

**G. LOCATION:**

1. Alignment and Grade: The water mains shall be laid, and valves, hydrants, and fittings shall be placed in accordance with the plans. Unless otherwise approved by the City's Engineer, all pipe shall be installed with the following minimum depths: All pipe smaller in diameter than 12" shall be installed a minimum of 42 inches below finished grade or when installed along streets, 42 inches below the existing street pavement centerline elevation, whichever is greater. All pipe 12" and larger in diameter shall be installed a minimum of 60 inches below finished grade or when installed along streets, 60 inches below the existing street pavement centerline elevation, whichever is greater.
2. Dead Ends: The dead end of a main shall have a fire hydrant, flushing hydrant, or approved flush assembly for flushing purposes. Flush assemblies shall be a min 2" for 6" & 8" mains, a min 4" for 10" & 12" mains, and a fire hydrant assembly for 16" mains. Temporary flushout standpipes shall be installed on the fire hydrant valve wherever possible. All 2" flushouts shall be galvanized pipe with no weephole. The standpipe shall extend a minimum of 2 feet and a maximum of 3 feet above ground level and be fitted with a plug. Larger mains shall utilize a flushing assembly that provides a minimum of 4 ft/sec water velocity within the pipe at flushing. It will be the responsibility of the contractor to supply all required materials for temporary flushouts. Temporary flushouts shall be placed by the contractor as per the plans and these specifications. Additional flushouts may be required by the Water & Light Inspector due to field conditions. These also shall be provided and placed by the contractor.
3. Ells, Tees, Plugs, and Hydrants: All fittings shall have thrust reinforcement, either in the form of approved manufactured restraint, stainless steel rods, or a properly designed thrust block of concrete.
4. Water Mains Near Sewers:
  - a. Horizontal Separation: A water main shall be laid at least 10 feet horizontally from any existing or proposed storm or sanitary sewer line. Should local conditions prevent a lateral separation of 10 feet, water main may be laid closer than 10 feet to a storm or sanitary sewer line provided

that the water main is laid in separate trench or on an undisturbed earth shelf located on one side of the sewer line and at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer line. When it is impossible to obtain vertical or horizontal separation, the sewer line must be relaid and constructed with ductile iron pipe. Backfill shall be of compacted clay to a min of 18 inches over/under the water main. In no case shall the water main and the sewer main share the same granular fill bed.

b. Vertical Separation: Where water mains must cross over storm drains, or sanitary sewers, the water main must be laid at such an elevation that the bottom of the water main is at least 18 inches above the top of the sewer, and a full length of water main pipe must be centered over the sewer to be crossed so both of the joints will be equally distant from the sewer and as remote therefrom as possible. This vertical separation must be maintained for that portion of the water main located within 10 feet horizontally of any storm drain or sanitary sewer that it crosses, said 10 feet to be measured as the shortest distance from the water main to the sewer at that point. Backfill shall be of compacted clay to a minimum of 18" above and below the outside dimension of the water main and for a horizontal distance of 10 feet from the sewer being crossed. In no case shall the water main and the sewer share the same granular fill bed.

c. Unusual Conditions: Where conditions prevent the minimum vertical separation as set forth above from being maintained or where it is necessary for the water main to pass under a sewer line, the water main must be encased with either a PVC C-900 casing or a steel casing pipe and backfilled with compacted clay to a minimum of 18" above and below the outside dimension of the water main and for a horizontal distance of 10 feet from the sewer being crossed. In no case shall the water main and the sewer share the same granular fill bed. In making such crossings, a full length of pipe must be centered over or under the sewer to be crossed so that the joints will be equally distant from the sewer and as remote therefrom as possible. Where a water main must cross under a sewer, a vertical separation of at least 18 inches between the bottom of the sewer line and the top of the water main must be maintained with adequate support for the larger size sewer lines to prevent them from settling. In no case shall the water main and the sewer main share the same granular bed. Where these conditions cannot be met the Missouri Department of Natural Resources shall be consulted as to the precautions

to be taken to protect the public water supply.