

SECTION 2 - WATER, RECLAIMED WATER, AND WASTEWATER CRITERIA  
2.9.0 DESIGN REQUIREMENTS FOR WATER, RECLAIMED WATER, AND WASTEWATER SYSTEMS

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## 2.9.0 DESIGN REQUIREMENTS FOR WATER, RECLAIMED WATER, AND WASTEWATER SYSTEMS

These guidelines are intended to establish the minimum basic design requirements for water, reclaimed water, and wastewater systems within Austin Water's (AW) service area and within the City of Austin's the Full Purpose and Limited Purpose Jurisdiction of the City of Austin and its and Extra Territorial Jurisdiction (ETJ), but do not address major facilities such as water and wastewater treatment plants. AW's service area is defined in the City of Austin Land Development Code (LDC) 25-9-2 to be coterminous with the water and wastewater impact fee service area established by City Council under LDC 25-9 Article 3. Generally, these systems will be operated and maintained by the City of Austin. Some systems, such as certain municipal utility districts, will not be operated by the City immediately upon completion, but it is likely that the City will take over operation and maintenance at some time in the future.

All project manuals shall include the appropriate City of Austin Standard Specifications. All projects are required to be built in accordance with these City of Austin Standard Specifications, which include other requirements not addressed here. All variations are subject to the approval of Austin Water (AW).

Per Texas Commission on Environmental Quality (TCEQ) criteria, Chapters 217 and 290, the utility shall provide adequate service that is operable, maintainable, and shall protect public health and safety. Design requirements which are necessary and reasonable, may be established as a condition of service. The utility may also require necessary and reasonable design measures regarding constructability, when activities encroach on property rights, pose environmental risks, or conflict with another utility.

The following information is provided to assist engineers and the general public in the design and construction of water and wastewater facilities within the City of Austin ETJ. All drawings for such facilities shall be prepared by or under the supervision of a Professional Engineer licensed by the State of Texas. It will be the responsibility of the engineer to ensure that the plans are in compliance with the latest versions of all applicable federal, state and local ordinances, rules and regulations.

These include, but are not limited to, the following:

- A. Design Criteria for Domestic Wastewater Systems - TCEQ.
- B. Rules and Regulations for Public Water Systems - TCEQ.
- C. The Code of the City of Austin.
- D. City of Austin Standard Specifications.
- E. The Austin Utility Location and Coordination Committee (AULCC) Policies.
- F. The City of Austin Water, Reclaimed Water, and Wastewater Criteria.
- G. Use of Reclaimed Water - TCEQ.
- H. City of Austin Standards.

## **2.9.2 Water Systems**

### **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 inch 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 normally be located on the high side of the street. When required to satisfy 2.9.2.D.9, 2.9.2.E.8, or 2.9.3.D.10, water mains shall be installed on both sides of divided roads or highways. Divided roads or highways are where opposing lanes of vehicular traffic are currently or planned to be separated by a median, railroad tracks, or other vehicle obstruction.
3. Piping materials and appurtenances shall conform to COA 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 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 2.9.1.A.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. ~~Reserved.~~ **Proposed crosses to existing infrastructure are not allowed. The use of multiple tees instead of crosses is required when connecting to existing infrastructure. Crosses may be allowed on new infrastructure on a case by case basis.**
8. Joint restraint for ductile iron pipes larger than 24 inches diameter shall be by use of integral, factory joint restraint systems. Joint restraint for ductile iron pipes 24 inches and smaller may be by joint restraint gaskets. External mechanical joint restraint devices are allowed at all sizes of MJ

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valves and fittings connecting to ductile iron or PVC pipe. Connections of polyethylene (PE) pipe to MJ valves and fittings shall be done using approved MJ Adapters.

