# CHAPTER 5

# WATER INFRASTRUCTURE DESIGN AND CONSTRUCTION

## 5-1 GENERAL INFORMATION

### A. System Design Criteria

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

1. The most current edition of the Peoria Water 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 System Master Plan is on the website at http://www.peoriaaz.gov/NewSecondary.aspx?id=1443
2. The Arizona Department of Environmental Quality (ADEQ) Engineering Bulletin 10.
3. International Fire Code, approved edition.
4. The design engineer is responsible for evaluating site specific design conditions.
5. All other applicable City, State, County and Federal Codes and Guidelines.

### B. Requirement to Connect

All developments, including single-family residences, are required to connect to the City's water system per Peoria City Code, Section 25-20. The connection to the City's water system and the extension of the waterline per City requirements are a condition of issuance of a building permit.

Waivers to this requirement may be granted by the Utilities Director if the connection is determined not to be feasible. A connection may be considered "not feasible" according to the following:

1. Single lot developments if such development is on a major arterial road.
2. The extension of the waterline is greater than 1320-feet from the City water system.
3. The applicant demonstrates the inability to obtain necessary easements upon reasonable pursuit.

Requests for a Temporary Revocable Water or Sewer Connection Waiver shall be applied for in writing at the engineering counter. The application is available on the website at http://www.peoriaaz.gov/

### C. Water System Facilities

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

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

Refer to the Appendices, Utility Facilities Design Guidelines for design criteria for Water System Facilities including: wells, booster stations, inline boosters, pressure reducing valves, and reservoirs.

### D. Exceptions to the Design Guidelines

Any exceptions to Chapter 5 of the City of Peoria Infrastructure Design Guidelines must be approved in writing by the PW-Utilities Director or their designees.

## 5-2 DESIGN STANDARDS

### A. General

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

2. *Looped System*. All water systems must demonstrate redundancy (i.e. connected to two separate waterlines) as approved by the Engineering Department.

3. *Conveyance*. Rights-of-way and easements shall be dedicated prior to any construction or with the Final Plat of the development.

4. *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. Classifications of Waterlines

The City of Peoria water system is a network of waterlines grouped into functional classifications described below. All development shall provide for 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. *Transmission waterlines*. Larger than 16-inch in diameter. Size and location will be in accordance with the most current edition of the Peoria Water System Master Plan.

2. *Distribution waterlines*

   a. Along section lines, Major Arterial Streets, Limited Access Parkway; 16-inch diameter lines.

   b. Along north-south midsection collectors (1/2 mile), Minor Arterial Streets; 12-inch minimum diameter lines.

   c. Along east-west midsection collectors (1/2 mile); 8-inch minimum diameter lines.

   d. If the waterline deviates from the section line or mid-section line, as in the case of curvilinear roads, the waterline shall be sized as directed in this section.

   e. 8-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 waterlines*

a. For single-family 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. Fire services lines shall be a minimum of 6-inch. Smaller fire services must obtain written approval from the Fire Department.

d. Service taps are prohibited on any line, which is designed to service fire sprinkler systems or fire hydrants, on transmission waterlines, and on all waterlines larger than 16-inch.

e. Water service lines shall not be located under driveways or under concrete aprons adjacent to driveways.

## C. Location of Waterlines

1. *Major Arterial Streets, Limited Access Parkway*. Waterline alignment shall be approved by the Public Works - Utilities and Engineering Departments.

2. *Minor Arterial Streets*. Waterlines shall be offset from street centerline 13-feet north or east.

3. *Collector Streets*. Waterlines shall be offset from street centerline 9-feet north or east.

4. *Local Streets*. Waterlines shall be offset from street centerline 6-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 waterlines shall be parallel to the street centerlines or property lines, or as close as possible. All horizontal deflections in 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 sewer lines shall be in accordance with MAG Section 610.5 and MAG Standard Detail 404-1.

