
WATER

This chapter provides ordinance, policy, and standards establishing design criteria for constructing and modifying water systems to be owned and operated by the city. It provides guidance on agreements, preparation of design reports and design of transmission, distribution, and fire protection systems and final plans preparation.

DS&PM 2014 UPDATE NOTES OCTOBER 28, 2014:

The revisions shown in red bold font (new language) and red bold font strike-through (deleted language) were made after publishing for the September 15, 2014 Open House meeting and public review.

- There one public input comment on this document and that was a typographic correction note.
- The revisions shown are staff review revisions.

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WATER

GENERAL INFORMATION

- A. Ordinance Requirements
Developers shall install at their expense all improvements necessary to provide water service to their development. This will include any pump stations, reservoirs, transmission mains, pressure reducing valves or other related facilities and the payment of all required fees. Refer to Scottsdale Revised Code, Sec. 49-73.
There is a program for extension of the city’s water system to newly developed areas and subdivisions within the city’s service area where city water service is available. Refer to Scottsdale Revised Code, Sec. 49-212.
- B. Design Policy
A civil engineer registered in the State of Arizona shall analyze all proposed development that is determined by the city to have an impact on the water distribution system. The effects of various flow scenarios will be examined to ensure proper sizing and layout of the proposed water system.
- C. Diligence
It is strongly advised that developers and property owners verify the need for any water extensions necessary to provide service to a site and comply with the extension/frontage requirements of Scottsdale Revised Code, Sec. 49-219.
- D. Available Resources:
 - 1. Records counter – obtain existing utility maps and as-built drawings.
 - 2. Scottsdale Revised Code – generally Chapters 47 through 49 available at www.ScottsdaleAZ.gov/codes.
 - 3. MAG Uniform Standard Specifications and Details for Public Works Construction available at <http://www.azmag.gov/Communications/publications.asp>
 - 4. The Scottsdale supplements to the MAG standards and details available at <http://www.scottsdaleaz.gov/design/cosmagsupp>
 - 5. City’s website – Home Improvement Center at www.ScottsdaleAZ.gov/bldgresources.
 - 6. A city civil plans examiner and/or city water resources engineer can confirm the need for any required extension or condition for water service.
 - 7. Water Resources Planning and Engineering – 480-312-5685.

ENVIRONMENTAL QUALITY REQUIREMENTS

Maricopa County Environmental Services Department (MCESD) is required to review and approve all public water main extensions and construction of water related facilities within the city’s service area prior to the city approving the final plans. Relocation or realignment of an existing water line to resolve a utility conflict does not require County approval.

Engineering Bulletin No. 10, “Guidelines for the Construction of Water Systems” published by the Arizona Department of Environmental Quality and Arizona Administrative Code, “Title18 – Environmental Quality”, contain specific requirements for submittals, approvals and notifications when extension of a public water line is proposed. Some of the provisions of these documents are outlined below. It is the responsibility of the developer

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and the engineer to read and comply with the applicable requirements of these documents.

1. Prior to city approval of final plans, the developer will submit a cover sheet for the final plans with a completed signature and date of approval from MCESD.
2. Before commencing construction, the contractor or developer will provide documentation to the city public works inspector that a Certificate of Approval to Construct and/or Provisional Verification of General Permit Conformance has been approved by MCESD. The Public Water Supply Number Signature Form will be signed by a City of Scottsdale Water Resources Engineer. Refer to Section 6-1.201 for city water system information. Contact MCESD at 602-506-6666.
3. Before building permits are issued, the developer will submit to the city public works inspector a Certificate of Approval of Construction and/or Verification of General Permit Conformance signed by MCESD for the water line extension.
4. Prior to Inspection Services issuing a Letter of Acceptance, the developer must deliver to the Public Works Inspector an acceptable set of full-size 4 mil as-built mylars of the improvements.

PRIVATE WATER COMPANIES

Portions of Scottsdale's municipal area are provided water service by private water companies. Figure 6.1-1 delineates those areas.

Proposed private water lines located within the city's rights-of-ways or easements will require an agreement between the city and the private water company delineating liability and maintenance responsibilities. Water line design and materials shall comply with the requirements for city water lines.

Private water companies should review and approve the construction of, and modification to, water systems within their franchise areas. The developer will submit to Plan Review written documentation that the private water company has approved facilities shown on the final plans before the city grants approval.

The city will not provide water service within private water company franchise areas and will not review private water system plans unless the work will occur within the city's rights-of-ways or easements. Applicable review fees must be paid when the city reviews private water systems plans. A note will be placed on the final plans stating that the operation and maintenance of privately owned lines is not the responsibility of the city.

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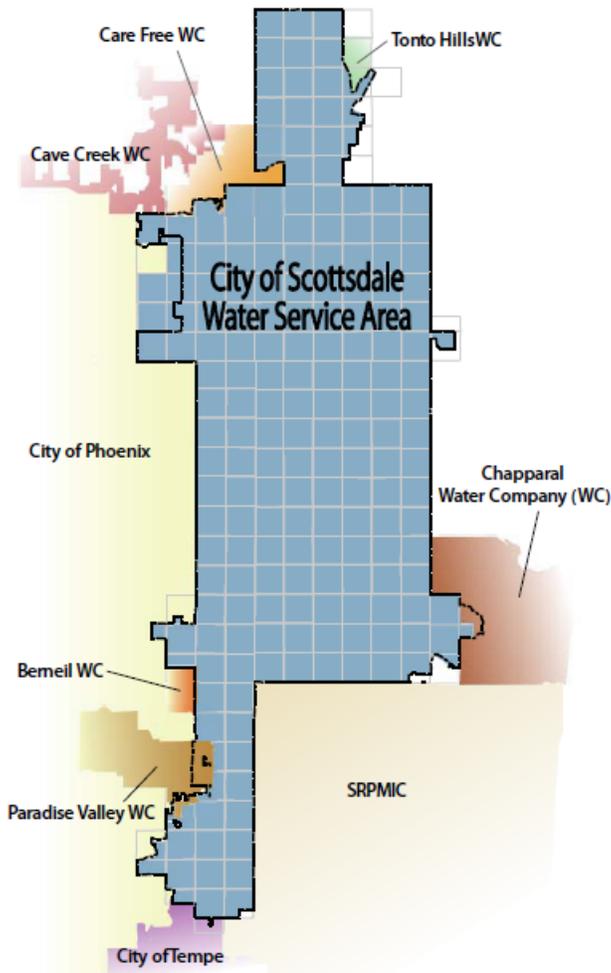


FIGURE 6.1-1 WATER SERVICE AREAS

AGREEMENTS

Developers and property owners who install improvements to the public water system may be eligible to request a credit, oversizing, or payback agreement with the city allowing for partial reimbursement of costs to design and construct those improvements.

A. Ordinance Requirements

Developers who construct water system improvements may receive credit for such construction per Scottsdale Revised Code, Sec. 49-74.2. The city has specific reimbursement agreements for developers or property owners that allow them to collect line payback charges and compensation for the cost of oversizing water lines. Reference Scottsdale Revised Code, Sec. 49-212.

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CREDIT AGREEMENTS

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Credit agreements are established to compensate a developer for installing system infrastructure that has been identified in the city’s Capital Improvement Plan and/or included in the most recent infrastructure improvement plan or long range master plan. Credit agreements are set up through the Water Resources Department and are to be identified in the developer’s master plan.

