

UTILITIES CRITERIA MANUAL

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 Austin Water (AW) 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. Pressure reducing valves (PRV), as required by the plumbing code, that are to be installed outside of the footprint of a building must be illustrated and identified on site utility plans and must be located on private property outside of any public utility easements.
- f. Minimum operating pressure is 50 psi at the highest elevation meter location using average day demand.

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 Requirements

- a. Emergency demands are considered to be fire flow requirement plus peak day demands.
- b. Fire flow requirements (flow rate and duration) will be determined in accordance with the City of Austin Fire Code and associated rules under Chapter 25-12 Article 7. Where the City of Austin Fire Code does not apply, the fire flow requirement (flow rate and duration) will be determined by the regulating fire department.
- c. The maximum allowable velocity shall not exceed 10 fps.
- d. 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.
- e. 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

- a. 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. 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. Transmission line sizes will be determined on a case-by-case basis. Minimum main size shall be 8 inches with consideration for 4-inch pipe in cul-de-sacs less than 200 feet in length. Provision ~~s~~ must be made in these cases for a flush valve at the end of dead end lines.
 - b. For purposes of water main sizing the emergency demand shall be assumed at a single point on the existing or proposed water main at the subject tract or development phase, unless otherwise approved by AW.
5. Storage Requirements - If it is determined by AW that additional storage is required, the following criteria shall be used:

Effective Storage = 100 gal/connection

Emergency Storage = 100 gal/connection

TOTAL STORAGE = 200 gal/ connection

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 Owner's Consulting Engineer may be required to provide computer simulations as determined on a case-by-case basis.

B. Mains

1. While looped systems are required, it is recognized that in certain situations, installation of dead end pipe may be necessary. When a dead end section of water main is approved for installation, the following requirements must be met:
 - a. A gate valve shall be installed near the end of the main followed by an appropriate length of one joint of restrained pipe and a plug with a 1" or larger tap. Thrust blocking shall not be used as restraint at the end of the main. The engineer shall determine the necessary length of restraint on each side of the valve that will keep the main in place for future extension when the plug is removed. No services may be installed between the valve and the plug.
 - b. Adequate water circulation must be provided to achieve turn-over of water in the dead end main every 72 hours. Until such time as water demand from active services on the dead end section of main results in the 72 hour turn over, 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, reclaimed water and wastewater mains must comply with the Texas Commission on Environmental Quality (TCEQ) rules ~~or have a variance approved by TCEQ before submittal to AW~~. When a new waterline crosses under an existing wastewater main or lateral, the waterline shall be encased as described in TCEQ Chapter 290. Mechanical or welded joints for ductile iron or steel pipes will not be allowed to be used in lieu of the encasement requirement. 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 AW infrastructure and all other ~~utilities and/or conduits~~ **non-AW mains** in order to maintain trench integrity. **A minimum horizontal separation between water service lines and dry utility services shall be three (3) feet OD-OD.**

Water Mains should normally be located on the high side of the street. However, mains shall be installed on both sides of all divided roads/highways. Roads/highways, where opposing lanes of traffic are separated by a vehicle obstruction, shall be considered a divided road/highway.

~~In major collector and arterial roadways, mains should be located outside the pavement, curbs, etc., wherever feasible.~~ When mains ~~are~~ **must be** located outside of the right-of-way, they shall be within a dedicated utility easement. Main assignments in ~~such~~ city streets must be ~~approved~~ **coordinated with** by the Austin Utility Location and Coordination Committee. ~~Assignment for lines~~ **mains** in county roads ~~assignments~~ must also be approved by the County Engineer. **Assignments for mains to be located within State or Federal Highway Right-of-Way shall also be approved and permitted by the Texas Department of Transportation.**