## D. Easements

1. The minimum clear width of the easement for distribution and transmission waterlines shall be 20-feet. The minimum width for a shared easement with sanitary sewer shall be 30-feet. There is a minimum of 10-feet each side of the water facility. Larger easement widths will be required for deeper installations as determined by the Public Works - Utilities or Engineering Department.

2. The minimum clear width of the easement for service waterlines shall be 12-feet. There is a minimum of 6-feet each side of the water facility. Larger easement widths will be required for deeper installations as determined by the Public Works-Utilities or Engineering Department.

3. Waterlines shall be centered in easements. No other parallel utilities shall be located within the water or sewer easement.

4. Water easements are to be dedicated for the specific use, maintenance and repair of the waterline, and any associated appurtenances. Water easements are to be dedicated as part of a Final Plat or by separate instrument with written approval from the Engineering Department.

*5.* Underground retention and above ground retention basins are not permitted to cross or be within designated public water or public sewer easements.

*6.* Trees and substantial plantings are not permitted within designated public water or public sewer easements where the easement provides primary access to the utilities. Plantings must typically be at least 5' from the centerline of the pipeline.

*7.* Meters, fire hydrants, and valves located on private property shall be contained within a dedicated public water easement, 6-feet from the sides and 6-feet behind the appurtenance.

## 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" 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 waterlines 12-inch and larger must be shown in plan and profile.

   c. To increase clarity, profiles of 8-inch 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 due to topography or potential conflicts with facilities such as canals, washes, or rivers.

   b. Where the bottom of pipe of the 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 water line is greater than 2-feet below any irrigation pipe, storm drain, sanitary sewer, force main or other gray water pipe. No 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 waterlines pass under a significant structure greater than 10-feet wide such as box culverts, railroads, highways, canals, etc. The 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 waterlines.

f. As deemed necessary by the plan reviewer.

## F. Design Requirements

1. Fire hydrant runs in excess of 100-feet in length require 8-inch diameter waterlines and additional valves.

2. Fire hydrants shall be installed on all dead end lines as close to the end as possible.

3. The maximum length for a dead end waterline is 400 feet unless approved in writing by the Engineering Department.

4. An automatic flushing valve will be required on dead end transmission mains per City of Peoria Standard Detail PE-410. Automatic flushing valves will also be required on dead end waterlines exceeding 400 feet in length. Automatic flushing valves are to be connected to a water meter and discharge to the sanitary sewer.

5. Combination Air/Vacuum release valves shall be installed at high points in the waterline and where the waterline changes slope or as required by the Engineering Department. The valves shall be installed per City of Peoria Standard Detail PE-395.

6. The City of Peoria water testing standards require at least 1 water sampling station per developed square mile. New residential developments are required to construct the water quality sampling stations per Standard Detail PE-371. Sampling station frequency and location will be coordinated by the Utilities Department during plan review.

7. *Existing Waterlines to be Removed or Abandoned*. Water pipes shall be removed or abandoned according to City policy as outlined in Chapter 1.

   a. Removal of asbestos cement pipe (ACP) shall be in accordance with EPA National Emission Standard for Hazardous Pollutants (NESHAP), ADEQ and MCESD requirements.

   b. If abandonment is allowed submit abandonment plans to include filling procedure for filling the abandoned pipe and the proposed slurry mixture to be used. All abandoned pipes must be shown on the as-built drawings and marked appropriately.

8. *Tapping Sleeves*

   a. Tapping sleeves are not allowed on Asbestos Cement or other deficient pipe

sections. Replace the pipe section with ductile iron pipe and fittings as needed.

b. Tapping sleeves are allowed to be installed on ductile iron waterlines 12-inch and less in diameter in good condition. Tapping sleeves are not allowed to be installed on waterlines 16-inch or larger. Any exceptions must be approved in writing by the Engineering Department.

c. Size on size taps are not allowed. Any exceptions must be approved in writing by the Engineering Department.

9. *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 with 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.