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). All pipes, valves, and fittings, greater than 2 inches in size, installed in the TxDOT Right-of-Way (ROW), Austin Bergstrom International Airport (ABIA) property and University of Texas property shall be restrained ductile iron pipe.
10. Allowable pipe sizes. The following sizes will be the only sizes allowed for new watermains: 4 inches (see Section 2.9.2.A.4.a), 6 inches (fire-hydrant leads and services only), 8 inches, 12 inches, 16 inches, 24 inches, 30 inches, 36 inches, and 42 inches. Larger sizes may be approved on a case-by-case basis.
11. Connections 4 inches and larger of new mains to existing mains shall be made by cutting in a tee. For PE pipe the branch connection shall be closed by electrofusion coupler per SPL WW-706C. On ductile iron and PVC pipe, 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. Reconnection to existing tapping sleeves is prohibited.
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, PVC, or PE pipe. 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, Pressure Class 350 minimum for pipe 12-inch diameter and smaller and Pressure Class 250 minimum for pipes greater than 12-inch diameter. AWWA C-900 pressure class 305 (DR14) potable water line pipe may be considered to be installed within utility easements on private property only when it meets the following criteria:
  - a. The finished surface of the water line easement over the potable water line must be paved. Where the water pipe is under HMA or Portland cement concrete pavement designed structurally for automobile and truck traffic per the Geotechnical report, PVC pipe may be allowed just in those paved areas, provided it can be demonstrated that the pipe will not be damaged by construction traffic if it does not maintain a minimum of 48 inches of cover.
  - b. The potable water line must maintain a minimum 48 inches of cover over the uppermost projection of pipe to the finished grade.
  - c. The plan and profile must clearly identify the potable water line size, material type and class as well as the paved finished grade.

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16. Changes in alignment in water lines.
  - a. For ductile iron and PVC pipe, changes in both horizontal and vertical deflection 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. Deflection of joints in ductile iron pipe shall not exceed manufacturer's maximum allowable deflection. For PVC pipe, the deflection at pipe joints shall not exceed 1°, or the manufacturer's maximum allowed deflection, whichever is less.
  - b. For PE pipe, changes in horizontal and vertical alignment by Cold (Field) Bending is allowed. The minimum cold bending radius shall not be less than 25x the pipe O.D. for DR11 pipe or 20x the pipe O.D. for DR9 pipe. No fittings (ductile iron or PE) or mechanical water service clamps are allowed within a bent section of PE pipe. Ductile iron MJ fittings may be used to accommodate bends for PE pipe by using an MJ Adapter to connect the PE pipe to the MJ fitting.
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 10 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. 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 when the trench under the water main is 3 feet or less in width.
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. Connections to Concrete Steel Cylinder Pipe.
  - a. Special Details are required to show materials and method of connecting proposed water mains to existing Concrete Steel Cylinder, or CSC, water mains.
  - b. Connections to Bar-Wrapped CSC Pipe shall be made by cutting and removing an appropriate pipe segment, and replacing with Ductile Iron fittings, valves, or pipe, using appropriate CSC to DI steel transition adapters and steel butt straps.
  - c. Connections to Prestressed Concrete Cylinder Pipe shall be by removing entire pipe segments, joint to joint, and replacing with Ductile Iron pipe or welded steel pipe, as designated by AW, using appropriate bell-to-Mechanical Joint Plain End (MJPE) and spigot-to-MJPE transition adaptors.
21. Where mains transition from PE pipe to a different pipe material (ductile iron pipe, PVC pipe, etc.), the PE pipe segments shall be designed to undergo hydrostatic testing separately from the segments of different pipe material by way of isolation valves or other means.

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22. Mains shall be located so that isolation valves, air valves, and hydrants will be readily accessible during their service life for maintenance and operations personnel and equipment.

### **2.9.3 Reclaimed Water Systems**

**B. Mains**

1. Sizing of Mains - Computer modeling is preferred for sizing reclaimed water mains. However, for mains less than 16 inches in diameter other engineering calculation methods may be accepted. Standard main sizes are: 6 inches, 8 inches, 12 inches, 16 inches, 24 inches, 30 inches, 36 inches, 42 inches, and 48 inches.
2. All reclaimed water mains shall be constructed of ductile iron, PVC, or polyethylene (PE) pipe. Alternative pipe materials may be considered on a project-by-project basis. Plans shall indicate that all mains and appurtenances be manufactured, factory painted, or striped Pantone 522 purple. All buried metallic pipe and fittings shall be encased in polyethylene per WW-27D.
3. Piping materials and appurtenances shall conform to City of Austin (COA) Standard Specifications, Standard Details, and AW 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. Maximum depth will be approved by AW for the specific materials, application and conditions. If fill or embankment placed over existing reclaimed water mains or services increases by more than 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 reclaimed water mains or services results in less than the minimum cover required by COA Standard Details, AW approval is required.
5. For mains of 16 inches and larger, drain valves shall be placed at low points.
6. ~~Reserved.~~ **Proposed crosses to existing infrastructure are not allowed. The use of multiple tees instead of crosses is required when connecting to existing infrastructure. Crosses may be allowed on new infrastructure on a case by case basis.**
7. Dead-end mains shall terminate with a flushing device and flushing devices shall be installed as necessary to facilitate flushing of the system.
8. Mains shall have an approved flushing device located at the high point between main intersections.
9. Joint restraint for ductile iron pipes larger than 24 inches diameter shall be by use of integral, factory joint restraint systems. Joint restraint for ductile iron pipes 24 inches and smaller may be by joint restraint gaskets. External mechanical joint restraint devices are allowed at all sizes of MJ valves and fittings connecting to ductile iron or PVC pipe. Connections of polyethylene (PE) pipe to MJ valves and fittings shall be done using approved MJ Adapters.
10. Joint restraint shall be provided for all pipe bends, reducers, and tees. When joint restraints are required in intersections, the joint restraints shall extend, 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.
11. 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 30<sup>th</sup> Street) due to the congestion of utilities, structures and