3. Piping materials and appurtenances shall conform to City of Austin Standard Specifications and AW's Standard Products List (SPL).
4. Minimum depth of cover over the uppermost projection of pipe shall be at least 48 inches below proposed ground elevation. If fill or embankment placed over existing water mains or services exceeds four (4) feet or results in a final depth exceeding two times the easement width if applicable, AW review and approval is required. If a cut over the existing mains or services results in less than minimum cover, AW approval is required. If manholes, valves, hydrants, meters, cleanouts, etc. are located within the cut or fill area(s), adjustment must be made to match final grade and plans must be reviewed and approved by AW and the construction inspected by the City. If the fill is located on top of an existing easement, see Section 2.9.2.G.1.
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 an AW 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. The Engineer is responsible for determining the size and type of air release valves necessary to assure the water system operates properly based upon the water system characteristics and shall provide calculations determining the size and type of valves for review by AW when requested. Air release valves may be necessary on any size of main. Minimally, 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 gate 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 flange including a 1" corporation (minimum) for installation at high points where the installation of an air release valve (ARV) would be necessary. In the absence of an ARV requirement, an 18" outlet with flange including a 1" corporation shall be placed every 2500 feet. Proposed waterline connections to air release valve piping are prohibited.
8. Joint restraint for pipes larger than 16 inch diameter shall be by use of integral, factory joint restraint systems.

9. Joint restraint shall be provided for all pipe bends and where necessary when joint deflection is utilized. A minimum safety factor of 1.5 shall be used when calculating restrained water pipe length. 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. Cast Iron and Asbestos Concrete Pipes cannot be mechanically restrained and shall be removed and replaced with Ductile Iron Pipe or PVC C-900 pipe to ensure adequate restraint. Concrete thrust blocking may be approved on a case by case basis. In cases where concrete thrust blocks are utilized, at a minimum the Engineer shall include block dimensions and locations on the plans. 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).
10. Allowable pipe sizes. The following sizes will be the only sizes allowed for new water lines : 4"(see 2.9.2.A.4.a), 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 4" and larger 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.
12. Wyes are not allowed on waterlines.
13. The maximum bend for waterlines is 45 degrees.
14. All potable water mains shall be constructed of ductile iron or PVC pipe. For ductile iron pipes, Pressure Class 350 minimum for pipe 12-inch diameter and smaller and Pressure Class 250 for pipes greater than 12-inch diameter shall be used. For PVC pipe 16-inch diameter and smaller conforming to the requirements of AWWA C-900, DR 14 shall be acceptable. Alternative pipe materials may be considered on a project by project basis.
15. All potable water pipe within utility easements on private property shall be Ductile Iron Pipe, Pressure Class 350 minimum for pipe 12-inch diameter and smaller and Pressure Class 250 minimum for pipes greater than 12-inch diameter.
16. Changes in alignment in water lines, both horizontal and vertical, shall be achieved by deflection of joints or by use of fittings. Deflection of pipe joints at fittings is only allowed on ductile iron pipes. Longitudinal bending of pipe is not allowed.
17. Utility crossings constructed under water lines by trenchless methods are allowed only if the distance between the outside surface of the water line and the top, crown, or roof of the excavation made for the crossing utility is at least two times the diameter or horizontal span of the trenchless excavation below the water line, or 36 inches, whichever is larger. The trenchless method shall support the advancing face and roof or crown of the excavation at all times when within a horizontal distance of ten feet of the water line.
18. Utility crossings constructed under water mains by open cut methods are not allowed if the water main consists of asbestos cement pipe or cast iron pipe with lead caulk joints. In those instances, the main must be removed and replaced to accommodate construction of the subject utility. Replacement will be with new pipe of the type currently used in the AW system for comparable size pipe. If the utility crossing under the water main is a water or wastewater service line, in lieu of replacing the main, the Engineer may provide a design detail showing how the main shall be supported during the open cut method.
19. Bedding and backfill for that portion of a utility installed by open cut construction under and within 5 feet horizontally of a water main shall be made using controlled low strength

material from the bottom of the subject utility to the bottom of the bedding envelope of the water line even if that water line is removed and replaced as described above.