10. *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 bedding may be approved on a case by case basis by the Engineering Department.

11. *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.

12. *Wash Crossings*

All wash crossings will be constructed using restrained joint ductile iron pipe. Bury requirements to place water lines under washes or channels shall be based upon the 100-year 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 pipe to conform to Section 6-1.413. The engineer shall submit the scour analysis with the final plans.

All pipelines located within the scour zone 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. Fire Hydrants

1. *Materials and Details*

a. Fire hydrants shall be per City of Peoria Standard Details PE-360-1 (residential) or PE-360-2 (non-residential), as applicable.

b. All of the hydrants that are connected to the City of Peoria distribution system must be public hydrants.

2. *Fire Flow and Number of Hydrants Required*

a. The minimum required fire flow and minimum required number of fire hydrants are per Table B105.1 and Table C105.1 from the International Fire Code, approved edition.

b. Reduction of fire flow up to 50% is possible, but not automatic, when the buildings have fire sprinkler systems installed. Formal request in writing shall be made to the Fire Department. Please include information of water availability, water purveyor, total building square footages, proposed usage, construction type of the buildings, sprinkler system information, and water storage information (if applicable). If approved, the Fire Department will issue a Fire Flow Reduction approval letter.

3. *Hydrant Spacing*

a. Residential: 500-feet maximum in a single-family residential development.

b. Non-Residential: Average Spacing shall be per Table C105.1 of the 2006 IFC, except for Fire-Flow up to 5000 gpm, the average spacing shall be 300-feet.

300-feet maximum in a multi-family residential development.
300-feet maximum in commercial/industrial areas.

c. Collector Roads: 1000-feet maximum

d. Arterial streets with 4 or more traffic lanes;
Roadways with a traffic count of more than 30, 000 vehicles per day; or
Roadways with median dividers.

1000-feet maximum spacing on each side of the road in alternating positions, resulting in a hydrant every 500 feet along the roadway.

e. For higher risk protection, determination shall be made by the Fire Department, regarding fire hydrant spacing, flow and pressure requirements.

*4. Private Hydrants: (owned and maintained by Private Water Companies)*

a. Hydrants proposed in the service area of a private water company shall adhere to all City of Peoria standards unless otherwise approved by the Fire Department.

5. *Hydrant Markers:*

   a. Markers shall be as specified in City of Peoria Standard Detail PE-362.

   b. Hydrant Markers are required for all public or private hydrants.

## H. Fire Flow Tests

Conduct Fire Flow Tests according to the City of Peoria *Fire Flow Testing Procedure* as published by the City of Peoria Fire Department on the City of Peoria website.

1. In order to accurately predict the strength of the distribution system a fire flow test is required. The flow test results are valid for 180 days.

2. Flow tests are not provided by the City. The developer shall be responsible for obtaining a qualified testing agent. Test results must be prepared by a registered engineer in the state of Arizona or by an individual or firm with a level II NICET certification in Fire Sprinklers.

3. It is required that the Fire Department observes the test and acknowledges approval of the flow. Contact the Fire Department to schedule the observation of the flow test.

## I. 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 water system shall be installed per Peoria Standard Detail PE-270 and shall conform to MAG 630. Gate valves shall be used for 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:

      i. Maximum spacing requirements per b. through e. below.
      ii. The maximum number of hydrants to be out of service per closure is two.
      iii. The maximum number of residential units to be out of service per closure is 20.
      iv. The maximum number of valves to isolate a segment of waterline is four.

   b. 500 feet maximum spacing of valves in industrial, commercial and multi-family districts.

   c. 800 feet maximum spacing of valves in single-family residential developments.

   d. 1320 feet maximum spacing of valves on transmission mains 16-inch in diameter.

e. 2640 feet maximum spacing on transmission mains larger than 16 inches.

f. Any 8-inch and larger 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 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 water valves located outside of paved areas shall have a "Curve-Flex" Utility Marker as manufactured by Carsonite (CFR4-08-Blue) or approved equal.

d. Valves shall be at least 3-feet clear of any constructed obstructions and 6-feet clear of any landscaping.

