

CHAPTER 8

RECLAIMED WATER INFRASTRUCTURE DESIGN AND CONSTRUCTION

8-1 GENERAL INFORMATION

A. System Design Criteria

The criteria for development of reclaimed water infrastructure in the City of Peoria shall be in conformance with:

1. The most current edition of the Peoria Water Reuse System Master Plan. All new construction shall comply with the Master Plan. Directions for obtaining a PDF copy of the most current edition of the Water Reuse Master Plan is on the website at <http://www.peoriaaz.gov/NewSecondary.aspx?id=1443>
2. The Arizona Department of Environmental Quality (ADEQ) Aquifer Protection Permit and Arizona Pollutant Discharge Elimination System regulations.
3. The design engineer is responsible for evaluating site specific design conditions.
4. All other applicable City, State, County and Federal Codes and Guidelines.
5. The Public Works-Utilities Department Standard Operating Procedure (SOP) for Reclaimed & Non-Potable Water Retrofit Systems.

B. Requirement to Connect

Connection to the City's reclaimed water system shall be per Peoria City Code, Section 25-63. A Reclaimed Water Service Agreement must be in place prior to service being provided.

C. Reclaimed Water System Facilities

Reclaimed Water System Facilities include the: recharge wells, booster stations, inline boosters, pressure reducing valves, reservoirs, treatment facilities, and all other appurtenances required for proper treatment, conveyance, and disposal of reclaimed water within the system.

It is the responsibility of the design engineer to review the most current edition of the Water Reuse Master Plan and determine what additional reclaimed water infrastructure is necessary to serve the proposed development. The Public Works-Utilities Department will utilize the most current edition of the Reclaimed Water Master Plan and operational knowledge of the system to determine which facilities or upgrades are the responsibility of the new development.

Refer to the Appendices, Utility Facilities Design Guidelines for design criteria for Reclaimed Water System Facilities.

D. Exceptions to the Design Guidelines

Any exceptions to Chapter 8 of the Design Guidelines must be approved in writing by the director of the Public Works-Utilities Department or their designees.

8-2 DESIGN STANDARDS

A. General

1. Materials. Refer to City of Peoria Standard Detail PE-101 for allowable materials. The

design engineer must specify the exact pipe material in the construction drawings that are in accordance with the City approved pipe materials. Modifications to the pipe material will require a formal plan revision and must be approved by the design engineer and the City of Peoria. Color for all materials to be Pantone 512.

2. Conveyance. Rights-of-way and easements shall be dedicated prior to any construction or with the Final Plat of the development.
3. Pavement Replacement. Pavement replacement type and compaction type shall be indicated per MAG Standard Details and Specifications on each sheet or as modified in the City of Peoria General Notes.

B. Classification of Reclaimed Lines

The City of Peoria reclaimed system is a network of reclaimed waterlines grouped into functional classifications described below. All development shall provide for reclaimed water distribution and service lines of appropriate sizes and in standard locations. These are minimum requirements and the City may require larger sizes in unusual circumstances or in order to satisfy fire flow and pressure requirements.

1. Reclaimed Transmission Waterlines. Size and location will be in accordance with the most current edition of the Peoria Water Reuse Master Plan.
2. Distribution Reclaimed Waterlines
 - a. Along section lines, Major Arterial Streets, Limited Access Parkway; 12-inch diameter lines.
 - b. Along north-south midsection collectors (1/2 mile), Minor Arterial Streets; 8-inch minimum diameter lines.
 - c. Along east-west midsection collectors (1/2 mile), 8-inch minimum diameter lines.
 - d. If the reclaimed waterline deviates from the section line or mid-section line, as in the case of curvilinear roads, the reclaimed waterline shall be sized as directed in this section.
 - e. 4-inch minimum diameter lines shall be the standard in other locations.
 - f. Non standard sizes such as 10", 14", and 18" will not be allowed unless approved by the Public Works-Utilities Director.
3. Service Reclaimed Waterlines
 - a. For residential developments, standard sizes for metered taps shall be 1 inch, 1.5 inches or 2 inches. No smaller sizes will be allowed.
 - b. For all other types of development, service lines shall be sized per the design engineer.
 - c. Reclaimed water service lines shall not be located under driveways or under concrete aprons adjacent to driveways.

