles,

c. general layout,

d. detailed plans,

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1.2. ENGINEER'S REPORT (if required) - In general, the engineering report for water works improvements shall clearly present:

a. a statement of the problem,

b. a summary of the alternative solutions, if applicable,

c. recommendations.

1.2.1. Extent of water works system, including

1.2.1.1. description of the nature and extent of the area to be served,

1.2.1.2. appraisal of the future demand requirements for service, including existing and potential industrial, commercial, institutional and other water supply needs.

1.2.2. Water consumption, including

1.2.2.1. description of the population trends as indicated by available records, and the estimated population which will be served by the proposed water supply system or expanded system,

1.2.2.2. present and future water consumption values used as the basis of design, including number of proposed service connections,

1.2.2.3. hydraulic calculations and hydraulic profiles,

1.2.2.4. distribution of storage capacities,

1.2.2.5. water losses in system.

1.2.3. Fire flow requirements

1.2.4. Distribution System, including

a. Map of overall distribution system showing existing and proposed

1. location and size of water lines,
2. location, size, and elevation of storage tanks,
3. location, and size of pumps.

b. Preliminary hydraulic gradient or calculations and data to provide hydraulics of system (this may be deferred until plans are submitted).

1.3. PLANS - Plans for water works improvements should, where pertinent, provide the following:

1.3.1. General layout, including

1.3.1.1. title,

1.3.1.2. City of Franklin on title blocks and location map on title sheet

1.3.1.3. area or institution to be served,

1.3.1.4. scale, in feet, not less than 1 inch = 200 feet for urban areas, and not less than 1 inch = 400 feet for rural areas,

1.3.1.5. north direction,

1.3.1.6. datum used,

1.3.1.7. boundaries of the area to be served,

1.3.1.8. date, address, name, and phone number of the designing engineer,

1.3.1.9. signed and dated imprint of professional engineer's seal,

1.3.1.10. legible prints suitable for reproduction, preferably all sheets same size,

1.3.1.11. location and size of existing water mains, adjacent to proposed construction,

1.3.1.12. location and nature of existing water works structures and appurtenances affecting the proposed improvements, noted on one sheet.

1.3.2. Detailed plans for distribution systems, including

a. a vicinity map showing location of project, if system map is not included,

b. key map, showing location of detailed drawings, when project is comprehensive,

c. location of proposed water lines in relation to roads, bridges, and other identifiable objects,

d. location of valves, fire hydrants, tees, and reducers/enlargers,

e. hydraulic profile or data and computations showing hydraulics of proposed additions to the distribution system.

1.4. SPECIFICATIONS

1.4.1. The following alternate specifications may be referenced in lieu of submitting new specifications as long as these are applicable to the project:

1.4.1.1. current, approved standard specifications for the water system on file in our office,

1.5. REVISIONS TO APPROVED PLANS - Any significant deviations from approved plans or specifications affecting capacity, hydraulic conditions, must be approved by the Department before such changes are made. Revised plans or specifications must be submitted in time to permit the review and approval of such plans or specifications before any construction work which will be affected by such changes is begun.

1.6. AS-BUILT PLANS - As-built plans shall be submitted to the Department for water distribution systems expansion

Part 2 - PUMPING FACILITIES

2.1. GENERAL - Pumping facilities shall be designed to maintain the sanitary quality of pumped water. Subsurface pits or pump rooms and inaccessible installations should be avoided. No pumping station shall be subject to flooding.

2.2. LOCATION - The pumping station shall be so located that the proposed site will meet the requirements of the sanitary protection of the water quality, hydraulics of the system and be protected against interruption of service by fire, flood or any other hazard.

2.2.1. Site Protection - The station shall be:

2.2.1.1. elevated to a minimum of one foot above the 100-year flood elevation, or protected to such elevation;

2.2.1.2. accessible at all times unless permitted to be out of service for period of inaccessibility;

2.2.1.3. graded around station so as to lead surface drainage away from the station;

2.2.1.4. protected to prevent vandalism and entrance by unauthorized persons or animals.

