

2.9.2. Water Systems

A. Size/Capacity Determination

1. General

a. Hazen Williams Friction Coefficient $C = 80$, higher C coefficient may be used for new mains only upon approval by the City with sufficient documentation to show effects of long-term use.

b. Average day demand = 200 gal/person/day.

c. Peak day demand = 530 gal/person/day.

d. Peak hour demand = 900 gal/person/day.

~~e. Maximum static pressure = 110 psi (fire hydrants will have attached PRV where pressure exceeds 150 psi).~~

~~f.~~ **e.** If the maximum static pressure exceeds 80 psi, a pressure-reducing valve (PRV) will be required on the property owner's side of the water meter and should be shown on the plan view.

~~g.~~ **f.** Minimum operating pressure is 50 psi at the highest elevation meter location using average day demand.

2. Peak Hour Demand Requirements

a. The maximum allowable velocity shall not exceed 5 feet per second (fps).

b. The minimum pressure at any point in the affected pressure zone must not be less than 35 psi.

3. Emergency Demand (Fire Flow) Requirements

a. The maximum allowable velocity shall not exceed 10 fps.

b. Fire flow (reference City of Austin Fire Protection Manual) requirements will be determined in accordance with the City of Austin Fire Code and associated rules.

c. The minimum residual pressure at any point in the affected pressure zone at peak day plus fire flow must not be less than 20 psi.

d. Required fire pumps, for high-rise buildings, as defined in the building code, shall be supplied by connections to a minimum of two water mains. The domestic water line will be allowed off one of the fire lines. Domestic water lines must be

metered either after the fire line or along the fire line that includes the domestic water line. Separate supply piping shall be provided between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps shall be sized to supply the flow and pressure required for the pumps to operate.

Exception: Two connections to the same main shall be permitted provided the main is valved such that an interruption can be isolated so that the water supply will continue without interruption through at least one of the connections.

4. Sizing of Water Mains - Computer modeling is preferred for sizing water mains. However, for water mains less than 16 inches in diameter other engineering calculation methods may be accepted. The largest size, as determined by comparing the service area's peak hour demand and peak day plus fire flow demand, shall be used.

5. Storage Requirements - If it is determined by the Austin Water Utility that additional storage is required, the following criteria shall be used:

Effective Storage = 100 gal/person

Emergency Storage = 100 gal/person

TOTAL STORAGE = 200 gal/person

Effective Storage is defined as storage, which will provide a minimum of 35 psi of pressure at the highest service elevation in pressure zone.

The Engineer may be required to provide computer simulations as determined on a case-by-case basis.

B. Mains

1. Minimum main size shall be 8 inches with consideration for 4-inch pipe in cul-de-sacs less than 200 feet in length. Provision must be made in these cases for a flush valve at the end of the 4" line. The minimum size for any street type, however, will be governed by various factors which include fire protection requirements, high density land usage, and the designer's consideration of general system gridding, future transmission mains, neighboring developments and area configuration. Looped systems are required for service reliability. Transmission line sizes will be determined on a case-by-case basis.

While looped systems are required, it is recognized that in certain situations, short sections of dead end pipe may be more practical. When a dead end section of watermain, containing more than 100 gallons of water, is approved for installation, the following requirements must be met:

a. If a dead end section is installed for future connection or extension, and no service will be taken from the stub prior to the future connection or extension, a valve must be placed at the location where the main becomes a dead end (ie at the tee).

b. If a dead end is installed and service is to be provided via the dead end

i. The water demand from the service (or services) must be sufficient to turn over the water every 72 hours.

ii. If the service(s) do not provide sufficient demand to turn over the water every 72 hours, an approved automatic flushing device must be installed and programmed such that the 72 hour criterion is met.

2. Water mains should be located, where maintenance can be accomplished with the least interference with traffic, structures, and other utilities.

The separation between water and wastewater mains must comply with TCEQ rules or have a variance approved by TCEQ before submittal to the City. *A minimum horizontal separation distance of five (5) feet, measured from OD of pipe to OD of pipe, shall be maintained between existing or proposed water mains and all other utilities and/or conduits in order to maintain trench integrity.*

Mains should normally be located on the high side of the street. However, mains shall be installed on both sides of all divided road/highways. Roads/highways, where opposing lanes of traffic are separated by a vehicle obstruction, shall be considered a divided road/highway. The following locations may be considered as standard assignments:

<u>Right -of-Way</u>	<u>Assignment</u>
50 to 60 feet	14.5 feet from ROW
70 to 80 feet	17.5 feet from ROW
90 to 120 feet	22.5 feet from ROW

In major collector and arterial roadways, mains should be located outside the pavement, curbs, etc., wherever feasible. When mains are located outside of the right-of-way, they shall be within a dedicated utility easement. Main assignments in such city streets must be approved by the Austin Utility Location and Coordination Committee assignments for lines in such county roads must also be approved by the county engineer.

3. Piping materials and appurtenances shall conform to City of Austin Standard Specifications and the Utility's Standard Products List (SPL).