OVERSIZE AGREEMENTS

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Oversizing Agreements will allow the city to compensate developers for the cost to install a water line larger than what is minimally required to serve the development. This typically occurs where water extensions are proposed on section and mid-section line streets, or areas with projected future growth. All oversizing projects involving city funds must have an oversizing agreement and must meet all city requirements. The city can only participate in the cost of oversizing provided there are sufficient funds in the capital improvements budget and the amount does not exceed the limitations set forth by the Arizona Revised Statutes, Title 34, Article 2, Paragraph 201.D. If sufficient funds do not exist, the oversized lines will be installed at the developer’s cost. For more information on oversizing agreements contact the Water Resources Department.

PAYBACK AGREEMENTS

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Developers may request a line extension payback agreement when they construct local distribution lines across frontages of parcels not currently receiving water service from the city. Line extension payback agreements are set up through the Water Resources Department. For questions or details on procedures to initiate an agreement, contact the Water Resources Department.

The Extension Participation Program (refer to <http://www.scottsdaleaz.gov/bldgresources/counterresources/waterratefees/ExtensionParticipation>) may be available to single family property owners required to extend public water lines to their lot for service.

WATER SERVICE AGREEMENTS

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The County’s Water Service Agreement form should be filled out by the developer’s engineer and submitted or emailed for signature to the Water Resources Department and the Solid Waste Management Division. It is the owner’s responsibility to obtain these signatures from the respective city divisions. The agreements will not be signed prior to the city approving the final plans. Following is the specific information regarding the Scottsdale municipal water system and the appropriate identification numbers:

- Potable water system # 07- 098
- System Name: City of Scottsdale Water Campus
- Address: 8787 E. Hualapai Dr., Scottsdale, AZ 85255
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IN-LIEU PAYMENTS

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At the sole discretion of the Water Resources Department, an in-lieu payment may be accepted as a developer contribution satisfying the frontage extension requirements of the ordinance provided:

- A. An existing public water line presently fronts a portion of the property and is available to provide domestic service and fire protection.
- B. An anticipated land division of adjacent property would impact the size or desired alignment of the water line.
- C. Future construction of the water line will not impact any offsite improvements otherwise required of the property.

All in-lieu estimates are subject to review and acceptance by the Water Resources Department and shall include itemized amounts for design, permitting, construction, inspection, and administration based on current costs from the City’s Capital Project Management program. In-lieu payments are to be made at the City’s One Stop Shop when applying for either an encroachment or a building permit.

DESIGN REPORTS

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Projects requiring the extension of a water line will require a basis of design report and a fire hydrant flow test.

Preliminary Basis of Design Reports will be identified on the application checklist when required for a case submittal (zoning, preliminary plat, development review, etc.).

Final Basis of Design Reports must be reviewed and accepted by the Water Resources Department prior to submittal of improvement plans to the city’s One Stop Shop.

Larger planned communities, phased developments and rezoned properties may be stipulated for a Water Master Plan to evaluate offsite water infrastructure and implications of phased construction. Contact the Water Resources Department to discuss offsite and onsite requirements and the necessary content for a specific Water Master Plan.

PRELIMINARY BASIS OF DESIGN REPORTS

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Preliminary design reports will evaluate a site’s existing and proposed water and fire demands to determine if adequate supply is available or if offsite infrastructure is required.

A. Report Format

- 1. A narrative describing the existing and proposed site development and utilities.
- 2. An estimate of existing and proposed water demand.
- 3. A preliminary site plan with onsite water line layout (11 x 17 or 24 x 36).
- 4. Any additional analysis determined necessary will be discussed in the pre-application meeting.

B. Submittals

Two copies of the Preliminary Basis of Design Report shall be included in the project's case submittal. A copy will be available for the developer upon acceptance by the Water Resources Department.

FINAL BASIS OF DESIGN REPORTS

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Final Water Basis of Design Reports shall provide an analysis of a development's impact on the local water system. These reports are reviewed and accepted by the Water Resources Department then utilized by Plan Review as support for their review of the construction drawings. The report's objectives are to demonstrate design conformance to the city's current Integrated Water Master Plan and/or established hydraulic boundary conditions.

A. Design Policy

A civil engineer registered in the State of Arizona must analyze a new development's impact on the city's water system. The effects of average day flow, peak hour flow and max day plus fire flow are to be evaluated ensuring sufficient water supply is available to meet the needs of that development and that the proposed water system layout and sizing are adequate. The Final Basis of Design Report shall provide supporting map detail to serve as a master utility plan for the project.

B. General Format

1. The report shall be letter-sized (8 1/2 x 11).
2. Provide a table of contents.
3. Maps and other supporting materials shall be attached as an appendix to the report.
4. Reports must be sealed by a civil engineer licensed to practice in the State of Arizona.

C. Report Covers

1. Covers shall include the project name along with the name, address and phone number of the developer/owner and engineer.
2. Covers shall include the original submittal date and any subsequent revision dates.

D. Vicinity Map

1. Identify the project's location with respect to major cross streets and city quarter-section.

E. Introduction

1. Summarize the proposed development including the number of residential units, square footages of non-residential development, and related site improvements.
2. Summarize any previous site development.

F. Existing Conditions

1. State the existing zoning and land use.
2. Describe the existing, topography, vegetation and landform features.
3. Include a description of existing utilities in the vicinity.
4. Summarize and attach the results of a certified flow test of the existing water system.

5. Include a listing of existing site water meters including size, location and use for fee credit purposes.

G. Proposed Conditions

1. Describe the proposed connections to the city's water system and extension of any water lines into the site.
2. Describe the project's location within the appropriate water zone(s).
3. Indicate second sourcing for all water extensions when necessary to meet requirements of the Fire Department or Water Quality Division.
4. State the required fire flow referencing the city's current adopted fire code.

H. Computations

1. Base generated water demands upon the unit demands listed in Figure 6.1-2 or other sources acceptable to the Water Resources Department and present in tabular form.
2. Analyze the water system for average day, peak hour and maximum day with fire demand. Pay particular attention to water demand factors used for restaurants or specialty developments.
3. Computer modeling shall use H2ONET, WATERCAD, or EPANET software. Other software products may be authorized by the Water Resources Department.
4. Provide calculations showing that the minimum water pressure requirements are met at the highest proposed finish floor elevation (with and without fire flow).
5. Pipes and nodes tables – include ID, demand, pressure, elevation, hydraulic grade, length, status, diameter, velocity, and head loss/1000 ft.
6. Reservoirs and pumps tables – include ID, elevation, hydraulic grade, inflow, and outflow.
7. PRV tables – include ID, elevation, upstream and downstream hydraulic grades.
8. Include diagrams clearly showing all pipe, node, reservoir, pump and valve references.
9. Include a scour analysis when crossing washes with flow greater than 499 cfs.

WATER

AVERAGE DAY WATER DEMANDS				
Land Use	Inside Use	Outside Use	Total Use	
Residential Demand per Dwelling Unit:				
< 2 DU/ac	208.9	276.7	485.6	per unit
2 – 2.9 DU/ac	193.7	276.7	470.4	per unit
3 – 7.9 DU/ac	175.9	72.3	248.2	per unit
8 – 11.9 DU/ac	155.3	72.3	227.6	per unit
12 – 22 DU/ac	155.3	72.3	227.6	per unit
High Density Condominium	155.3	30	185.3	per unit
Resort Hotel (includes site amenities)	401.7	44.6	446.3	per room
Service and Employment:				
Restaurant	1.2	0.1	1.3	per sq.ft.
Commercial/Retail	0.7	0.1	0.8	per sq.ft.
Commercial High Rise	0.5	0.1	0.6	per sq.ft.
Office	0.5	0.1	0.6	per sq.ft.
Institutional	670	670	1340	per acre
Industrial	873	154	1027	per acre
Research and Development	1092	192	1284	per acre
Special Use Areas:				
Natural Area Open Space	0	0	0	per acre
Developed Open Space – Parks	0	1786	1786	per acre
Developed Open Space – Golf Course	0	4285	4285	per acre

FIGURE 6.1-2 AVERAGE DAY WATER DEMANDS IN GALLONS PER DAY

I. Summary

1. Summarize the proposed water improvements stating that all the city's design standards and policies have been met or note why the developer is requesting any variance or exception.
2. Include a brief project schedule indicating the proposed start and completion of the development's improvements.
3. State any intent to request a credit, oversize or payback agreements along with a description of the applicable water infrastructure.