2.3. BOOSTER PUMPS - Booster pumps shall be located or controlled so that:

2.3.1. they will not produce negative pressure anywhere in the distribution system;

2.3.2. the pressure in the suction line shall be maintained at or above 20 psi by the use of a pressure sustaining valve or low pressure cutoff device.

2.3.3. automatic or remote control devices shall have a range between the start and cutoff pressure which will prevent excessive cycling.

2.3.4. In-line Booster Pumps - In addition to the other requirements of this section, in-line booster pumps shall be accessible for servicing and repairs.

2.3.4.1. The criteria in this section also apply to fire pumps.

2.3.4.2. Booster pumps shall not serve more than 50 service connections unless gravity storage is provided or service pressure can be maintained above 20 psi without the pumps running.

2.4. AUTOMATIC AND REMOTE-CONTROLLED STATIONS - All automatic stations should be provided with automatic signaling apparatus which will report when the station is out of service. All remote controlled stations shall be electrically operated and controlled and shall have signaling apparatus of proven performance. Installation of electrical equipment shall conform with the National Electrical Code.

2.5. APPURTENANCES

2.5.1. Valves - Pumps shall be adequately valved to permit satisfactory operation, maintenance and repair of the equipment. If foot valves are necessary they shall have a net valve area of at least 2½ times the area of the suction pipe and they shall be screened. Each pump shall have a positive acting check valve on the discharge side between the pump and shutoff valve.

2.5.2. Piping - In general, piping shall:

2.5.2.1. be designed so that the friction head will be minimized;

2.5.2.2. not be subject to contamination;

2.5.2.3. have watertight joints;

2.5.2.4. be protected against surge or water hammer;

2.5.2.5. be such that each pump has an individual suction line or the lines shall be so manifolded that they will insure similar hydraulic and operation conditions.

2.5.3. Gauges and Meters - Each pump shall:

2.5.3.1. shall have a standard pressure gauge on its discharge line;

2.5.3.2. shall have a compound gauge on its suction line;

2.5.3.3. shall have recording gauges in larger stations;

2.5.3.4. should have a means for measuring the discharge.

2.5.3.5. The larger stations should have indicating, totalizing and recording metering of the total water pumped.

2.5.4. Water Seals - Water seals shall not be supplied with water of a lesser sanitary quality than that of the water being pumped.

2.5.5. Controls - Pumps, their prime movers and accessories, shall be controlled in such a manner that they will operate at rated capacity without dangerous overload. Where two or more pumps are installed, provision shall be made for proper alternation. Provision shall be made to prevent operation of the pump during the backspin cycle. Electrical controls should be located above grade.

2.5.6. Power - When power failure would result in cessation of minimum essential service, power supply shall be provided from at least two independent sources or standby or auxiliary source shall be provided.

2.5.7. Auxiliary Power Supply - When automatic pre-lubrication of pump bearings is necessary, and an auxiliary power supply is provided, the pre-lubrication line shall be provided with a valved by-pass around the automatic control.

Part 3 – FINISHED WATER STORAGE

3. GENERAL - The materials and designs used for finished water storage structures shall provide stability and durability as well as protect the quality of the stored water. Steel structures shall follow the current AWWA standards concerning steel tanks, standpipes, reservoirs, and elevated tanks wherever they are applicable. Prestressed concrete tanks shall meet applicable AWWA Standards. Other materials of construction are acceptable when properly designed to meet the requirements of this part.

3.1. Location

3.1.1. The bottom of ground-level reservoirs should be placed at the normal ground surface and above maximum flood level.

3.1.2. Where the bottom must be below normal ground surface, it should be placed above the ground water table. Sewers, drains, standing water, and similar sources of contamination must be kept at least 50 feet from the reservoir. Mechanical-joint water pipe, pressure tested in place to 50 psi without leakage, may be used for gravity sewers at lesser separations.

3.1.3. The top of a ground-level reservoir should not be less than 2 feet above normal ground surface and any possible flood level. Clearwells constructed under filters may be excepted from this requirement when the total design gives the same protection.