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excavations in the right-of-way. Concrete thrust blocking may be approved on a case-by-case basis.

12. Connections 4 inches and larger of new reclaimed mains to existing reclaimed mains shall be made by cutting in a tee. ***For PE pipe the branch connection shall be closed by electrofusion coupler per SPL WW-706C. On ductile iron and PVC pipe, 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.***
13. Changes in alignment in reclaimed water lines.
  - a. For ductile iron and PVC pipe, changes in both horizontal and vertical alignment shall be achieved by deflection of joints or by use of fittings. Longitudinal bending of pipe is not allowed. Deflection of joints in ductile iron pipe shall not exceed manufacturer's maximum allowable deflection. For PVC pipe, the deflection at pipe joints shall not exceed 1°, or the manufacturer's maximum allowed deflection, whichever is less.
  - b. For polyethylene (PE) pipe, changes in alignment by Cold (Field) Bending is allowed. The minimum cold bending radius shall not be less than 25x the pipe O.D. for DR11 pipe or 20x the pipe O.D. for DR9 pipe. No fittings or mechanical water service clamps are allowed within a bent section of pipe. Electrofusion saddles may be allowed in bends on a case-by-case basis. Ductile iron MJ fittings may be used to accommodate bends for PE pipe by using an MJ Adapter to connect the PE pipe to the fitting.
14. Where mains transition from polyethylene (PE) pipe to a different pipe material (ductile iron pipe, PVC pipe, etc.), the PE pipe segments shall be designed to undergo hydrostatic testing separately from the segments of different pipe material by way of isolation valves or other means.
15. Mains shall be located so that isolation valves, air valves, and flushing devices will be readily accessible during their service life for maintenance and operations personnel and equipment.

**RULE NO.: R161-25.01**

**NOTICE OF RULE ADOPTION**

**ADOPTION DATE: 03/10/2025**

By: Shay Ralls Roalson, P.E., Director  
Austin Water

The Director of the Austin Water Department has adopted the following rule. Notice of the proposed rule was posted on 02/04/25. Public comment on the proposed rule was solicited in the 02/04/25 notice. This notice is issued under Chapter 1-2 of the City Code. The adoption of a rule may be appealed to the City Manager in accordance with Section 1-2-10 of the City Code as explained below.

A copy of the complete text of the adopted rule is attached to this notice.

**EFFECTIVE DATE OF ADOPTED RULE**

A rule adopted by this notice is effective on 03/10/25.

**TEXT OF ADOPTED RULE**

The adopted rule contains no changes from the proposed rule as shown below.

R161-25.01: Proposed revision to UCM 2.9.0, 2.9.2 & 2.9.3

**Rule 1 – Revisions to Utility Criteria Manual Sections 2.9.0, 2.9.2 & 2.9.3**

1. SECTION 2.9.0 – Design Requirements for Water, Reclaimed Water, and Wastewater Systems – **Section 2.9.0** – Provides the Austin Water service area that must follow the UCM as defined by the LDC.
2. SECTION 2.9.2 – Water Systems – **Section 2.9.2.B.7** – Create new language to discuss when the use of crosses is allowed.
3. SECTION 2.9.2 – Water Systems – **Section 2.9.2.B.11**– Add requirements for cutting in a tee on PE pipe.
4. SECTION 2.9.3 – Reclaimed Water Systems – **Section 2.9.3.B.6** – Create new language to discuss when the use of crosses is allowed.
5. SECTION 2.9.3 – Reclaimed Water Systems – **Section 2.9.3.B.12** – Add requirements for cutting in a tee on PE pipe.