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, to perpetually maintain the 6-foot clearance.

4. *Operation*

a. Representatives of the Public Works - Utilities Department are the only personnel authorized to operate water valves on the City's existing water system.

b. To request a 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 water distribution system and can be downloaded at: http://www.peoriaaz.gov/uploadedFiles/Peoriaaz/Departments/Engineering/Downloads/Water_System_Shutdown_Form.pdf

## J. Water Services and 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 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.

f. Individual pressure reducing valves sized equivalent to the meter size shall be installed on private services where static pressures will exceed 80 psi.

g. Individual boosters, if necessary, must be approved by the PW-Utilities Director or their designee.

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

3. *Water Meters 2-Inch Diameter and Smaller*. Water meters 2-inch and smaller shall be located per City of Peoria Standard Detail PE-363. 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. *Water Meters Larger than 3-Inch Diameter*

Water meters 3-inch and larger shall be installed above grade in accordance with Peoria Standard Detail PE-354. Water meters will be supplied by the City of Peoria Meters Services Section. 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. Water services installed outside of public right-of-way shall be contained within a dedicated easement for access, maintenance and reading of meters.

b. 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.

## K. Backflow Prevention

*1. Facility Requirements*

a. Backflow protection will be required on the domestic and irrigation potable water supply lines to all commercial facilities to prevent the possibility of polluting or contaminating the potable water system Additional backflow prevention assemblies may be required to isolate potential internal hazards per reviewer request.

b. Containment (or secondary protection) will be installed at the service connection or

downstream side of the water meter. The backflow assembly will be installed as close as possible to the water meter for domestic and landscape irrigation services, or as close as possible to the property line or main line tie-in for the fire sprinkler system. It is not permitted to combine the meter and the backflow into one assembly, there should be a minimum of 5-foot separation between the meter and backflow prevented. A (RP) Reduced Pressure Principle Backflow Preventer shall be installed as standard containment protection. Any backflow prevention assembly other than an (RP) must have written approval from the Public Works - Utilities department. Installation of secondary backflow protection shall be in accordance to City of Peoria Standard Details PE-351-1&2, PE-352-1, PE-353-1&2, and/or PE-455.

c. Internal (or primary protection) may be required within the potable water system of a facility at the point of use to isolate potential internal hazards. Internal backflow assembly requirements will be determined during the plan review process. Installation of internal backflow assemblies shall be in accordance to City of Peoria Standard Detail PE-352-2.

*2. Installation Requirements*

a. All backflow assembly installations shall be in accordance with International Plumbing Code, latest adopted edition, and current City of Peoria Code. Installation shall be completed by a qualified licensed contractor and comply with current City of Peoria Standard Details. Backflow assembly testing may only be conducted by City of Peoria Recognized Testers. The "Recognized Testers List" is available on the website at http://www.peoriaaz.gov/uploadedFiles/TESTER_LIST(4).pdf.

b. A final inspection will be required by a member of the Environmental/Building Safety Division prior to the issuance of a Certificate of Occupancy.

*3. Fire Systems*

a. All American Water Works Association classes 1, 2, and 3 fire systems six (6) inches in size and larger or any system three (3) inches in size and larger constructed of a piping material not approved as a potable water system material per the International Plumbing Code, latest adopted edition, shall have a Double Check Valve (DC). All American Water Works Association classes 4, 5, and 6 shall have a (RP). In all other circumstances a (RP) is required.

b. Proposed fire lines less than 6-inches in size require special approval. If approved, all fire line services less than six (6) inches in size and in excess of one hundred fifty (150) feet from mainline tie-in to fire riser shall have at a minimum a (DC) located as close as possible to the property line or mainline tie-in. Fire lines less than one hundred fifty (150) from the main line tie-in shall have a Double Check Valve (DC) installed on the fire riser. Fire line backflow prevention assemblies shall be installed according to City of Peoria Standard Details 351-1&2 and/or 353-1&2. The Public Works – Utilities Department and/or the Fire Community Services Division shall provide final approval for all backflow prevention assemblies and configurations. Fire sprinkler systems must be sized to allow for a minimum ten (10) psi head loss plus the losses associated with all fittings, valves, elbows, risers and additional appurtenances.