3.1.4. Protection - All new finished water storage structures shall have suitable watertight roofs or covers which exclude birds, animals, insects, and excessive dust.

3.1.5. Protection from Trespassers - Fencing, locks on access manholes, and other necessary precautions shall be provided to prevent trespassing, vandalism, and sabotage.

3.1.6. Drains - No drain on a water storage structure may have a direct connection to a sewer or storm drain. Splash pad and drainway shall be provided to prevent erosion.

3.1.7. Overflow - The overflow pipe of a water storage structure should be brought down near the ground surface and discharged over a drainage inlet structure or a splash plate and flow onto a drainway which is rip-rapped or otherwise protected to minimize erosion. No overflow may be connected directly to a sewer or storm drain.

3.1.7.1. When an internal overflow pipe is used, it shall be located in the access tube.

3.1.7.2. The overflow of a ground-level structure shall be high enough above normal or graded ground surface to prevent the entrance of surface water.

3.1.7.3. The overflow shall be protected with a twenty-four mesh non-corrodible screen and a flap valve.

3.1.8. Access - Finished water storage structures shall be designed with reasonably convenient access to the interior for cleaning and maintenance. Manholes on scuttles above waterline:

3.1.8.1. shall be framed at least 4 inches, and preferably 6 inches, above the surface of the roof at the opening; on ground-level structures manholes should be elevated 24 to 36 inches above the top or covering sod;

3.1.8.2. shall be fitted with a solid watertight cover which overlaps the framed opening and extends. down around the frame at least 2 inches;

3.1.8.3. should be hinged at one side;

3.1.8.4. shall have a locking device,

3.1.8.5. shall be a minimum of 20 inches in diameter or equivalent.

3.1.9. Vents - Finished water storage structures shall be vented by special vent structures. Open construction between the side wall and roof is not permissible. These vents:

3.1.9.1. shall prevent the entrance of surface water;

3.1.9.2. shall exclude birds and animals;

3.1.9.3. shall exclude insects and dust, as much as this function can be made compatible with effective venting; for elevated tanks and standpipes, 4-mesh non-corrodible screen may be used;

3.1.9.4. shall, on ground-level structures, terminate in an inverted U construction, the opening of which is 24 to 36 inches above the roof of sod and is covered with 24-mesh non-corrodible screen cloth.

3.1.10. Roof and Sidewall - The roof and sidewalls of all structures must be watertight with no openings except properly constructed vents, manholes, overflows, risers, drains, pump mountings, control ports, or piping for inflow and outflow.

3.1.10.1. Any pipes running through the roof or sidewall of a finished water storage structure must be welded or properly gasketed in metal tanks, or should be connected to standard wall castings which were poured in place during the forming of a concrete structure; these wall castings should have flanges embedded in the concrete.

3.1.10.2. openings in a storage structure roof or top, designed to accommodate control apparatus or pump columns, shall be curbed and sleeved with proper additional shielding to prevent the access of surface or slop water to the structure.

3.1.10.3. Valves and controls should be located outside the storage structure so that valve stems and similar projections will not pass through the roof or top of the reservoir.

3.1.11. Drainage for Roof or Cover - The roof or cover of the storage structure should be well drained, but downspout pipes shall not enter or pass through the reservoir; parapets, or similar construction which would tend to hold water and snow on the roof will not be approved.

3.1.12. Safety - The safety of employees must be considered in the design of the storage structure. As a minimum, such matters shall conform to pertinent laws and regulations.

3.1.12.1. Ladders, ladder guards, balcony railings, and safe location of entrance hatches shall be provided where applicable.

3.1.12.2. Elevated tanks with riser pipes over 8 inches in diameter shall have protective bars over the riser openings inside the tank.

3.1.13. Freezing - All finished water storage structures and their appurtenances, especially the riser pipes, overflows, and vents, shall be designed to prevent freezing which will interfere with proper functioning.