## **SUMMARY OF COMMENTS**

Austin Water did not receive comments regarding the rule adopted in this notice.

## **AUTHORITY FOR ADOPTION OF RULE**

The authority and procedure for adoption of a rule to assist in the implementation, administration, or enforcement of a provision of the City Code is provided in Chapter 1-2 of the City Code. The authority to adopt this rule is established in Section 552.001 of the Texas Local Government Code, Section 552.017 of the Texas Local Government Code, and Section 15-9-9 of the City Code.

## **APPEAL OF ADOPTED RULE TO CITY MANAGER**

A person may appeal the adoption of a rule to the City Manager. **AN APPEAL MUST BE FILED WITH THE CITY CLERK NOT LATER THAN THE 30TH DAY AFTER THE DATE THIS NOTICE OF RULE ADOPTION IS POSTED. THE POSTING DATE IS NOTED ON THE FIRST PAGE OF THIS NOTICE.** If the 30th day is a Saturday, Sunday, or official city holiday, an appeal may be filed on the next day which is not a Saturday, Sunday, or official city holiday.

An adopted rule may be appealed by filing a written statement with the City Clerk. A person who appeals a rule must (1) provide the person's name, mailing address, and telephone number; (2) identify the rule being appealed; and (3) include a statement of specific reasons why the rule should be modified or withdrawn.

Notice that an appeal was filed will be posted by the City Clerk. A copy of the appeal will be provided to the City Council. An adopted rule will not be enforced pending the City Manager's decision. The City Manager may affirm, modify, or withdraw an adopted rule. If the City Manager does not act on an appeal on or before the 60th day after the date the notice of rule adoption is posted, the rule is withdrawn. Notice of the City Manager's decision on an appeal will be posted by the City Clerk and provided to the City Council.

On or before the 16th day after the City Clerk posts notice of the City Manager's decision, the City Manager may reconsider the decision on an appeal. The City Manager shall decide not later than the 31st day after giving written notice of an intent to reconsider.

## **CERTIFICATION BY CITY ATTORNEY**

By signing this Notice of Rule Adoption R161-25.01, the City Attorney certifies that the City Attorney has reviewed the rule and finds that adoption of the rule is a valid exercise of the Director's administrative authority.

## **REVIEWED AND APPROVED**

  
Shay Ralls Roalson, P.E., Director  
Austin Water

Date: 3/6/2025

  
Deborah Thomas  
Interim City Attorney

Date: 3/8/2025

## 2.9.0 DESIGN REQUIREMENTS FOR WATER, RECLAIMED WATER, AND WASTEWATER SYSTEMS

These guidelines are intended to establish the minimum basic design requirements for water, reclaimed water, and wastewater systems within Austin Water's (AW) service area and within the City of Austin's the Full Purpose and Limited Purpose Jurisdiction of the City of Austin and its and Extra Territorial Jurisdiction (ETJ), but do not address major facilities such as water and wastewater treatment plants. AW's service area is defined in the City of Austin Land Development Code (LDC) 25-9-2 to be coterminous with the water and wastewater impact fee service area established by City Council under LDC 25-9 Article 3. Generally, these systems will be operated and maintained by the City of Austin. Some systems, such as certain municipal utility districts, will not be operated by the City immediately upon completion, but it is likely that the City will take over operation and maintenance at some time in the future.

All project manuals shall include the appropriate City of Austin Standard Specifications. All projects are required to be built in accordance with these City of Austin Standard Specifications, which include other requirements not addressed here. All variations are subject to the approval of Austin Water (AW).

Per Texas Commission on Environmental Quality (TCEQ) criteria, Chapters 217 and 290, the utility shall provide adequate service that is operable, maintainable, and shall protect public health and safety. Design requirements which are necessary and reasonable, may be established as a condition of service. The utility may also require necessary and reasonable design measures regarding constructability, when activities encroach on property rights, pose environmental risks, or conflict with another utility.

The following information is provided to assist engineers and the general public in the design and construction of water and wastewater facilities within the City of Austin ETJ. All drawings for such facilities shall be prepared by or under the supervision of a Professional Engineer licensed by the State of Texas. It will be the responsibility of the engineer to ensure that the plans are in compliance with the latest versions of all applicable federal, state and local ordinances, rules and regulations.