J. Supporting Maps

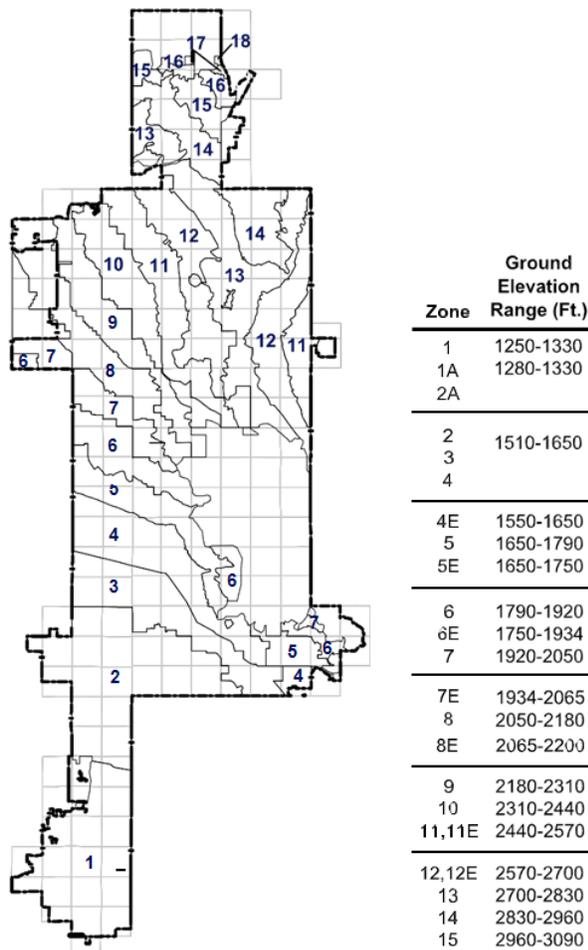
1. Include a scaled site plan showing all existing and proposed utility lines and all existing and proposed improvements. Provide separate maps if site demolition involves significant removal of existing utilities and improvements.
2. Screen existing topography and clearly label all existing and proposed contours, or provide spot elevations with sufficient information to evaluate pipe cover.
3. Indicate locations and sizes of proposed meters (domestic and landscape), backflow preventers, fire lines and fire hydrants.

4. Show, dimension and label all property lines, rights-of-way, tract and easement lines.
 5. Indicate any water zone boundary lines corresponding to the topography.
- K. Submittals
1. Counter submittal – reports stipulated to be accepted by Water Resources prior to submittal of improvement plans, shall be submitted to the One Stop Shop to the attention of the Water Resources Department or may be submitted electronically. Counter submittals require three copies of the report in addition to any previously redlined reports.
 2. Electronic submittal – reports may be electronically submitted following the digital plan submittal processes described on the city’s website at <http://www.scottsdaleaz.gov/bldgresources/planreview.asp>.

ADDITIONAL INFORMATION

Questions regarding report requirements and the city’s water distribution system may be obtained by contacting the Water Resources Department at 480-312-5685.

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6.1-3 PRESSURE ZONE MAP

WATER FACILITIES

Water facilities (wells, reservoirs and booster pump stations) are typically designed and constructed by the city through its capital improvement program. Developers needing to construct water facilities should contact the Water Resources Department and request a meeting. The city will address design issues, the review process for facilities and any potential city cost participation.

A. Design Policy

Water facilities will be located on a tract or a lot dedicated to the city (conveyed by a general warranty deed) and accompanied by a title policy in favor of the city.

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WELLS

The Water Resources Department will be notified of any proposed well drilling. Under the Arizona Groundwater Management Code, the Arizona Department of Water Resources (ADWR) regulates all groundwater wells in Arizona. Water Resources will not support the drilling of a private well when public water is available within 660 feet of the property. Additional information is available from ADWR at 602-771-8500 and online at www.azwater.gov/dwr/.

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RESERVOIRS

Storage facilities must provide emergency fire protection and be designed to maximize the efficient use of water production wells and pumping facilities. Therefore, storage in each designated service area will exceed each of the following criteria:

- Three hours fire flow reserve plus 25% of the maximum day demand.
- ~~One average day demand.~~

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BOOSTER PUMP STATIONS

Booster pumps will be designed as required to maintain adequate pressure for domestic and fire protection water supply. The city's current pump system design criteria, details and specifications are available online at www.ScottsdaleAZ.gov/bldgresources/counterresources/waterfeepacket.

A preliminary design report must be prepared and submitted to the One Stop Shop for review and acceptance by the Water Resources Department prior to submittal of improvement plans. This report shall outline the type of equipment and controls proposed for the station along with the proposed hydraulics. A final design report and project specifications prepared by a registered civil engineer licensed in the State of Arizona must be accepted by Water Resources prior to approval of the improvement plans.

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TRANSMISSION & DISTRIBUTION SYSTEMS

A. Ordinance Requirements

Water mains shall be extended to provide water service upon development of a property if an approved source is within 660 feet of the nearest property line of the

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development. Individual properties that are not within 660 feet of the public water distribution system have the option to extend the public water system, drill a separate well for each individual property, or haul water. Refer to Scottsdale Revised Code Sec. 49-75.

The city requires water mains to be installed along the entire length of the property line frontage of that property being developed. The property line frontage is defined as that portion of a parcel of property that abuts a street, easement, or public rights-of-way. If a parcel to be developed has more than one frontage, improvements shall be installed along all frontages per Scottsdale Revised Code Sec. 49-212.

B. Design Policy

The city may require the extension of water lines along a frontage, or through a subdivided parcel, to the boundary where future extension of the water line is possible, providing a point of service to adjacent properties, or as determined necessary by the city.

Reconstruction of residential or commercial structures requires compliance with all current ordinances and design guidelines relating to water line extensions, main sizing, and service lines.

Each lot will have safe, reliable, and potable water in sufficient volume and pressure for domestic use and fire protection. This shall be verified by the engineer, in part, by performing a flow and pressure test of that part of the potable system to be extended or connected to. The flows and pressure must meet minimum requirements for domestic and fire flow per Section 6-1.501. A statement verifying this shall be placed on the cover sheet of the final plans.

The city's water distribution system operates on a grid system. Minimum line size requirements for this grid are as follows, unless otherwise approved by the Water Resources Department:

1. Mile and half-mile alignments must be a minimum of 12 inch.
2. Quarter mile alignments must be a minimum of 8 inch.
3. Water lines located in the city's county service area must be a minimum of 8 inch unless otherwise approved by the Water Resources Department.
4. All other alignments must be a minimum of 6 inch.

The grid system and frontage requirements may be reevaluated through a master planning process where density, topography and other environmental features are considered. Upon acceptance of a master plan, detailed design reports for each developing parcel within the master planned area are required. Acceptance of the detailed design report, complying with the accepted master plan, provides a variance from the normal grid and water line frontage requirements.

The city maintains several pressure zones and care must be taken to identify boundary conditions when designing near a zone line. Refer to Figure 6.1-3 for water pressure zone boundaries. Static water pressure tests will be taken on a fire hydrant located on each leg of the existing water system where interconnections are proposed. Refer to Section 6-1.405.