3.1.14. Grading - The area surrounding a ground-level structure should be graded in a manner that will prevent surface water from standing within 50 feet of the structure.

3.1.15. Silt stop - The discharge pipe of the reservoir shall be located in a manner that will prevent the flow of sediment into the distribution systems. Either a permanent or removable silt stop shall be provided at least 4 inches above the bottom of the storage structure.

3.1.16. Painting and/or Cathodic Protection - Proper protection should be given to metal surfaces by paints or other protective coatings, by cathodic protective devices, or by both.

3.1.16.1. Paint systems consistent with current American Water Works Association standards, or otherwise acceptable to the Department shall be used. All paints must be acceptable to FDA and EPA for contact with potable water.

3.1.16.2. Cathodic protection should be designed and installed by competent technical personnel.

3.1.17. Turnover of water - If the storage reservoir is sized larger than required for initial demand and there is more than 2 days storage, provisions shall be made for turnover of the water in the tank and/or booster chlorination. Internal piping arrangements to prevent water stratification in ground level standpipes are recommended. For large, ground level tanks/reservoirs, piping and/or check valves can be installed to force water in and out of the tank at different locations in order to minimize dead/stagnant water zones.

3.1.18. Sampling - A suitable sampling tap should be provided on all storage structures and be protected from public access.

3.1.19. Disinfection - Finished water storage structures shall be disinfected in accordance with AWWA Standard C652 before being put in service.

3.1.20. Location - The tank should be located above normal ground surface and be completely housed, or earth-mounted with one end projecting into an operating house, to prevent freezing.

3.1.21. Bypass - tank should have bypass piping to permit operation of the system while the tank is being repaired or painted.

3.1.22. Appurtenances - Each tank should have an access manhole, a drain, a control equipment consisting of pressure gage, water sight glass, automatic or manual air blow-off, mechanical means for adding air, and pressure-operated start-stop controls for the pumps.

3.1.23. Sizing -

3.1.23.1. The capacity of each well and/or pump in a hydropneumatic system should be at least ten times the average daily consumption rate of the community or the maximum peak demand whichever is greater.

3.1.23.2. The gross volume of the hydropneumatic tank, in gallons, should be at least 20 times the capacity of the largest pump, rated in gallons per minute.

3.1.24. Auxiliary power - Auxiliary power with automatic takeover capability shall be provided when positive pressures are not available from system gravity flow.

Part 4 – DISTRIBUTION STORAGE

4. GENERAL - The applicable design standards of this part shall be followed for distribution storage.

4.1. The purpose of system storage is to have sufficient water available to provide adequate flow and pressure at peak demand as well as to provide for fire flows when needed. For most water systems a satisfactory rule-of-thumb to meet these needs is to provide at least the average 24-hour demand in elevated storage. In the absence of an acceptable engineering study of the amount of water the system needs to meet customer demand and to provide for fire emergencies, the projected 24-hour demand at the end of the planning period will be the minimum requirement for elevated storage. This requirement may be reduced when the source, treatment facilities and pumps have sufficient capacity with standby power capability to supplement peak demands of the system.

4.2. Pressure Variation - System pressure variation on account of changes in level of water in storage structures should be minimized. Elevated storage tanks or large diameter ground tanks located on high ground should be the usual choices. Standpipes will not normally be approved and must be completely justified if proposed.

4.3. Drainage - Storage structures which float on the distribution system should be designed to drain for cleaning or maintenance without necessitating loss of pressure in the distribution system. The drains should discharge to the ground surface with no direct connection to a sewer or storm drain. A nearby fire hydrant may be considered as a drain as long as service is not interrupted and suitable erosion protection is provided.

4.4. Level Controls - Adequate controls shall be provided to maintain levels in distribution system storage structures.

4.4.1. Telemeter equipment should be used when pressure-type controls are employed and any appreciable head loss occurs in the distribution system between the source and the storage structure.

4.4.2. Altitude valves or equivalent controls may be required for a second and subsequent structures on the system.

4.4.3. Overflow and low-level warnings or alarms should be located at places in the community where they will be under responsible surveillance on a 24-hour basis.