20. Location of mains and services in the proximity of Street Trees and Planting Zones:

“Street Tree Utility Gap/Utility Gap” refers to the area between street tree planting zones where utility services will be located.

Where Street Trees are placed within the right-of-way, root barriers shall be placed on all sides of the planting zone where AW mains and/or services are located. Root barriers shall be installed no closer than seven (7) feet from the tree trunk. Utilities shall be placed no closer than two (2) feet from the root barrier. In no circumstances shall utility infrastructure be placed within the planting zone. Where “Street Tree Utility Gaps” are located between planting zones, the gap shall be a minimum of eight (8) feet wide between root barriers. Additional width will be required to allow for multiple utilities to be placed within the “utility gap.”

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 feet.
3. For valves at the end of dead end mains, see Section 2.9.2.B.1.a.
4. Branch piping (both new and future branches) shall be separated from the main with gate valves.
5. For all mains, 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. The operating nut or extension of any valve shall be between eighteen (18) inches and twenty-four (24) inches below finished grade.
8. Valves with valve extensions and those at pressure zone boundaries shall be equipped with a locking type debris cap.
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.
10. Valves having "push on" joints are not permitted for fire hydrant leads and laterals.
11. Butterfly valves shall not be allowed.
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. The entire fire hydrant assembly shall have restrained joints.
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.
5. Fire hydrants shall be designed so as not to interfere with sidewalk ramps, trash receptacles, and street light and signal pole foundations.
6. To avoid sidewalks, ramps, and other features, fire hydrants placed near a street corner should in general be located outside the curve radius and a minimum of 4 feet from ramps. Exceptions may apply in existing neighborhoods or long (>5 feet) radius curb return.
7. Placement of fire hydrants should take into consideration above ground improvements, landscaping, critical root zones, grades and other utilities.
8. In existing neighborhoods, new fire hydrants should be placed as close as possible to the existing fire hydrant locations with the exception of new hydrants needed to meet minimum spacing requirements.
9. Fire hydrants should be placed on the short side of the street where possible unless there are site constraints.
10. When fire hydrants are subjected to pressures above 150 psi, they shall have an attached PRV installed and set to reduce the operating pressure of the fire hydrants below 150 psi.
11. 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 the existing fire hydrant is older than 10 years old.
12. Fire Hydrants shall not be designed in such a manner as to provide fire flow for developments served by other water utility service providers.

E. Services

1. Water services shall be in accordance with City of Austin Standard Details.
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.
3. Water meters shall be placed within the public right-of-way (ROW) or in an easement immediately adjacent to the ROW. Meters may not be located inside fences and must be ~~vehicular~~ accessible ~~from roadways~~ **by vehicle**. Water meter boxes and its appurtenances are not allowed in sidewalks, paved areas, driveways or load bearing pavement. ~~If the water meter or its appurtenances must be located in a sidewalk or paved area (as allowed by a variance issued by AW only), then locking lids will be required for the water meter or appurtenances.~~
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.
6. Domestic water services shall not be supplied from fire hydrant leads.

F. Water Meters

1. Properties with two, three, or four individual dwelling units (attached or detached) shall have an individual **AW** water meter serving each dwelling unit. Dwelling units are defined as a residential unit providing independent living facilities. Accessory uses defined in Land Development Codes 25-2-893 and 25-2-901, are not viewed as dwelling units and will not be required to provide multiple meters.
2. Commercial and multi-family properties shall purchase and install a separate **AW** 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.