C. Construction Standards and Details

The engineer should be familiar with the MAG Uniform Standard Specifications for Public Works Construction and the COS Supplement to MAG Uniform Standard Specifications for Public Works Construction, including all applicable Standard Details. These documents contain construction-related specifications and details that impact the design of water systems including trenching, bedding, backfill and pavement replacement, etc.

MATERIALS

1. Water distribution lines are 6 inch through 12 inch in diameter and shall be ductile iron pipe (DIP) with a minimum pressure class of 350.
2. The city does not allow 10 inch, 14 inch, or 18 inch water lines for new construction.
3. Water transmission lines are 16 inch and larger, and may be DIP, mortar lined steel, steel cylinder pre-tensioned pipe, or an approved equal. The pressure class will be verified with the Water Resources Department.
4. The use of AWWA C-900 PVC is prohibited in the Scottsdale public water system.
5. Fire line services 4 inches and larger shall be constructed of ductile iron pipe, class 350. Fire line services 3 inches and smaller shall be constructed of type K, soft copper.
6. All ductile iron water lines are to be specified with polyethylene wrapping. Designs specifying the installation of other acceptable metallic pipe materials will require soil testing in accordance with procedures of the American Ductile Iron Pipe Research Association. Such tests shall be submitted to the city with the final plans submittal to determine if cathodic protection is required in the design.
7. Polyethylene locating tape (color coded blue) will be placed above all public water lines.
8. Design calculations for wall thickness will be required in cases where pipelines could be subjected to heavy external loads. These include, but are not limited to, pipelines crossing under storm drain lines greater than 36 inches in diameter, pipelines in the roadway alignment that would be exposed to heavy construction vehicle loads prior to paving, and installations exceeding the pipe manufacturer's maximum depth of bury.

SYSTEM LAYOUT

- A. To provide appropriate water pressure, water circulation and redundancy, all new water mains must be designed in a looped configuration, providing a minimum of two sources that can be isolated by a gate valve, except as provided for in Section 6.1-403.
 1. In general, water distribution and transmission lines will be on the north and east side of the street, under the drive lane or as otherwise approved by the Water Resources Department.
 2. The Water Resources Department will only replace standard black asphalt and grey concrete when repairing water lines. Any water lines located under colored concrete, pavers, or other specialty paving (except at crosswalks) shall require prior approval from the Water Resources Department. In such cases a note shall be placed on the subdivision plat stating that any decorative pavement disrupted as a result of maintenance to the city's water and/or sewer system shall be the responsibility of the property owners to repair or replace.

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WATER

3. All water lines will be aligned parallel to property lines or street center lines, except as noted in paragraph 7 below.
4. Water lines shall not be located within 10 feet of a building or retaining wall without providing additional protection. Additional protection shall include placing the water line in a sleeve or modifying the footing to prevent damage in the event of a water line break.
5. Design joint deflection shall not exceed 4 degrees for water lines 12 inches and smaller in diameter and 2½ degrees for water lines greater than 12 inches in diameter. Curved water lines are permissible where the individual joint deflection does not exceed the above criteria.
6. For purposes of horizontal separation, storm drains and non-potable water lines shall be treated as sewer lines.
7. Developments with numerous curved streets will be discussed with the Water Resources Department to decide whether the city will consider a design report with water and sewer layouts in accordance with the following criteria:
 - a. Water and sewer mains will be placed under the paved section of the roadway within the area from back of curb to back of curb.
 - b. All water mains must maintain 3 feet horizontal clearance to dry utilities.
 - c. The water main and sewer main will run parallel to each other with 9 feet of separation to the pipes centerlines in order to maintain 6 feet of clearance at manholes. Lines may cross the street centerline.
 - d. Deflections in the water line shall be designed to nominal fitting angles within standard tolerances and will occur at the same locations where the sewer line is deflected.
8. Hydrants, meters, blow-offs and valves shall not be located in washes, detention areas, retention areas, driveways, or sidewalks.

Refer to Section 7-1.402 for related sewer criteria. The above criteria will be consistently and uniformly applied throughout each phase, parcel, or unit of a development.

- B. Water lines in commercial, multi-family and industrial developments should be located under driveway areas within a 20 feet wide water line easement. The easement shall not extend under parking areas or allow the encroachment of any permanent structures for maintenance purposes. In developments where other dry utilities, or private sewers are to occupy the same driveway, Plan Review may accept a 12 or 16 foot wide water line easement provided an adjacent public utility or access easement provides for a minimum 20 feet overall width.
Dry utilities and private sewers will not be allowed to run parallel within the easement.

DEAD-END LINES

Terminal water lines must comply with the following:

1. The maximum length for a dead-end water distribution line, 8 inch diameter to 12 inch diameter, will be 1,200 feet in length.
2. Dead-end lines 1,000 feet or less may be 6 inches minimum in diameter provided adequate pressure and fire flow rates are maintained.

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3. Dead-end lines for water transmission lines 16 inches and larger, exceeding 1,200 feet in length must be approved by the Water Resources Department.

Capped dead-end lines will be fitted with a flushing pipe per MAG Standard Detail No. 390, Type "B", a flushing assembly per COS Standard Detail No. 2383, or a fire hydrant to allow periodic flushing of the lines. Flushing devices shall not be located in washes, detention areas, retention areas, sidewalks, driveways, or paved areas.

Valves on dead-end lines that may be extended shall be provided with two full pipe lengths between the valve and the plug for lines larger than 12 inches and 1 full pipe length for lines smaller than 12 inches.

DESIGN FLOWS

The ultimate design flow within the city's water transmission and distribution system will be based on the city's current Integrated Water Master Plan. Water demand for each development will be calculated using the average day demands, as shown in Figure 6.1-2, to ensure that the existing distribution supply is sufficient. Designs will include all necessary improvements, including booster pumping stations, reservoirs, lines and appurtenances to meet the system's ultimate demand.

1. Hydraulic calculations will demonstrate that the system will provide both peak-hour demand and maximum-day demand including fire flow. The peaking factors are 2 times the average day for maximum day, and 3 1/2 times the average day for peak hour. These factors shall be appropriately increased for restaurants and high-demand water users.
2. The maximum allowable pipe head loss for transmission lines is 8 feet per 1,000 feet and 10 feet per 1,000 feet distribution lines.
3. Design flows for all distribution systems will be based upon flow and pressure of the existing system as documented by the engineer. Refer to Section 6-1.405.
4. Prior to acceptance by the city, all platted subdivisions will conduct an additional flow test at the lowest and highest elevation available in which the development is constructed.
5. Developments that cross pressure zone boundaries must conduct a flow test within each pressure zone.

FIRE HYDRANT FLOW TEST REQUIREMENTS

Pressure and available flow information for existing water lines must be obtained by having a flow test performed on the system. Flow tests are required for all commercial projects, multi-family residential projects and public extensions of the city's water distribution system. A private fire protection company will perform the tests and certify the results. An encroachment permit issued by the One Stop Shop is required for a flow test and the Inspection Services Division will be notified a minimum of 48 hours before performing the flow test. The permit is also available online through the city's website at www.ScottsdaleAZ.gov/bldgresources/counterresources.

Refer to www.ScottsdaleAZ.gov/bldgresources/forms for the flow test design form. The certified tests must be included in design reports or submitted along with the final plans

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to Plan Review should a design report not be necessary. Flow tests will be conducted during periods of high water use, such as 6:00 am to 8:00 am.

PRESSURE REQUIREMENTS

Pressure extremes in water systems result in the potential for contaminants to enter the network. Low pressures in the water system may allow polluted fluids to be forced into the system, and high pressures may cause ruptures or breaks in the network.