4. Minimum depth of cover over the uppermost projection of the pipe and all appurtenances shall be as follows:

a. Water piping installed in undisturbed ground in easements of undeveloped areas, which are not within existing or planned streets, roads, or other traffic areas, shall be laid with at least 36 inches of cover.

b. Water piping installed in existing streets, roads, or other traffic areas shall be laid with at least 48 inches of cover below finished grade.

c. Unless approved by the Austin Water Utility, installation of water piping in proposed new streets will not be permitted until paving and drainage plans have been approved and the roadway traffic areas excavated to the specified or standard paving subgrade, with all parkways and sidewalk areas graded according to any applicable provisions of the drainage plans or sloped upward from the curb line to the right of way at minimum slope of ¼ inch per foot. Piping and appurtenances installed in such proposed streets shall be laid with at least 36 inches of cover below the actual subgrade. The maximum depth will be as approved by the Utility for the specific materials, application, and conditions.

5. For mains 16 inches in diameter and larger and on smaller mains where appropriate, hydrants or drain valves shall be placed at low points and on the up-slope side of all valve locations.

6. All fire lines shall have a gate valve on the line at the connection to the main line and a backflow preventer inside the property line, but accessible for inspection by City personnel. All unmetered fire lines shall have a Utility approved flow detection device. This flow detection service shall be located such that no more than 100 gallons of water is contained between the device and the point where the fire line is connected to the City's main.

7. On water mains 16 inches in diameter and larger and on smaller mains where appropriate, combination air valves will be placed at all high points and air/vacuum valves shall be placed at the down-slope side of all valve locations. Air/vacuum and vacuum release valves shall be approved on a case-by-case basis. *All mains twenty-four (24) inches and larger will include an 18" outlet with blind flange installation at high points where the installation of an ARV would be necessary. In the absence of an ARV requirement, an 18" outlet with blind flange shall be placed every 2500 feet.*

8. Joint restraint for pipes larger than 16 inch diameter shall be by use of integral, factory joint restraint systems, or by restraint gaskets.

9. Joint restraint shall be provided for all pipe bends and where necessary when joint deflection is utilized. *When joint restraint is required in intersections, extend the joint restraint, at a minimum, to the point of curvature (PC) of the curb line.* Notes shall be placed in both plan and profile views and shall include at a minimum the type of restraint to be utilized and the beginning and ending stations of the restraint. Concrete thrust blocking may be approved on a case by case basis. The proximity of other utilities and structures must be taken into account when specifying the use of thrust blocking.

The use of thrust blocks will be prohibited in the downtown area (Loop 1 to I35 and Lady Bird Lake to 30th Street) due to the congestion of utilities, structures and excavations in the right of way.

10. Allowable pipe sizes.

The following sizes will be the only sizes allowed for use in the system: (4" see item 1. above), (6" fire-hydrant leads and services only), 8", 12", 16", 24", 30", 36", and 42". Larger sizes may be approved on a case by case basis.

11. Connections of new mains to existing mains shall be made by cutting in a tee. Tapping sleeves may be allowed in lieu of cutting in a tee on a case-by-case basis. Full-body tapping sleeves shall be used. A tapping sleeve will not be allowed if the materials and conditions of the existing main preclude tapping. "Size on size" taps will not be permitted, unless made by use of an approved full bodied mechanical joint tapping sleeve.

C. Valves

1. There shall be a valve on each fire hydrant lead restrained to the main. These and all valves twenty-four (24) inches and smaller shall be resilient seated gate valves.

2. Valves shall be located at the intersection of two or more mains and shall be spaced so that no more than thirty (30) customers will be without water during a shutout. For lines smaller than twenty-four (24) inches, typical spacing should be 500 feet in high-density areas and 1,200 feet in residential area. Mains twenty-four (24) inches and larger shall be valved at intervals not to exceed 2,000 ft.

3. At dead ends, gate valves shall be located one (1) pipe length ten (10-ft. minimum) from the end points of the main. The Engineer shall provide - and show drawings – complete restraint for all such valves, pipe extensions and end caps.

4. Branch piping (both new and future branches) shall be separated from the main with gate valves.

5. For **all mains** ~~mains twelve (12) and smaller~~, valves at intersections shall be placed at point of curvature (p.c.) of the curb line.

6. Valves shall be located so that isolating any segment of water main requires closing of no more than three (3) valves.

~~7. Double disc gate valves may be used at other locations where, in the judgment of the Design Engineer, complete shut-out is critical.~~

~~8.~~ **Z.** The operating nut or extension of any valve shall be between eighteen (18) inches and twenty-four (24) inches below finished grade.

~~9.~~ **8.** Valves with valve extensions and those at pressure zone boundaries shall be equipped with a locking type debris cap.

~~10.~~ ~~All horizontal gate valves larger than sixteen (16) inches shall have the operating bonnet located in a vault.~~ **9.** All vertical gate valves larger than sixteen (16) inches shall have the bonnet located in a vault or manhole. All horizontal gate valves larger than sixteen (16) inches shall have the valve actuator (gearing) located in a vault or manhole.