These include, but are not limited to, the following:

- A. Design Criteria for Domestic Wastewater Systems - TCEQ.
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- F. The City of Austin Water, Reclaimed Water, and Wastewater Criteria.
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## **2.9.2 Water Systems**

### **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 inch 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 normally be located on the high side of the street. When required to satisfy 2.9.2.D.9, 2.9.2.E.8, or 2.9.3.D.10, water mains shall be installed on both sides of divided roads or highways. Divided roads or highways are where opposing lanes of vehicular traffic are currently or planned to be separated by a median, railroad tracks, or other vehicle obstruction.
3. Piping materials and appurtenances shall conform to COA 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 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 2.9.1.A.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. ~~Reserved.~~ **Proposed crosses to existing infrastructure are not allowed. The use of multiple tees instead of crosses is required when connecting to existing infrastructure. Crosses may be allowed on new infrastructure on a case by case basis.**
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valves and fittings connecting to ductile iron or PVC pipe. Connections of polyethylene (PE) pipe to MJ valves and fittings shall be done using approved MJ Adapters.

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). All pipes, valves, and fittings, greater than 2 inches in size, installed in the TxDOT Right-of-Way (ROW), Austin Bergstrom International Airport (ABIA) property and University of Texas property shall be restrained ductile iron pipe.
10. Allowable pipe sizes. The following sizes will be the only sizes allowed for new watermains: 4 inches (see Section 2.9.2.A.4.a), 6 inches (fire-hydrant leads and services only), 8 inches, 12 inches, 16 inches, 24 inches, 30 inches, 36 inches, and 42 inches. Larger sizes may be approved on a case-by-case basis.
11. Connections 4 inches and larger of new mains to existing mains shall be made by cutting in a tee. For PE pipe the branch connection shall be closed by electrofusion coupler per SPL WW-706C. On ductile iron and PVC pipe, 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. Reconnection to existing tapping sleeves is prohibited.
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, PVC, or PE pipe. 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, Pressure Class 350 minimum for pipe 12-inch diameter and smaller and Pressure Class 250 minimum for pipes greater than 12-inch diameter. AWWA C-900 pressure class 305 (DR14) potable water line pipe may be considered to be installed within utility easements on private property only when it meets the following criteria:
  - a. The finished surface of the water line easement over the potable water line must be paved. Where the water pipe is under HMA or Portland cement concrete pavement designed structurally for automobile and truck traffic per the Geotechnical report, PVC pipe may be allowed just in those paved areas, provided it can be demonstrated that the pipe will not be damaged by construction traffic if it does not maintain a minimum of 48 inches of cover.
  - b. The potable water line must maintain a minimum 48 inches of cover over the uppermost projection of pipe to the finished grade.
  - c. The plan and profile must clearly identify the potable water line size, material type and class as well as the paved finished grade.

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16. Changes in alignment in water lines.
  - a. For ductile iron and PVC pipe, changes in both horizontal and vertical deflection 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. Deflection of joints in ductile iron pipe shall not exceed manufacturer's maximum allowable deflection. For PVC pipe, the deflection at pipe joints shall not exceed 1°, or the manufacturer's maximum allowed deflection, whichever is less.
  - b. For PE pipe, changes in horizontal and vertical alignment by Cold (Field) Bending is allowed. The minimum cold bending radius shall not be less than 25x the pipe O.D. for DR11 pipe or 20x the pipe O.D. for DR9 pipe. No fittings (ductile iron or PE) or mechanical water service clamps are allowed within a bent section of PE pipe. Ductile iron MJ fittings may be used to accommodate bends for PE pipe by using an MJ Adapter to connect the PE pipe to the MJ fitting.
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 10 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. 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 when the trench under the water main is 3 feet or less in width.
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. Connections to Concrete Steel Cylinder Pipe.
  - a. Special Details are required to show materials and method of connecting proposed water mains to existing Concrete Steel Cylinder, or CSC, water mains.
  - b. Connections to Bar-Wrapped CSC Pipe shall be made by cutting and removing an appropriate pipe segment, and replacing with Ductile Iron fittings, valves, or pipe, using appropriate CSC to DI steel transition adapters and steel butt straps.
  - c. Connections to Prestressed Concrete Cylinder Pipe shall be by removing entire pipe segments, joint to joint, and replacing with Ductile Iron pipe or welded steel pipe, as designated by AW, using appropriate bell-to-Mechanical Joint Plain End (MJPE) and spigot-to-MJPE transition adaptors.
21. Where mains transition from PE pipe to a different pipe material (ductile iron pipe, PVC pipe, etc.), the PE pipe segments shall be designed to undergo hydrostatic testing separately from the segments of different pipe material by way of isolation valves or other means.