The static pressure in the distribution system shall not exceed 120 pounds per square inch (psi) and the system shall be designed to maintain a minimum residual pressure of 50 psi at the highest finished floor level to be served by system pressure under normal daily operating conditions. The system shall be designed to maintain 30 psi minimum pressure under design fire flow requirements, refer to Section 6-1.501. The 30 psi minimum pressure design requirement provides a 10 psi safety factor to account for aging infrastructure and flexibility in locating pressure zone boundaries.

All distribution water mains, appurtenances and service lines will be designed for a minimum normal internal working pressure of 150 psi plus allowance for water hammer. Working pressures for transmission lines must be verified with the Water Resources Department.

Water hammer may produce momentary pressures greatly in excess of normal static pressures, thus increasing the probability of water main failure. Suitable provisions must be made to protect the system from water hammer pressures. The occurrence and severity of water hammer can be reduced by using slow-closing valves, pressure-release valves, surge tanks, variable frequency drives, soft start motor controllers and air chambers. In cases where pressures exceed 120 psi or water hammer conditions are developed, all elements of the system will be designed accordingly.

PRESSURE REDUCING VALVES (PRVS) AND PRESSURE REGULATING VALVES

Approximate pressure zone boundaries and their respective elevations are shown in Figure 6.1-3. PRVs will be required when necessary to maintain pressure zones within the distribution system. Distribution systems will not be designed to operate at pressures in excess of 120 psi. PRVs shall be designed in accordance with COS Standard Detail No. 2342-1 and 2342-2 and the city's Design Standards Development for PRVs and AVs, available online.

A minimum of one PRV in each pressure zone will be designed with a high-pressure relief valve.

PRV vaults shall be located outside of paved areas generally adjacent to the back of curb or sidewalk. Vaults must be within the right-of-way or an easement and will be provided with unobstructed vehicular access. Curbs adjacent to vaults will be roll or mountable type. Site grading will route storm water and discharge water from relief valves away from

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6-1.407

the vault. Site design will consider the impacts of discharge water on downstream improvements. The location of pressure relief risers shall be shown on the final plans. The engineer shall specify on final plans, the size of the main line valve and bypass valve, the upstream system pressure, and the design downstream pressure setting. Where multiple PRVs supply a pressure zone, the engineer may request the Water Resources Department to consider eliminating the bypass valve where redundancy occurs.

The city operates its system from wells and pumps that commonly have pressures exceeding 80 psi. Changes in demand, supply and the operation of the distribution system also vary the pressure within the system. Therefore, the city requires all metered services to have a pressure-regulating valve installed on the private service line. Existing structures that are required to obtain a plumbing permit for home improvements are required to install a pressure regulating valve if one is not present. A written variance request may be submitted to the Water Resources Department for their review and concurrence or denial.

FITTINGS

No water line will be deflected either vertically or horizontally, in excess of that recommended by the manufacturer of the pipe or coupling or as stated in Section 6-1.402, without the appropriate use of bends or offsets. Fittings may be required where more than 2 pipe lengths are deflected.

The engineer is responsible for verifying the minimum distance necessary between taps and fittings for the type and diameter of pipe.

Tapping sleeves shall not be used on existing ACP or PVC pipe where the branch diameter is equivalent to the mainline diameter.

Fittings installed into ACP or PVC pipe within 6-feet of another fitting or joint will require that section of pipe to be removed and replaced with DIP.

Existing tees, tapping sleeves and related appurtenances that are not utilized by a development shall be removed by the contractor. A minimum 3-foot section of pipe shall be removed, with no less than 6 feet remaining to the nearest joint. The removed pipe shall be replaced with DIP.

SHUTOFF VALVES

Shutoff valves will be located such that closing no more than 4 valves can isolate any section of the system. Valves shall be installed on water mains at locations that allow sections of the system to be taken out of service for repairs or maintenance without significantly disrupting service in other areas. Consideration should be given to the number of fire hydrants taken out of service.

Maximum spacing of water distribution main isolation valves:

1. In commercial, multi-family, and industrial areas, valve spacing will not exceed 500 foot intervals.

6-1.408

6-1.409

WATER

2. In single-family residential and other areas, valve spacing cannot exceed 800 foot intervals, or 1 per block, whichever is less.

Maximum spacing of water transmission main isolation valves:

1. At every mile section line, install a cross with a valve on each leg of the cross.
2. Valves spacing between mile section lines will not exceed 1,320 feet unless otherwise allowed by the Water Resources Department.

Any design not complying with the above spacing requirements must be approved in writing by the Water Resources Department.

Tees shall have a valve on the lateral line, so the lateral can be taken out of service without interrupting the supply to other locations. At intersections of distribution mains, the required number of valves will normally be one less than the number of radiating mains. The non-valved branch should be the line that supplies flow to the intersection.

Install shutoff valves for new construction at the point of curvature of curb returns at street intersections, and aligned with a property line or a lot line at mid-block locations.

Provide valves to allow for isolation of lines crossing washes with a capacity exceeding 500 cfs, major and minor arterial roads, bridges, and locations where lines have been vertically deflected to cross other infrastructure.

Valves shall not be installed in sidewalks, curbs, crosswalks, multi-use paths, driveways or bicycle lanes.

Valves 12 inches or smaller are to be resilient wedge type. Valves 16 inches or larger shall be low torque resilient wedge or butterfly type. All valves 16 inches or larger shall have bypasses per COS Standard Detail No. 2361* unless otherwise approved by the Water Resources Department. The valve operators on butterfly valves 16 inches or larger in diameter shall be installed entirely with a manhole for repair or replacement. Configure entrances to manholes so that the internal valve parts can be serviced.

Manholes on water appurtenances shall be the hinged type frame and cover in accordance with COS MAG Supplement, Section 610.8.

Pressure rating on all valves will be equal to or greater than the pressure rating of adjacent pipe.

All valves require valve boxes installed per MAG Standard Detail No. 391-1, Type "C", with locking lids.

All valve frame and cover adjustments will be per COS Standard Detail No. 2270.

AIR RELEASE VALVES

6-1.410

- A. Air release valves will be installed at all changes in slope of water lines 8 inches or larger in diameter, as follows:
 - 1. When water line changes from a positive slope to a zero slope, or a negative slope in the primary direction of flow;
 - 2. When water line changes from a zero slope to a negative slope in a primary direction of flow;
 - 3. For vertical alignment changes to cross under or over another facility, such as utility, drainage washes, etc. Refer to COS Standard Detail No. 2370, and Sec. 6-1.415.
 - 4. Air release valves may be omitted if service taps or fire hydrant laterals are located to allow for the elimination of air.
 - 5. Slopes less than or equal to 0.002 ft/ft shall be treated as zero slopes. In the absence of any changes in slope, air release valves will be installed not more than 2,640 feet apart.
 - 6. All air release valves will be a combination air/vacuum release type per COS Standard Detail No. 2348.
- B. Air release valves will be installed on 6 inch water lines under the following circumstances:
 - 1. At the high point of the line if no lateral, fire hydrant, or water service connection is proposed at that location to adequately remove trapped air.
 - 2. Refer to COS Standard Detail No. 2370, and Section 6-1.415 for vertical separation and vertical alignment for crossing under or over another facility, such as utility, drainage washes, etc.
- C. Air release valves on lines 12 inches and smaller can be located in a manhole over the water line. Air release valves on lines 16 inches and larger will be located in an above-grade enclosure adjacent to the roadway where applicable. Locations for all valves and vent pipes must be shown on the final plans and will be within the rights-of-way, private street tract, or easement.