Part 5 - DISTRIBUTION SYSTEMS

5. SYSTEM DESIGN

5.1. Minimum Pipe Size

5.1.1. The minimum size of pipe for principal water mains and for water mains where fire hydrants are to be attached shall be 6-inch diameter.

5.1.2. Size of water mains shall be justified by hydraulic analysis. 2-inch water mains will only be considered for short cul-de-sacs and permanent dead-ends where future growth is not feasible. The length of 2-inch mains shall be restricted to 3000 feet in any one direction.

5.1.3. All water mains including those not designed to provide fire protection shall be sized after a hydraulic analysis based on flow demands and pressure requirements. The system shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in distribution system under all conditions of flow.

5.1.4. Wide variations in pressure above the minimum requirement of 20 psi may be inherent in the design of a distribution system but pressures no greater than 100 psi should be delivered to the customer (unless higher pressures are requested.). Main line pressure reducing valves can be used to reduce pressures below 100 psi where feasible. Where water pressures over 100 psi are necessary to the operation of the distribution system, customers must have individual pressure reducing valves.

5.1.5. All assumptions and any flow data used must be clearly documented and submitted with the hydraulic analysis. if actual flow data is not available theoretical calculations shall be based on all storage facilities half-full and the Hazen-Williams friction factor appropriate for type of pipe being used but in no case greater than 130.

5.1.6. Water distribution lines should be designed and sized for an instantaneous peak demand of 2 gpm per connection for water lines serving up to 100 residential connections. Peak design demands can be reduced to 1.5 gpm per connection for 150 residential connections, 1.0 gpm per connection for 300 residential connections, 0.75 gpm per connection for 500 residential connections, and 0.5 gpm per connection for 1000 or more residential connections.

5.2. Fire Protection

5.2.1. The minimum pipe size to which a fire hydrant may be connected is 6-inch.

5.2.2. Ordinarily fire hydrants shall not be connected to water mains which are not capable of providing a flow of 500 gpm at 20 psi. When a municipality or county enacts a restrictive use ordinance prohibiting pumper trucks from connecting to restricted fire hydrants which are painted a distinctive color and when a copy of this ordinance in on file at this office, we will permit fire hydrants to be connected to 6-inch mains which do not have the required pressure and flow.

5.2.3. When fire protection is to be provided, system design should consider the recommendations of the state Insurance Services Organization.

5.2.4. Fire hydrants shall meet current AWWA Standard C502.

5.3. Dead Ends

5.3.1. Dead ends shall be minimized.

5.3.2. Where dead-end mains occur, they should be provided with a fire hydrant, when fire flows are available, or blow-off for flushing purposes. The blow-off shall be at least 2 inches in diameter

but should provide flushing velocities of 2 feet per second or greater.

5.3.3. No flushing device shall be directly connected to any sewer nor be subject to flooding or plugging.

Part 6 – INSTALLATION OF MAINS

6. Adequate support shall be provided for all pipes.

6.1. A continuous and uniform bedding shall be provided in the trench for all buried pipe.

6.2. Rock Excavation - Stones found in the trench shall be removed for a depth of at least six inches below the bottom of the pipe.

6.3. Cover - All distribution mains shall be provided with sufficient earth or other suitable cover to prevent freezing. This shall not be less than 30 inches measured above the top of the pipe.

6.4. Hydrostatic Tests

6.4.1. Pressure and leakage tests shall be performed in accordance with current AWWA Standard C600 and/or manufacturer's installation procedures.

6.4.2. The test pressure of the installed pipe shall be a minimum of 150 psi or 1.5 times the working pressure, whichever is greater.

6.4.3. Allowable leakage shall be no greater than as calculated in L = SD /P/133,200 where L is allowable leakage in gallons/hour, S is the length of pipe tested in feet, D is pipe diameter in inches and P is test pressure in psi.