C. Location of Reclaimed Waterlines

1. Major Arterial Streets, Limited Access Parkways. Reclaimed waterline alignment shall be approved by the Public Works-Utilities and Engineering Departments.
2. Minor Arterial Streets. Reclaimed waterlines shall be offset from street centerline 7'-feet north or east.
3. Collector Streets. Reclaimed waterlines shall be offset from street centerline 3'-feet north or east.
4. Local Streets. Reclaimed waterlines shall be offset from street centerline 0'-feet north or east.
5. Valve Locations. Generally the intent is to locate the valve lids so that wheel line of normal vehicular traffic does not track over the casting. The location for the valve covers and lids should not be closer than 6 feet from the gutter line where possible.
6. Alignment. All Reclaimed waterlines shall be parallel to the street centerlines or property lines, or as close as possible. All horizontal deflections in reclaimed water lines shall comply with the pipe manufacturer's recommendations for deflection at joints. 50% of the recommended deflection will be allowed. Street crossings shall be perpendicular to the centerline of the street being crossed.
7. Separation. Vertical and horizontal separation from water lines and sewer lines shall be in accordance with MAG Section 610.5 and MAG Standard Detail 404 except as modified herein. When it comes to separation from sewer mains, reclaimed and non potable waterlines shall use the same requirements as potable waterlines. When it comes to separation from potable waterlines, reclaimed and non potable waterlines shall use the same requirements as wastewater lines.

D. Easements

1. Reclaimed water easements are to be dedicated for the specific use, maintenance and repair of the reclaimed waterline, and any associated appurtenances. Reclaimed water easements are to be dedicated as part of a Final Plat or by separate instrument with written approval from the Engineering Department.
2. Reclaimed waterlines shall be located within public rights-of-way or centered within a 20-foot wide easement dedicated for reclaimed water line, or within a 30-foot wide easement (minimum width) dedicated for both water and reclaimed water lines. Larger easement widths when combined with sanitary sewers with a minimum clear width equal to twice the depth of cover will be required for deeper installations as determined by the Public Works-Utilities or Engineering Department.
3. No other parallel utilities shall be located within the public water, reclaimed water or sewer easement.
4. Underground retention and above ground retention basins are not permitted to cross or be within designated public water or public reclaimed water easements.
5. Meters, and valves located on private property shall be contained within a dedicated public easement, 6-feet from the sides and 6-feet behind the appurtenance.
6. Trees and substantial plantings are not permitted within designated public reclaimed water easements where the easement provides primary access to the utilities. Plantings

must typically be at least 5' from the centerline of the pipeline.

E. Cover and Depth

1. Cover Requirements. Minimum cover from finish grade to top of the pipe shall be as specified in MAG 610.4 with the following exceptions:
 - a. The minimum cover from finish grade to top of pipe for all waterlines less than 12 inches diameter located in major streets shall be as specified by the design engineer, but no less than 48-inches unless approved in writing by the Public Works – Utilities Director.
 - b. The minimum cover from finish grade to top of pipe for waterlines which are 12-inches in diameter or larger, located in major streets shall be as specified by the design engineer, but no less than 60-inches, unless approved in writing by the Public Works – Utilities Director.
2. Plan Notation. The proposed depth shall be clearly noted on each plan sheet.
 - a. Any changes in depth required to avoid conflicting utilities shall be noted. The design plans shall detail the location and proposed elevation of each bend clearly. This can be done by using a standard detail that depicts the crossings in profile.
 - b. All Reclaimed waterlines 12-inch and larger must be shown in plan and profile.
 - c. To increase clarity, profiles of 8-inch reclaimed waterlines may be required at the request of the plans reviewer.
3. Encasement or Casing

Extra protection per MAG 610.5.5 and Standard Details 404-1, 404-2, and 404-3 is required:

 - a. Where cover is less than 4-feet to potential conflicts with facilities such as canals, washes, or rivers.
 - b. Where the bottom of pipe of the reclaimed water line is between one to two feet above the top of pipe of any irrigation, storm drain, sanitary sewer, force main or other gray water pipe.
 - c. Where the top of pipe of the reclaimed waterline is greater than 2-feet below any irrigation, storm drain, sanitary sewer, force main or other gray water pipe. No reclaimed water lines are allowed to be located less than 2-feet below the bottom of the irrigation, storm drain, sanitary sewer, force main or other gray water pipe.
 - d. Where reclaimed waterlines pass under a significant structure greater than 10-feet wide such as box culverts, railroads, highways, canals, etc. The reclaimed waterline(s) shall be installed inside a pipe casing as approved by the Engineering Department.
 - e. Pipe casing per Peoria Standard Detail PE-399 will be allowed as extra protection for new and existing reclaimed waterlines.
 - f. As deemed necessary by the plan reviewer.