THRUST RESTRAINT

6-1.411

Pipeline thrust occurs at horizontal and vertical bends and lateral branches. Thrust blocks will not be allowed for new construction on the city’s water system unless approved in writing by the Water Resources Department. Thrust restraint shall be provided by:

- 1. Welded joints in steel pipelines.
- 2. Mechanical joints in concrete and ductile iron pipelines.
- 3. Locking gasket and ring systems acceptable to the Water Resources Department.

The determination of whether or not a given section of pipeline needs restrained joints, or other means of anchorage, shall be made by the engineer and reviewed by Plan Review. Design all thrust restraint for 1-1/2 times the static line pressure or 200 psi, whichever is greater. MAG Standard Detail No. 303-1 and 303-2 are acceptable means of joint restraint. The engineer shall consider the water pressures and soil bearing pressures assumed by the standard details. Where joint restraint is not proposed per MAG Standard Detail No. 303-1 and 303-2, the engineer will submit joint restrain calculations with the final plans for review and comment.

All restrained pipe lengths must be specified on the final plans or referenced to a standard detail.

ELECTRONIC MARKERS

Final plans shall call out electronic markers to indicate all horizontal changes in direction. Valve locations permit adequate identification of pipeline location (typically at crosses and tees) and do not require electronic markers. An electronic marker must be placed at the center of all fittings at a depth of 2 to 4 feet below finish grade per COS Standard Detail No. 2397.

Long, straight reaches of transmission mains will be marked every 1,320 feet with an electronic marker.

PIPE COVER

Cover or depth of bury for water mains will be measured from the proposed finished grade as follows:

1. For lines smaller than 12 inches in diameter, allow a minimum cover of 36 inches to the top of pipe unless otherwise approved by the Water Resources Department.
2. For lines 12 inches in diameter, allow a minimum cover of 48 inches over the top of pipe.
3. For lines larger than 12 inches in diameter, allow a minimum cover of 60 inches over the top of pipe.
4. For all lines within industrial zoned areas or under major roadways (collector, arterial, couplet, or parkway/expressway), allow a minimum of 60 inches over the top of the pipe.

If a water line is installed within an area to be filled at a later time, adequate pipe protection must be provided. This may include temporary berms or constructing the water line to a minimum cover below the existing grade. Concrete encasement of new water lines is prohibited unless approved by the Water Resources Department.

Caution should be taken in design and construction to protect all water supplies from wastewater contamination.

When more than 3 feet of existing polyvinyl chloride (PVC) or asbestos cement pipe (ACP) water lines are exposed during construction and the bedding is disturbed, the water line must be replaced with ductile iron pipe (minimum Class 350) with mechanical joints or flanged joints to 3 feet past the sides of the exposed crossing trench. Refer to MAG Standard Detail No. 403-3.

Hydrants that require adjustment as a result of improvements will be adjusted using a "GradeLok" or approved equal when vertical adjustment is in excess of 6 inches. Hydrants must have depth of burial of 3.5 feet per COS MAG Supplement, Sec. 610.8.

6-1.412

6-1.413

WASH CROSSING

6-1.414

All wash crossings will be constructed using restrained joint ductile iron pipe. Depth of 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. The additional depth of bury is in addition to the normal cover requirements described in Section 6.1-413.

100 YEAR FLOW RATE	ADDITIONAL DEPTH OF BURY
1 to 49 cfs	1 foot
50 to 99 cfs	2 feet
100 to 499 cfs	3 feet
more than 499 cfs	Scour depth based on scour analysis

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, or with less than the minimum required depth of bury as indicated above, must be protected by installing a cut-off wall per COS Standard Detail No. 2228 downstream of the pipeline to stabilize the scour depth. Plan Review will review protection requirements under these instances on a case-by-case basis. Cut-off walls will be structurally designed to the scour conditions calculated.

VERTICAL SEPARATIONS AND VERTICAL REALIGNMENTS

6-1.415

1. Vertical separation of water and sanitary sewer lines must be in compliance with COS Standard Detail No. 2401. Where conditions prevent adequate horizontal and vertical separation:
 - a. both the proposed water and sewer lines shall be constructed of ductile iron pipe (minimum Class 350) or,
 - b. where the existing water line is other than restrained ductile iron, the water line shall be replaced with restrained ductile iron pipe per MAG Standard Detail No. 404-2, and/or,
 - c. where the existing sewer line is other than restrained ductile iron, the sewer line shall be encased in concrete per MAG Standard Detail No. 404-3 or replaced between manholes with ductile iron pipe (minimum Class 350) with a cured-in-place liner.
2. Separation of water from electrical or gas lines will conform to COS Standard Detail No. 2372.
3. Water lines crossing over culverts and storm drains must maintain both a minimum of 12 inches vertical separation and the minimum depth of bury. If the design cannot provide these clearances, a vertical realignment is necessary.
4. For minimum clearance under culverts, storm drains, and other utilities, refer to COS Standard Detail No. 2370 and 2372. The vertical realignment shall be

constructed of ductile iron pipe and shall not be deflected or swept. Air release valves and isolation valves shall be installed as per the following:

- a. Install isolation valves on each side of the vertical realignment to minimize disruption of service should the crossing need to be isolated for maintenance or repair. Plan Review may consider the location of adjacent valves, fire hydrants, and water service lines to help minimize valves at vertical realignments.
- b. For dead-end water lines, place the required air release and isolation valves on both sides of the vertical realignment.
- c. For looped applications, install air release valves at a location calculated by the engineer to release any air trapped in the system.
- d. Do not place tees, fire hydrants, service lines, and other appurtenances within any portion of the vertical realignment unless approved in writing by Water Resources.
- e. Vertical realignments on existing waterlines shall minimize disruption to the distribution system. Prior to connecting with the existing main, vertical realignments over 25 feet in length will be constructed to a minimum 3 feet offset from the existing line and tested per MAG Sec. 610 COS Supplement Sec. 610. Use separate horizontal or vertical bends to change pipe alignment. Do not rotate fittings to accomplish combined vertical and horizontal deflections.

SERVICE LINES AND METERS

Buildings with mixed uses should consider a separate meter and be separately plumbed for each type of use. Scottsdale's sewer billing structure supports separate metering for each of the user codes described in City Code Sec. 49-141(g). In the event separate use metering is not provided, sewer billing will be applied at the higher use rate applicable to that building. Developers should consider the economic benefits of separate metering.

Basis of Design Reports shall utilize the demand rates and peaking factors shown in Figure 6.1-2 (or other acceptable source) and size the meter to the recommended maximum capacity as shown in Fig. 6.1-4. When evaluating fixture unit demand, as determined by the applicable plumbing code, the demand load shall not exceed the safe maximum capacity of the meter as shown in Fig. 6.1-4. The final meter size shall be the larger derived from the two methods of evaluating demand.

1. That portion of the water service from the water main up to, and including the meter is public and will be maintained by the city. That portion of the water service from the meter into the site is private and will be maintained by the property owner. Design of the private on-site portion of the water service will comply with the current Plumbing Code and shall include a pressure regulating valve.
2. Water service lines shall be 1 inch minimum unless prior approval is obtained from the Water Resources Department.
3. Due to the city's water billing rate structure, meter sizes shall not exceed the size of the service line (a 1-1/2 inch meter will not be allowed on 1 inch service). Extra attention is recommended when sizing services for custom home lots where demands occasionally necessitate meter sizes exceeding 1 inch.