6.5. Disinfection of New Water Mains - The specifications shall include detailed procedures for the adequate flushing, disinfection, and (Total Coliform) bacteriological testing of all new water mains. Disinfection as described in current AWWA Standard C651 will be accepted.

6.6. Disinfection When Cutting into or Repairing Existing Mains:

6.6.1. Shall be performed when mains are wholly or partially dewatered;

6.6.2. Shall follow current AWWA C651 procedures including trench treatment, swabbing with hypochlorite solution, flushing and/or slug chlorination as appropriate;

6.6.3. Bacteriological testing should be done after repairs are complete but the water main may be returned to service prior to completion of testing to minimize the time customers are out of water;

6.6.4. Leaks or breaks that are repaired with clamping devices while mains remain full of water under pressure require no disinfection.

6.7. When non-metallic pipe is installed, detection tape or other acceptable means of detection shall be installed.

Part 7 – SEPARATION OF WATER MAINS AND SEWERS

7. General - The following factors should be considered in providing adequate separation:

7.1. materials and type of joints for water and sewer pipes;

7.2. soil conditions;

7.3. service and branch connections into the water main and sewer line;

7.4. compensating variations in the horizontal and vertical separations;

7.5. space for repair and alterations of water and sewer pipes;

7.6. off-setting of pipes around manholes;

7.7. water mains and sanitary or storm sewers shall not be laid in the same trench.

7.8. Parallel Installation

7.8.1. Normal conditions - Water mains shall be laid at least 10 feet horizontally from any sanitary sewer, storm sewer or sewer manhole, whenever possible; the distance shall be measured edge- to-edge.

7.8.2. Unusual conditions - When local conditions prevent a horizontal separation of 10 feet, a water main may be laid closer to a storm or sanitary sewer provided that:

7.8.2.1. The bottom of the water main is at least 18 inches above the top of the sewer;

7.8.2.2. where this vertical separation cannot be obtained, the sewer shall be constructed of materials and with joints that are equivalent to water main standards of construction and shall be pressure tested to assure water-tightness prior to backfilling.

7.9. Crossings

7.9.1. Normal conditions - Water mains crossing house sewers, storm sewers or sanitary sewers shall be laid to provide a separation of at least 18 inches between the bottom of the water main and the top of the sewer, whenever possible.

7.9.2. Unusual conditions - when local conditions prevent a vertical separation as described in Section 9.2.3a, the following construction shall be used:

7.9.2.1. Sewers passing over or under water mains should be constructed of the materials described in Section 11.0 of this design criteria and Per the City of Franklin “Technical Specifications For Utility Installation”

7.9.2.2. Water mains passing under sewers shall, in addition, be protected by providing:

7.9.2.2.1. A vertical separation of at least 18 inches between the bottom of the sewer and the top of the water main;

7.9.2.2.2. Adequate structural support for the sewers to prevent excessive deflection of joints and settling on and breaking the water mains;

7.9.2.2.3. That the length of water pipe be centered at the point of crossing so that the joints will be equidistant and as far as possible from the sewer.

7.9.2.2.4. Both the sewer and the water main shall be constructed of water pipe and tested in accordance with the City of Franklin Utility Standard Specifications.

7.9.2.3. Sewer manholes - No water pipe shall pass through or come into contact with any part of a sewer or sewer manhole.

Part 8 – SURFACE WATER CROSSINGS

8. GENERAL - Surface water crossings, both over and under water, present special problems which should be discussed with the Department before final plans are prepared.

8.1. Above-water crossings - The pipe shall be:

8.1.1. adequately supported;

8.1.2. protected from damage and freezing;

8.1.3. accessible for repair or replacement.

8.2. When crossing water courses which are greater than 15 feet in width:

8.2.1. The pipe shall be of special construction, having flexible, watertight joints;

8.2.2. Valves shall be provided at both ends of water crossing so that the section can be isolated for test or repair; the valves shall be easily accessible and not subject to flooding;

8.2.3. Sampling taps should be available at each end of the crossing;

8.2.4. Permanent taps should be made for testing and locating leaks.

Part 9 – CROSS CONNECTIONS

9. GENERAL There shall be no physical connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water and other contaminating materials may be discharged or drawn into the system.