F. Design Requirements

1. Combination Air/Vacuum release valves shall be installed at high points in the reclaimed waterline and where the reclaimed waterline changes slope or as required by the Engineering Department. The valves shall be installed per City of Peoria Standard Detail PE-395.
2. Tapping Sleeves
 - a. Tapping sleeves are allowed to be installed on reclaimed waterlines 12-inch and less in diameter. Tapping sleeves are not allowed to be installed on reclaimed waterlines 16-inch or larger. Any exceptions must be approved in writing by the Public Works-Utilities Department.
 - b. Size on size connections is not allowed. Any exceptions must be approved in writing by the Utilities Department.
3. Thrust Restraint
 - a. Mechanical Thrust Restraint may be provided with U.S. Pipe TR FLEX, Griffin SNAP-LOK RJ pipe or American Ductile Iron Flex Ring Joint Pipe. Joint restraint may be provided by Meg-a-Lug or equivalent, as approved by the Engineering Department.
 - b. Thrust Blocks will be concrete only per MAG Standard Details 301 and/or 340 and Class "B" concrete per MAG Specification 725.
 - c. Where conditions warrant both mechanical restraint and thrust blocks will be required as determined by the Engineering Department.
4. Pipe Bedding Requirements. Refer to City of Peoria Standard Detail PE-401. Bedding compaction densities shall be per MAG Specification Table 601-2. Specially designed and alternate beddings may be approved on a case by case basis by the Engineering Department.
5. Trench Backfill Requirements. Refer to PE-401 Minimum trench backfill requirements shall be Type I per MAG Specification 601.4.3, with compaction densities per MAG Specification Table 601-2. Backfill requirements provided by the design engineer shall apply when such provisions are more restrictive than the MAG specification.
6. Wash Crossings. All wash crossings will be constructed using restrained joint ductile pipe. Bury requirements to place water lines under washes or channels shall be based upon the 100year peak design discharge (Q100) in the channel or wash.

Scour depth will be estimated using Arizona State Standard Attachment (SSA) 5-96, Guideline 2, Level I, as published by the Arizona Department of Water Resources. The engineer will estimate the depth of scour and design the top of the pipe to conform to Section 6-1.413. The engineer shall submit the scour analysis with the final plans.

All pipelines that must be located within the scour zone at the required depth as indicated above. If the pipeline is located less than the minimum required depth of bury as indicated above, must be protected by installing a cut-off wall, downstream of the pipeline to stabilize the scour depth. Cut-off walls will be structurally designed to the scour conditions calculated.

G. Valves

1. Materials and Details

- a. Refer to the City of Peoria Standard Detail PE-101 for allowable materials.
- b. Gate valves required to control the operation of the reclaimed water system shall be installed per Peoria Standard Detail PE-270 and shall conform to MAG 630. Gate valves shall be used for reclaimed waterline sizes up to and including 16-inches in diameter.
- c. Butterfly valves shall be required on mains 24-inches in diameter and larger.
- d. Valves installation shall conform to Peoria Standard Details PE-270 and PE-398.

2. Spacing

- a. Generally, there shall be two valves per tee and three valves per cross. However, it is preferred to limit the number of unnecessary inline valves. See the following criteria to help define when inline valves are necessary (Maximum spacing requirements per b. through e. below).
- d. 500 feet maximum spacing of valves in industrial, commercial and multi-family districts.
- e. 800 feet maximum spacing of valves in single-family residential developments.
- f. 1320 feet maximum spacing of valves on transmission mains 16-inch in diameter.
- g. 2640 feet maximum spacing on transmission mains larger than 16 inches.
- f. Any 8-inch and larger reclaimed water line that will be extended in the future shall have a valve, along with a 20-foot minimum stub with cap and 2-inch curb stop, at the terminus per MAG Standard Detail 390-type A. (Type B in unimproved areas)
- g. For all reclaimed water lines crossing significant structures greater than 10 feet wide, such as drainage canals, and railroads, one valve shall be placed on each side of the structure as directed by the Engineering Department.