6-1.416

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4. Residential service lines are necessary to meet domestic, fire, and irrigation demands. Residential fire sprinkler and irrigation demand is usually supplied through the domestic service line and meter. A 1 inch water service line that will exceed fifty feet in length (between the main and the meter) should be increased to a larger diameter service pipe to offset pressure losses to the fire sprinkler system. Commercial developments typically will use separate meters for building and landscape service, and provide separate lines for fire protection.
5. Each service line requires a separate tap to the public main. Connection of 2 or more meters in a manifold configuration is prohibited.
6. Installation of metered 1 inch to 2 inch water services will be in accordance with COS Standard Detail No. 2330. Installation of 3 inch to 6 inch metered services require a tee and shutoff valve, or tapping sleeve and valve on the public main per MAG Standard Detail No. 340 and 391-1, Type "C", and a meter vault in accordance with COS Standard Detail No. 2345.
7. Final plans will show locations of service lines and meters to each unit referenced with stations and dimensions, or offsets, from the street centerline or monument line. Service lines and meter boxes will be located within a public rights-of-way easement within a private street tract, or a utility easement. Meters are to be accessible to city workers and be located as close as possible to the water main.
8. Plans shall accurately show meter vaults to scale, clearly showing access covers and vaults for meters 3 inches and larger. Meters shall be located cross back through the right-of-way or easement with a service line. Water service lines and meters shall not be located in driveways, sidewalks, washes, or detention basins.
9. Water service lines on lots smaller than 1/2 acre will be located within 3 feet of the property line adjacent to adjoining parcel's water service line. Water service on lots 1/2 acre and larger will be located within the lower 1/3 of the property frontage to the water main, avoiding Natural Area Open Space (NAOS) and adjacent to the sewer service where practical.
10. Water services will be designed perpendicular to the main where possible. Lines shall be continuous from the main to the meter with no bends or joints. Water service lines will have 6 feet minimum horizontal separation from sanitary sewer service lines.
11. No service or fire line connections will be made directly to water lines 14 inches or larger in diameter or to water lines designed solely to transmit water from one pressure zone to another.
12. All galvanized iron and polyethylene water service lines in sizes 3/4 inch through 2 inch, which are exposed during construction, will be replaced in their entirety with Type "K" copper tubing. Copper service lines smaller than 1 inch exposed during construction shall be replaced in their entirety with 1 inch Type "K" copper tubing. This includes the replacement of iron service saddles with bronze saddles and replacement of both the corporation stop and meter stop.
13. Existing water and fire lines not used by a development shall be noted on the plans to be abandoned at the main by the contractor per Section 6-1.402.

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DISC METER SIZE	SAFE MAX. CAPACITY (GAL./MIN.)	SAFE MAX. CAPACITY (GAL./DAY)	RECOMMENDED MAX. CAPACITY (GAL./MIN.)	RECOMMENDED MAX. CAPACITY (GAL./DAY)
5/8	20	28,800	10	14,400
3/4	30	43,200	15	21,600
1	50	72,000	25	36,000
1 1/2	100	144,000	50	72,000
2	160	230,400	80	115,200
COMPOUND METER SIZE	SAFE MAX. CAPACITY (GAL./MIN.)	SAFE MAX. CAPACITY (GAL./DAY)	RECOMMENDED MAX. CAPACITY (GAL./MIN.)	RECOMMENDED MAX. CAPACITY (GAL./DAY)
3	320	460,800	160	230,400
4	500	720,000	250	360,000
6	1,000	1,440,000	500	720,000
TURBINE METER SIZE	SAFE MAX. CAPACITY (GAL./MIN.)	SAFE MAX. CAPACITY (GAL./DAY)	RECOMMENDED MAX. CAPACITY (GAL./MIN.)	RECOMMENDED MAX. CAPACITY (GAL./DAY)
3	350	504,000	180	259,200
4	1,000	1,440,000	500	720,000
6	2,000	2,880,000	1,000	1,440,000

FIGURE 6.1-4 METER CAPACITIES

BACKFLOW PREVENTION & CROSS CONNECTION CONTROL

6-1.417

All metered services within the city, other than single family residential, require the installation of an approved backflow prevention device immediately adjacent to the meter on private property unless approved otherwise by the Water Resources Department. To determine the type of backflow protection required for a specific use, refer to Scottsdale Revised Code, Chapter 49, Division 3 Backflow Prevention and Cross Connection Control. The back flow prevention valve and the meter will be of equal size, unless the engineer submits calculations with final plans demonstrating that losses through a smaller device do not adversely affect water pressure to the building.

For installation requirements refer to the current version of the COS Standard Detail No. 2351 through 2356. Backflow prevention devices are to be owned and maintained by the property owner.

1. All backflow prevention devices shall be shown to scale and stationed on the plans. The location of backflow preventers and the adjacent meter shall take into consideration

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opportunities to screen with landscaping or consolidate into common areas providing utility service to a building. Generally, backflow preventers shall not be located at:

- a. Entrances to buildings unless appropriately screened.
 - b. At locations where they interfere with opening car doors.
 - c. Areas of high visibility
2. Every effort must be made to locate the water meter and vault in an area that can accommodate a properly installed backflow assembly.
 3. When the location of a backflow preventer cannot be accommodated adjacent to the meter, the designer shall:
 - a. Request permission from the Water Resources Department to separate the meter from the backflow preventer.
 - b. Backfill the water line between the meter box and the backflow preventer with 1-sack controlled low strength material (CLSM) per MAG, Section 728. CLSM shall be placed to the full width of the trench and to 6 inches above top of pipe.
 - c. Note on the plans that inspection of the water piping connecting the meter to the backflow preventer be inspected by a city backflow prevention specialist prior to CLSM and backfill.

Fire lines require backflow prevention at either the vertical riser, or at the property line when permitted. Refer to Section 6-1.504, for additional information.

The city requires backflow prevention on temporary construction meters for all extensions of the water system per COS Standard Detail No. 2346. For additional information, contact the Water Resources for a backflow prevention specialist.

SAMPLING STATIONS

Water sampling stations are generally required in all new residential subdivisions consisting of twenty or more platted lots. Developers shall contact the Water Quality Division prior to the preliminary plat submittal for a determination. Sampling stations are to be located within the right-of-way, a private street tract, or utility easement at mid-street, 3 feet behind the sidewalk, along a property line extension.

Construction will be per COS Standard Detail No. 2349. Large developments constructed in phases will be required to install the sampling station on the first phase and each subsequent phase when the overall number of dwelling exceeds 300. Manufacturer of these sampling stations shall be "Koraleen," or approved equal, with a stainless steel ball valve.

TRACT AND EASEMENT REQUIREMENTS

Water lines outside of a public rights-of-way or a private street tract must be placed in a minimum 20-foot-wide easement located within a dedicated tract unless approved otherwise by the Water Resources Department. The easement may be a portion of a utility tract, drainage tract or open space tract.

6-1.418

6-1.419

Easements for transmission lines or water lines with cover in excess of the minimum requirements may require easements wider than 20 feet. These easement widths will be determined by the Water Resources Department to meet access and maintenance needs. Horizontally, a minimum of 6 feet is required between the water line and the edge of the easement.

The tract/easement shall be accessible from a public right-of-way. The easement will be free of obstructions, shall not be located in a fenced area, and shall be accessible at all times to city service equipment such as trucks and backhoes. Areas in question shall be approved in writing by the Water Resources Department. **Water Resources may approve gates or removable type fencing across the easement. In addition,** Plan Review will evaluate, on a case-by-case basis, situations where encroachment into the easement with structural improvements such as screen walls and paving cannot be avoided.