## 5-3 WATER RESOURCES AND WATER CONSERVATION

The criteria for guiding management of the essential and finite water resources available to the City of Peoria are *The Principles of Sound Water Management*. Refer to the Planning Department process guide.

### A. Water Resources

1. Projects identified to have any of the following criteria will be required to have a separate water resources review:

    a. Annexation (within COP water service area)
    b. Major or minor general plan amendment
    c. 80 gross acres and larger in size
    d. Excessively high water use (50% over general plan allocation)

2. During the water resources review, and in accordance with the guidelines in the Principles of Sound Water Management, the City will confirm the City's water allocation for the project. In order to approve water use in excess of the aforementioned water allocation, the City will require serious and measurable water conservation initiatives and/or acquisition of new water rights to be dedicated to the City.

### B. Water Conservation

1. Serious and measurable water conservation initiatives are defined as initiatives that are enforceable by the City of Peoria that are proven to reduce the overall water use of a given development by utilizing water reduction measures **that are not already required** by current City requirements.

2. The developer may provide a **Water Conservation Plan** to the City of Peoria which outlines the proposed serious and measurable water conservation initiatives. Prior to submitting the Water Conservation Plan, the developer must schedule a meeting with the City of Peoria - Water Conservation Section of Public Works - Utilities.

3. The Water Conservation Plan, at a minimum, must outline the following:

    a. Best management practices to be utilized

    b. Landscape/hardscape requirements

    c. Proposed landscape plan with total amount of grass and xeriscape (low water use landscape).

    d. Utilization of only Arizona Department of Water Resources, Phoenix Active Management Area, drought tolerant/low water use plants.

    e. Turf/grass limited to common active residential areas only.

    f. Turf/grass shall not be planted immediately next to street curbing or sidewalks without a minimum 18-inch set back of decomposed granite to minimize or prevent overspray and runoff from irrigation system.

    g. Planting grass on sloped areas is prohibited.

h. If installing water feature: how large (amount of gallons used), what type (cascading, spraying, etc.), recirculating system.

i. Rain water harvesting initiatives.

j. Type of pool filter will be used (sand, cartridge).

k. Method of ensuring that these measures can be enforced by the City of Peoria.

l. Calculation of total proposed water use without conservation techniques.

m. Calculation of total proposed water use with conservation techniques

n. An itemized list of water savings from each of the water saving initiatives proposed (Water reduction efforts already required by the City will not be counted. Only water savings above and beyond the current requirements will be considered.)

## 5-4 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), except fire sprinkler lines. Fire sprinkler lines shall be tested per the Uniform Fire Code adopted by the City. Water usage for line filling is to be reported to the Public Works - Utilities Department on City forms.

### D. Chlorination, Flushing and Bacteriological Testing

Chlorination and flushing of new mains shall be performed by the contractor per MAG Section 611 and Part V of ADEQ Engineering Bulletin No. 8, except as stated below.

*1. General*

a. Before being placed in service, all newly installed pipe, valves, hydrants, and appurtenances shall be flushed, disinfected, kept clean, and will be sampled for acceptable bacteriological analysis.

b. Newly installed Waterline will have a sample taken from each and every 500-foot interval, and at each end. For each hydrant lateral over 18-feet in length, a sample will be taken at the hydrant end. Hoses for sampling will not be allowed. On new Waterline without hydrant, temporary sampling taps shall be provided, and then removed and plugged after acceptable bacteriological results are received. Hydrant

used for sampling shall be fitted with an approved sampling tap.

c. The Contractor shall coordinate with the Engineering Department for the location of sampling taps.