3. Location

- a. See City of Peoria Standard Detail PE-398 for valve locations from a tee and cross.
- b. Valves shall not be located in valley gutters. The centerline of the valve shall be a minimum of 2-feet from the edge of the valley gutter.
- c. All reclaimed water valves located outside of paved areas shall have a "Curve-Flex" Utility Marker as manufactured by Carsonite (CFR4--Purple) or approved equal.
- d. Valves shall be at least 3-feet clear of any constructed obstructions.
- e. Consideration shall be given to the location of driveways, especially residential, adjacent to the valve cover whereby a vehicle or other obstruction may be temporarily located.

4. Operation

- a. Representatives of the Public Works-Utilities Department are the only personnel authorized to operate reclaimed water valves on the City's existing reclaimed water system.
- b. To request a reclaimed water system shut down a "Peoria Distribution System-Shut Down Request Form" must be submitted. This form must be submitted at least 10 days in advance of any requests to shut down any lines in the City of Peoria's reclaimed water distribution system and can be downloaded at: http://www.peoriaaz.gov/uploadedFiles/Peoriaaz/Departments/Engineering/Downloads/Water_System_Shutdown_Form.pdf

H. Reclaimed Water Services and Reclaimed Water Meters

1. General

- a. The size of the service will be as determined by the Design engineer, sized and designed in accordance with requirements of the Uniform Plumbing Code and per the sizes herein.
- b. There will be one service per residential lot and one meter per service line unless specific written request is submitted to the Engineering Department and written approval is acknowledged by the City.
- c. A 3-foot minimum separation is required between taps and an 18-inch minimum separation is required from any fittings or mainline joints.
- d. The Developer shall make all service taps.
- e. The meter size shall be dictated by the service size. Manifolding is not permitted unless written approval is obtained from the Public Works-Utilities Director.

2. Standard Sizes and Fittings. Reclaimed water services, pipe and fittings, whether new or replaced, shall be per City of Peoria Standard Detail PE-363.

3. Reclaimed Water Meters 2-Inch Diameter and Smaller. Reclaimed water meters 2-inch and smaller shall be located per City of Peoria Standard Detail PE-363. Reclaimed water meters will be supplied and installed by the City of Peoria Meters Services Section. Meter shall be sized no more than one half size smaller than the service size.

4. Reclaimed Water Meters Larger than 3-Inch Diameter. Reclaimed water meters 3-inch and larger shall be installed above grade in accordance with Peoria Standard Detail PE-354. Reclaimed water meters will be supplied by the City of Peoria Meters Services Section. Reclaimed water meters shall be installed by the Developer.

A 20-scale detail is required for all large meters (3" and larger). The design engineer must provide a detail on the plans which depicts the meter and backflow device including manufacturer and model number, vandal enclosure, fittings, landscape, and easements at the proposed location per City requirements. If there is a change to meter or backflow device, the detail must be modified as a plan revision prior to installation in the field.

5. Location for Access, Maintenance, and Drainage Control

- a. Reclaimed water services installed outside of public right-of-way shall be contained within a dedicated easement for access, maintenance and reading of meters.

- b. Reclaimed water meters shall not be located in parking lots, driveways, or in areas of paving or where traffic may cause damage to the service, meter or meter box. Meters will not be fenced in and must be accessible at all times.
- c. In landscape areas, proposed grading shall direct runoff to flow away from the meter installation.
- d. Above ground vandal enclosures are required for all meters 3-inch and larger.

I. Backflow Prevention

1. Facility Requirements

- a. Backflow protection will be required on the potable water services at the site, as required by City ordinance and the Public Works-Utilities Department SOP for Reclaimed & Non-Potable Water Retrofit Systems.
- b. Backflow protection is normally required on reclaimed water system services per the Public Works-Utilities Department SOP.

2. Installation and Testing Requirements

- a. All backflow assembly installations shall be in accordance with Chapter 5 of the Infrastructure Guidelines.
- b. A final inspection will be required by a member of the Environmental Resources Division of the Public Works-Utilities Department prior to usage.
- c. Cross connection testing shall be conducted according to the Public Works-Utilities Department SOP for Reclaimed & Non-Potable Water Retrofit Systems.

8-3 CONSTRUCTION

A. General

All construction shall be per the latest MAG Uniform Standard Details and Specifications for Public Works Construction and subject to City of Peoria modifications, latest edition.