    9.1. The approval of the Department shall be obtained for interconnections between potable water supplies.

    9.2. Neither steam condensate nor cooling water from engine jackets or other heat exchange devices shall be returned to the potable water supply.

Part 10 – WATER SERVICES AND PLUMBING

10. GENERAL - Water services and plumbing shall conform to relevant local and/or state plumbing codes, or to the Standard Plumbing Code.

Part 11 – MATERIALS

11. GENERAL Pipe selected shall have been manufactured in conformity with the latest standards issued by the American Water Works Association, if such standards exist, and be acceptable to the Department.

11.1. in the absence of such standards, pipe meeting applicable ASTM and ANSI criteria and acceptable to the Department may be selected.

11.2. Used water mains that meet these standards may be used again, after the pipe has been thoroughly cleaned and restored practically to its original condition.

11.3. Packing and jointing materials used in the joints of pipe shall meet the standards of the American Water Works Association or the Department.

11.4. Mechanical joints or slip-on joints with rubber gaskets are preferred.

11.5. PIPE

11.5.1. Ductile iron and cast iron pipe shall meet the latest requirements of ANSI/AWWA - C106 or CIO8 for cast iron pipe and C151 for ductile iron pipe.

11.5.2. Concrete pressure pipe shall meet the latest requirements of AWWA C300 or AWWA C301.

11.5.3. PVC pipe - 2 inch through 12 inch

11.5.3.1. PVC pipe meeting the standards set forth in AWWA C-900 (latest edition) will be accepted for those working pressures as designated by class. (Note that C-900 refers only to 4-inch through 12-inch pipe).

11.5.3.2. Provision must be made for contraction and expansion at each joint with flexible ring gaskets made from rubber or other suitable material. Gasket materials shall meet the requirements established in ASTM F477.

11.5.3.3. Joints for PR 200 (pressure rated) pipe (ASTM D2241) shall be manufactured in accordance with ASTM D3139. Section 5.3.1 of this standard refers to 2000-hour tests. If pipe is manufactured in accordance with that section, the testing must be done by an independent laboratory with the results being furnished to this Department. Note also that a separate test is required for each different type of gasket provided.

11.5.3.4. All fittings such as tees, ells, etc. using welded joints shall be factory welded and shall meet the same specifications as the welded bell section.

11.5.3.5. Lubricants shall be non-toxic and shall not promote biological growth.

11.5.3.6. Solvent cemented joints in the field are not permitted.

11.5.3.7. Forty-foot lengths will be permitted when the engineering specifications contain special conditions for handling such pipe lengths. These conditions shall include provisions for transporting pipe from storage areas to the installation area on specially designed racks to prevent the ends of the pipe from dragging.

11.5.3.8. This policy does not apply to plastic service lines.

11.5.4. Molecular oriented PVC pipe shall meet the requirements of AWWA C909.

11.5.5. Any pipe material which is not specifically covered in this section will be considered on an individual basis.

11.6. VALVE, AIR RELIEF, METER AND BLOW-OFF CHAMBERS

11.6.1. Sediment accumulations may be removed through a standard fire hydrant, and compressed air and pumping may be used for dewatering mains through hydrants.

11.6.2. At high points in water mains where air can accumulate, provisions shall be made to remove the air by means of hydrants or air relief valves. Automatic air relief valves shall not be used in situations where flooding of the manhole or chamber may occur.

11.6.3. Chambers of pits containing valves, blow-offs, meters or other such appurtenances to a distribution system, shall not be connected directly to any storm drain or sanitary sewer, nor shall blowoffs or air-relief valves be connected directly to any sewer.

11.6.4. Such chambers or pits shall be drained to the surface of the ground where they are not subject to flooding by surface water, or to absorption pits underground.

11.6.5. Valves are to be placed at all intersections of water mains but at no time greater than 4000 feet apart.

11.6.5.1. Gate valves shall meet current AWWA standards.