~~11.~~ **10.** Valves having “push on” joints are not permitted for fire hydrant leads and laterals.

~~12.~~ **11.** Butterfly valves shall not be allowed.

~~13.~~ **12.** Water mains shall be designed so that valves can be installed vertically unless conditions dictate otherwise.

D. Fire Hydrants

1. Hydrants shall be installed at the intersection of two (2) streets and between intersections where necessary, at distances not in excess of 300 feet between hydrants in commercial or other high-density areas and not more than 600 feet in residential areas.

2. Hydrants shall be installed on both sides of all divided road/highways to provide adequate firefighting coverage. Roads/highways where opposing lanes of traffic are separated by a vehicle obstruction shall be considered a divided road/highway.

~~3.~~ ~~For dead end mains with no fire hydrant, an acceptable flushing device shall be required.~~

~~4.~~ **3.** The entire fire hydrant assembly shall have restrained joints.

~~5.~~ **4.** Fire hydrants shall not be designed to be within nine feet in any direction of any wastewater main, lateral, or service regardless of material of construction.

~~6.~~ **5.** Fire hydrants shall be designed so as not to interfere with sidewalk ramps, trash receptacles, and street light and signal pole foundations.

6. When fire hydrants are subjected to pressures above 150 psi, they shall have an attached PRV installed to reduce the operating pressure of the fire hydrants below 150 psi.

7. When new water lines are installed along with new fire hydrant leads, the drawings shall indicate existing fire hydrants are to be replaced with a new one, if it is older than 10 years old.

E. Services

1. Water services shall be in accordance with City of Austin Standard Details. More than two meters on a single service line will be considered on a case-by-case basis.

2. Individual meter services and fire lines will not be taken from transmission lines. Transmission lines are generally considered to be 24 inches in diameter or larger. ~~Exceptions must be approved by Pipeline Engineering at time of plan submittal. The Engineer shall submit a letter with this request.~~

3. Water meters shall be placed within the public ROW or in an easement.
Water meter boxes are not allowed in sidewalks or driveways.

4. Service taps to the main shall have a minimum separation distance of 3 feet.

5. Service taps, regardless of type, shall not be made in vaults.

F. Water Meters for Multi-Family and Commercial Customers

1. Properties with two, three, or four living units shall have an individual water meter serving each living unit. ~~Each unit in a duplex, triplex, or four-plex, shall be provided with an individual water meter.~~

2. Commercial and multi-family properties shall purchase and install a separate meter or meters to measure water used for all common areas and outdoor purposes, including swimming pools, fountains, permanently installed irrigation systems, and irrigation with quick-coupler hose bibbs. ~~Separate meters shall be used for all irrigation, swimming pools, common laundry areas, and all other common areas of each multi-family facility.~~

~~3. All commercial or multi-family building of any type that has a site plan area of over 10,000 square feet will purchase and install a separate meter or meters for all irrigation, fountain, swimming pool, and any other outdoor use of water.~~

~~3.~~ 4. ~~For all building permits issued on or after January 1, 2003, a~~ All multi-family, manufactured home rental community, or multiple-use facility, in order to ~~shall~~ provide for the measurement of the quantity of water, if any, consumed by the occupants of each unit, shall install ~~through the installation of:~~

a. Submeters, owned by the property owner or manager, for each dwelling unit or rental unit, or

b. Individual meters for each dwelling unit or rental unit.

4. Bypasses shall be provided on all meters three (3) inches and larger.

G. Easements

1. Easements for water mains shall be a minimum of 15 feet wide, or twice the depth of the main, measured from finished grade to pipe flowline, whichever is greater. Mains shall be centered on the easement. Narrower easements will be considered where the Engineer provides evidence, to the satisfaction of AWU, that maintenance activities will not be hindered by the reduced width.

2. Easement documents and the metes and bounds shall be reviewed and approved by AWU Pipeline Engineering prior to recordation with the County. Easement recordation at the County is required prior to AWU approval of construction plans.

H. Requirements for Existing and Proposed Water Infrastructure, Located Inside the Island, in Roundabouts or Traffic Circles

1. Requirements for a proposed roundabout or traffic circle intersection design with existing water infrastructures.

Existing water infrastructure shall be relocated around the outside of the roundabouts or traffic circle islands. If they are not able to be relocated, they may remain within/under the roundabout or traffic circle island as long as they are steel encased, subject to approval by AWU. Trees and permanent structures, including appurtenances such as valves, tees, crosses, fire hydrants, etc., shall be prohibited within the roundabout and traffic circle islands when existing water infrastructures remain. All the appurtenances must be relocated to accommodate sleeving of the mains.

2. Requirements for a proposed roundabout or traffic circle intersection design in new areas of development with no existing water infrastructures.

Water infrastructures shall be prohibited from being located within/under roundabouts or traffic circle islands in developments and must comply with current State and Local criteria.