B. Tie-ins to Existing System

Construction plans shall indicate that any tie-ins to the existing, active system shall be made only after completion of all new work and written approval of the City Engineering Inspector.

C. Pressure Testing

Pressure testing of new mains shall be by the contractor per MAG Section 610.15 and documented on City forms (available from the City Engineering Inspectors).

D. Flushing

Flushing of new mains shall be performed by the contractor per MAG Section 611, except as stated below.

1. General.

- a. Before being placed in service, all newly installed pipe, valves, hydrants, and appurtenances shall be flushed and kept clean.
- b. Pipe shall first be flushed to remove any solid or contaminated material. Flushing velocity shall be at least 2.5-feet per second in the pipe. Flushing period shall be at least 5 minutes for every 150-feet of new pipe but in no case less than 30 minutes.

E. Protection of Monuments

The Developer is responsible for protecting and restoring if damaged, construction survey stakes and property corner monuments used by the City to locate the reclaimed water services.

F. Existing Reclaimed Water System Facility Requirements

1. Reclaimed Water Service Installations. Requirements for lowering, extending and relocating meters are as follows;
 - a. A construction permit is required for any work on the City reclaimed water system regardless of the location of the facility. Construction permits can be obtained through the Engineering Department.
 - b. The contractor or licensed plumber, shall obtain permission from the Meter Services Division to complete all work including meter disconnects and reconnects.
 - c. Materials shall be copper and bronze in accordance with City of Peoria Standard Detail PE-363.
 - d. The Contractor's representative shall be responsible for reclaimed water customer notification.
2. Reclaimed Waterline Relocations to Eliminate Conflicts. All work shall be done by contractor including testing requirements that apply to this type of work. Contractor shall not operate valves; Representatives of the Public Works-Utilities Department are the only personnel authorized to operate reclaimed water valves on the City's existing reclaimed water system.
3. Switch-overs and Abandonments. Work will be done by contractor after written authorization by the City's Public Works-Utilities Department. Follow City of Peoria "Abandonment of Facilities in the City's ROW" Policy.

8-4 FINAL DOCUMENT SUBMITTALS

A. Plan Approvals

1. Plans shall be prepared per Chapter 1 of the Infrastructure Design Guidelines.
2. Utility Reports (Refer to the Planning Department process guide):

Preliminary Water and Sewer Analysis Report- This is used to determine the potential impact that the development would have to the existing water, reclaimed water and sewer infrastructure. This report will also be used to verify that the proposed density and water use of the proposed development is consistent with the City's general plan and the City's water allocation for the proposed parcel. Refer to the report template at <http://www.peoriaaz.gov/NewSecondary.aspx?id=1435>

Final Reclaimed Water Network Analysis- Required for all sites in which reclaimed waterline is extended/ looped in order to service the proposed development, in areas identified as having problematic or low pressures, or for services that have an unusually reclaimed high water demand. The modeling in this report will be used to verify that adequate service and irrigation flows can be obtained with the proposed reclaimed waterline construction. Refer to the report template at <http://www.peoriaaz.gov/NewSecondary.aspx?id=1435>

3. The completed Approval to Construct (ATC) application with signatures should be submitted during plan review. The *System Name* is one of three current City of Peoria facilities: *Butler Drive WRF*, *Beardsley WRF*, and *Jomax WRF*. Refer to the Water Reuse Master Plan to look up which service area the project is within.
4. A copy of the Approval to Construct (ATC) issued by Maricopa County Environmental Services Department (MCESD) and the cover sheet signed by MCESD must be submitted to Engineering prior to receiving final plan approval from the City.

B. Reclaimed Water Infrastructure Acceptance

Copies of the following documents must be submitted to the Engineering Department prior to acceptance of the reclaimed water line(s) by the City. Refer to Chapter 7 of this document for as-built requirements. Final Letter of Acceptance (FLOA) will be released by the City of Peoria Engineering Department after all other items have been completed.

1. A copy of the "Certificate of Approval of Construction" (AOC) issued by MCESD.
2. A copy of the "Engineer's Certification of Completion".
3. "Water Accounting Form" indicating all potable and reclaimed water quantities used for line fill, flushed quantities and any other water used not recorded by water meters.
4. Reclaimed Waterline Flushing documentation.
5. Reclaimed Waterline Pressure Testing documentation.