3. For properties with **five** **5** or more attached or detached living units on a single lot, including mobile home communities, commercial facilities with multiple occupants, and/or multi-use facilities, that do not have public water meters for each unit, owners must comply with private submetering requirements established by plumbing code and/or TCEQ.
4. Requirements for meters 3" and larger
 - a. Bypasses shall be provided on all meters three (3) inches and larger **except those used for irrigation only.**
 - b. Pipe and meter size shall be determined by Owner **based upon plumbing code and AWWA Water Meter Standards.** ~~Approval by AW.~~ Plans must be prepared by a Licensed Engineer Registered in the State of Texas.
5. Fire Demand Meters (4"x2", 6"x2", 8"x2", 10"x2", 12"x2") shall be allowed only if domestic demand necessitates a domestic meter of 3" or larger. If domestic demand does not require a 3" or larger meter, required fire flow shall be provided via an appropriately sized dedicated fire line with a double check detector backflow prevention assembly per Austin Water Standard Detail. For small fire demand applications where both fire demand and domestic demand can be provided with 2" or smaller meter, a single meter may be used for both fire and domestic.

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 AW, that maintenance activities will not be hindered by the reduced width. If fill is placed over an existing easement, the easement width will need to be adjusted to meet the minimum width requirements.
2. Easement documents and the metes and bounds shall be reviewed and approved by AW Pipeline Engineering prior to recordation in the real property records of the appropriate county. Easement recordation in the real property records of the appropriate county is required prior to AW approval of construction plans.

H. Requirements for Existing and Proposed Water Infrastructure beneath Circular Intersections or Other Geometric Street Features

1. Installation of Circular Intersections or Other Geometric Street Features over existing water infrastructure.
 - a. Existing water infrastructure may be allowed to exist beneath circular intersections or other geometric street features such as, but not limited to, modern roundabouts, medians, bulb-outs, splitter islands, channelization islands, and other types of physical roadway features. These features may contain hardscaping, landscaping, water quality features, public art, permanent structures, street furniture, or other similar amenities.
 - b. The planning and design of these features and their amenities shall include consideration for access, maintenance, protection, testing, cleaning, and operations of the water infrastructure. Where existing water facilities are to remain, trees with root zones of 18 inches in depth or greater at maturity may be considered for inclusion provided the drip lines at maturity of the proposed trees are not located within a minimum horizontal separation of 7.5 feet from any water infrastructure. Public art, permanent structures, and other similar amenities may be considered for inclusion provided they are not located within a minimum horizontal separation of 7.5 feet from any water infrastructure. The drip lines at maturity of ornamental trees with root zones at maturity of less than 18 inches in depth, grasses, woody or herbaceous shrubs, and street furniture may be located within a minimum horizontal separation of 7.5 feet from any water infrastructure.

- c. The need for relocating, replacing or protecting in place existing water infrastructure beneath these features and their amenities shall be determined on a case-by-case basis by AW.
- 2. Installation of Circular Intersections or Other Geometric Street Features in new areas of development with no existing water infrastructure.
 - a. Proposed water infrastructure may be placed beneath proposed circular intersections or other geometric street features such as, but not limited to, modern roundabouts, medians, bulb-outs, splitter islands, channelization islands, and other types of physical roadway features. These features may contain hardscaping, landscaping, water quality features, public art, permanent structures, street furniture, or other similar amenities.
 - b. The planning and design of these features and their amenities shall include consideration for access, maintenance, protection, testing, cleaning, and operations of AW infrastructures. Trees with root zones of 18 inches in depth or greater at maturity may be considered for inclusion provided the drip lines at maturity of the proposed trees are not located within a minimum horizontal separation of 7.5 feet from any water infrastructure. Public art, permanent structures, and other similar amenities may be considered for inclusion provided they are not located within a minimum horizontal separation of 7.5 feet from any water infrastructure. The drip lines at maturity of ornamental trees with root zones at maturity of less than 18 inches in depth, grasses, woody or herbaceous shrubs, and street furniture may be located within a minimum horizontal separation of 7.5 feet from any water infrastructure.
 - c. The need for alternative alignments or the inclusion of protective systems for the proposed water infrastructure beneath these features and their amenities shall be determined on a case-by-case basis by AW.

Source: [Rule No. R161-16.18](#), 11-28-2016.

Source: [Rule No. R161-16.03, 5-25-2016](#); [Rule No. R161-16.18](#), 11-28-2016.