*2. Pre-disinfection Flushing*

a. 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.

b. One 3" hydrant meter will, under normal pressure of 40 psi, provide this velocity in pipe sizes up to and including 8-inches.

c. For pipe sizes exceeding 8-inches diameter, additional hydrant meters will be needed to provide the required flow as shown below.

**REQUIRED FLOW TO FLUSH WATERLINES**

| Pipe Diameter (inches) | Flow Requires (gpm) to Produce 2.5 feet per second (fps) Velocity in Waterline | Number – Hydrants Required |
|---|---|---|
| 12 | 900 | 2 |
| 16 | 1600 | 3 |
| 24 | 3600 | 7 |

3. *Final Flushing and Testing*. Following chlorination, all treated water shall be flushed from the pipe until the replacement water treated throughout its lengths shows an absence of chlorine. If chlorine is normally used in the source of supply, tests shall show a residual not in excess of that carried in the system. Flushing velocity shall be at least 2.5-feet per second in the Waterline. Flushing period shall be at least 5 minutes for every 150-feet of new Waterline but in no case less than 30 minutes. All hydrants on the new Waterline shall be flushed to remove excess chlorine from the hydrant and hydrant branch.

4. *Documentation*. Document on City forms (available from the City Engineering Inspectors). Samples will be taken and tested by the City. Water usage for line filling and flushing is to be reported to the Utilities Department on City forms.

## 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 water services.

## F. Existing Water System Requirements

1. *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 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 water customer notification.

2. *Fire Hydrant Setbacks and Waterline Relocations to Eliminate Conflicts*. All work shall be done by contractor including chlorination and 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 water valves on the City's existing water system.

3. *Switch-overs and Abandonments*. Work will be done by contractor after written authorization by the City Public Works - Utilities Department. Follow City of Peoria "Abandonment of Facilities in the City's ROW Policy.

4. Asbestos – Cement Pipe. All work on asbestos-cement pipe shall be in accordance with AWWA 20406 Work Practices for Asbestos Cement Pipe and OSHA's Asbestos Standard for construction, 1926.1101.

## 5-5 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) and the Integrated Water Utility Master Plan 2015.

   Preliminary Water and Sewer Analysis Report This is used to determine the potential impact that the development would have to the existing 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.

   Final Water Network Analysis- Required for all sites in which water main is extended/ looped in order to service the proposed development, in areas identified as having problematic or low pressures, or for buildings that have an unusually high water demand. The modeling in this report will be used to verify that adequate service and fire flows can be obtained with the proposed waterline construction.

   Master Water and Master Sewer Reports- When required this report should show the infrastructure required for the utilities in the development to function per City of Peoria standards. Individual Final Water and Final Sewer Reports will be required for each parcel at the time of submittal. Individual phased reports should be consistent with the data, calculations, and assumptions shown in the Master Reports. Refer to Chapter 6 for additional information regarding Sewer Reports.

3. The completed Approval to Construct (ATC) application with signatures should be submitted during plan review. Sign-off from the "public water supply provider" on page 2 of 3 the Approval to Construct (ATC) will be issued by the Public Works - Utilities Department after the ATC application has been submitted and will not be provided until the utility plans are substantially approved.

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. Water Infrastructure Acceptance**

Copies of the following documents must be submitted to the Engineering Department prior to acceptance of the waterline(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. "Water Accounting Form" indicating all water quantities used for line fill, flushed quantities and any other water used not recorded by water meters.

2. Waterline Flushing documentation.

3. Waterline Pressure Testing documentation.

4. Residual testing.

5. Waterline Disinfection and Bacteriological Testing documentation certified by a State of Arizona Registered Water Distribution Operator including laboratory analytical results.

6. A copy of the "Engineer's Certification of Completion".

7. A copy of the "Certificate of Approval of Construction" (AOC) issued by MCESD.