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22. Mains shall be located so that isolation valves, air valves, and hydrants will be readily accessible during their service life for maintenance and operations personnel and equipment.

### **2.9.3 Reclaimed Water Systems**

**B. Mains**

1. Sizing of Mains - Computer modeling is preferred for sizing reclaimed water mains. However, for mains less than 16 inches in diameter other engineering calculation methods may be accepted. Standard main sizes are: 6 inches, 8 inches, 12 inches, 16 inches, 24 inches, 30 inches, 36 inches, 42 inches, and 48 inches.
2. All reclaimed water mains shall be constructed of ductile iron, PVC, or polyethylene (PE) pipe. Alternative pipe materials may be considered on a project-by-project basis. Plans shall indicate that all mains and appurtenances be manufactured, factory painted, or striped Pantone 522 purple. All buried metallic pipe and fittings shall be encased in polyethylene per WW-27D.
3. Piping materials and appurtenances shall conform to City of Austin (COA) Standard Specifications, Standard Details, and AW 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. Maximum depth will be approved by AW for the specific materials, application and conditions. If fill or embankment placed over existing reclaimed water mains or services increases by more than 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 reclaimed water mains or services results in less than the minimum cover required by COA Standard Details, AW approval is required.
5. For mains of 16 inches and larger, drain valves shall be placed at low points.
6. ~~Reserved.~~ **Proposed crosses to existing infrastructure are not allowed. The use of multiple tees instead of crosses is required when connecting to existing infrastructure. Crosses may be allowed on new infrastructure on a case by case basis.**
7. Dead-end mains shall terminate with a flushing device and flushing devices shall be installed as necessary to facilitate flushing of the system.
8. Mains shall have an approved flushing device located at the high point between main intersections.
9. Joint restraint for ductile iron pipes larger than 24 inches diameter shall be by use of integral, factory joint restraint systems. Joint restraint for ductile iron pipes 24 inches and smaller may be by joint restraint gaskets. External mechanical joint restraint devices are allowed at all sizes of MJ valves and fittings connecting to ductile iron or PVC pipe. Connections of polyethylene (PE) pipe to MJ valves and fittings shall be done using approved MJ Adapters.
10. Joint restraint shall be provided for all pipe bends, reducers, and tees. When joint restraints are required in intersections, the joint restraints shall extend, 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.
11. 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 30<sup>th</sup> Street) due to the congestion of utilities, structures and



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excavations in the right-of-way. Concrete thrust blocking may be approved on a case-by-case basis.

12. Connections 4 inches and larger of new reclaimed mains to existing reclaimed mains shall be made by cutting in a tee. ***For PE pipe the branch connection shall be closed by electrofusion coupler per SPL WW-706C. On ductile iron and PVC pipe, 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.***
13. Changes in alignment in reclaimed water lines.
  - a. For ductile iron and PVC pipe, changes in both horizontal and vertical alignment shall be achieved by deflection of joints or by use of fittings. Longitudinal bending of pipe is not allowed. Deflection of joints in ductile iron pipe shall not exceed manufacturer's maximum allowable deflection. For PVC pipe, the deflection at pipe joints shall not exceed 1°, or the manufacturer's maximum allowed deflection, whichever is less.
  - b. For polyethylene (PE) pipe, changes in alignment by Cold (Field) Bending is allowed. The minimum cold bending radius shall not be less than 25x the pipe O.D. for DR11 pipe or 20x the pipe O.D. for DR9 pipe. No fittings or mechanical water service clamps are allowed within a bent section of pipe. Electrofusion saddles may be allowed in bends on a case-by-case basis. Ductile iron MJ fittings may be used to accommodate bends for PE pipe by using an MJ Adapter to connect the PE pipe to the fitting.
14. Where mains transition from polyethylene (PE) pipe to a different pipe material (ductile iron pipe, PVC pipe, etc.), the PE pipe segments shall be designed to undergo hydrostatic testing separately from the segments of different pipe material by way of isolation valves or other means.
15. Mains shall be located so that isolation valves, air valves, and flushing devices will be readily accessible during their service life for maintenance and operations personnel and equipment.