1. No water line will be installed in an easement outside of a tract unless the Water Resources Department has approved in writing the placement of the line in an easement and the property owner has granted the necessary easement to the city.
2. Water line easements outside of paved areas shall have a 10 foot wide hardened path with a cross-sectional slope not greater than 10% and a longitudinal slope not greater than 20%. Hardened paths shall consist of native soil compacted to 95% to a depth of 1 foot from the existing or design surface, whichever is lower. Revegetation within the easement shall consist of low growing shrubs or plant material acceptable to the Water Resources Department. Trees may be located along the edge of the easement but not within 7 feet of the water line as measured to the trunk of the tree. Attention shall be given to the aggressive nature of vegetation roots to prevent plants that may be harmful to water lines.
3. If access across a desert wash is not practical, the Water Resources Department may approve turn around areas at each side of the wash. Hammerhead turnaround configurations are acceptable allowing for turning movements of a full size pickup truck.
4. A copy of any written approval from the Water Resources Department shall be submitted with the final plans.

EASEMENT RELEASE/ABANDONMENT REQUIREMENTS

When a property owner or developer believes a water line easement, or portion thereof, is no longer required by the city, an abandonment may be requested by completing and filing an application through the city's One Stop Shop, www.ScottsdaleAZ.gov/bldgresources/counterresources.

After completing and filing the application, the property owner or developer shall send a letter or email requesting release of the easement to the Water Resources Department with the following exhibits attached:

1. A detailed map highlighting the easement to be abandoned and locations of any existing water lines shown in reference to the easement.
2. If existing water lines are to be abandoned, a detailed civil plan prepared by a professional engineer licensed in the State of Arizona must be supplied describing the method of abandonment and any necessary relocation of the water lines.

6-1.420

The Water Resources Department will issue a determination recommending approval or denial of the request along with any stipulations that may be required in conjunction with the abandonment.

The determination shall be attached to an Application for Release of Easement and must be submitted by the applicant to the One Stop Shop for subsequent processing by the city. Failure to comply with the above process will result in a denial of the request. Where replacement rights are requested by the city, the city will not relinquish existing rights until the replacement rights have been granted.

FIRE PROTECTION

It is the intent of the COS Fire Department to establish requirements consistent with nationally recognized practices for safeguarding life and property from hazards of fire and explosion arising from the storage, handling and use of hazardous substances, materials and devices, and from conditions hazardous to life and property arising from the use or occupancy of buildings or premises.

For complete Fire Department related issues, refer to Chapter 11.

A. Ordinance Requirements

For information related to the current adopted plumbing and fire codes (**remove typo "r"**) the Scottsdale Revised Code, www.ScottsdaleAZ.gov/codes/fireord. For Fire Code Adoptions refer to Chapter 36, and Chapter 31 for Building and other related code adoptions.

B. Design Policy

If the property is to be supplied with domestic service and with fire flows from a storage tank or facility, the engineer must provide a report indicating that sufficient volumes exist, as required by the Fire Department, and are available to meet the calculated fire demands as defined by the engineer.

Attention will be given to the fire hydrant locations on final plans for infrastructure where future building locations are not identified. Final building location and floor may necessitate the addition of another water line, fire hydrant, and/or fire pump to serve that structure after the city has accepted the system. Compliance with the fire hydrant spacing and pressure requirements are the responsibility of the party requesting a building permit, as these requirements are a condition of that property's development.

FIRE FLOW REQUIREMENTS

Water distribution facilities shall be sized to deliver:

1. A minimum of 500 gallons per minute (gpm) for single and two-family residential properties with interior fire sprinkler systems.
2. A minimum of 1,000 gpm for single-family residential properties located outside of the city.
3. A minimum of 1,500 gpm for commercial, industrial and multi-family residential properties with interior fire sprinkler systems.

6-1.500

6-1.501

4. A minimum of 2,500 gpm for high-rise structures to account for potential firefighting activities.

The minimum fire flow requirements for residential and commercial buildings with interior sprinkler systems are based on Scottsdale Revised Code, Section 36 - 41. Refer to Appendix B of the International Fire Code, latest edition, for fire flow requirements in excess of the minimum requirements stated above.

Note: developments with single and two-family dwellings larger than 3,600 square feet will generally require a fire flow larger than the minimum stated above.

HYDRANT LOCATIONS

The spacing of fire hydrants is to be measured along the street or roadway in which a fire hose would be laid. Generally, this spacing is measured along the curb line and shall be inclusive of the distance along a private driveway to the proposed structure.

The Fire Department will stipulate fire hydrant locations during the site planning process or on the final plans review. The following standards shall be used as a guide:

1. The spacing of the fire hydrants in developments consisting of lots with detached single-family residences on each lot must be no more than 1,200 feet on center when street grade is less than 9%, and no greater than 600 feet on center when street grade is greater than 9%. When a cul-de-sac is greater than 600 feet in length, an additional fire hydrant must be installed. A residential structure must be located within 600 feet of a fire hydrant as measured along the streets and driveways. Additional hydrants and attention to the spacing may be required to meet the distances above for large lots including, but not limited to, those areas zoned R1-18 (18,000 square feet) or greater.
2. The spacing of fire hydrants in commercial and industrial areas and in attached multi-family residential developments, such as apartments and condominiums, must be no greater than 700 feet. This spacing applies to interior, on-site fire lane locations for hydrants, as well as to locations along public rights-of-way or private street tracts. A structure in this category must be located within 600 feet of a fire hydrant as measured along the accessible fire routes.
3. The spacing of the fire hydrants in the county must be no more than 660 feet. No structures shall be located more than 330 feet from a fire hydrant, as measured along the rights-of-way, private street tract or utility easement.
4. A 6 inch fire hydrant lateral shall not be tapped for fire sprinkler supply lines.
5. Auxiliary fire hydrant valves must be connected to the main water line by a flanged tee.

For more information contact Fire Department Plan Review at 480-312-7080, or visit the COS Fire & Life Safety webpage, www.ScottsdaleAZ.gov/bldgresources/planreview.

PAVEMENT MARKERS

Two-way, reflective blue, raised pavement markers must be provided to identify the location of fire hydrants and remote fire department connections in accordance with COS Standard Detail No. 2363*. These markers are readily available from businesses providing highway marker materials.

6-1.502

6-1.503

FIRE LINES AND BUILDING SPRINKLER LINES

6-1.504

1. Determine the location of on-site fire lines and taps by the site relationship of the fire department connection, riser location, emergency access and fire hydrant locations.
2. Projects within 1700 feet of a canal or open body of water will require a backflow assembly in accordance with American Water Works Association Manual M14, Second Edition. Uses permitting a double check valve assembly may incorporate the valve into the fire riser. Uses requiring a reduced pressure principle assembly shall place the valve at the edge of the right-of-way or easement adjacent to the connection with a public water line. For specific project information, contact 480-312-7000.
3. Determine the size of fire lines from the flow test data provided by the engineer for design of the project. Fire systems must include a city approved backflow prevention device. An approved, vertically mounted backflow prevention device located on the building riser is preferred by the Fire Department.
4. Show all fire lines on the civil site final plans.
5. Fire lines shall not be connected to 14 inches or larger transmission lines.
6. Installation of 1½ to 2 inch fire service lines use a saddle connection per COS Standard Detail No. 2362-1, and installation of 3 inch and larger fire service lines use a tee and valve per COS Standard Detail No. 2362-2. Meters are not required on services used solely for fire sprinkler systems.
7. Fire service lines shall be installed perpendicular or radial to the main line within the right-of-way or easement.
8. All on-site fire line construction shall comply with the MAG Standard Specifications and Details and the COS Supplements thereto.

BUILDING SPRINKLER SYSTEM REQUIREMENTS

6-1.505

The following are structures that require building sprinkler systems:

1. All new commercial or industrial buildings (including basements).
2. All multi-family residential structures (apartments, condominiums and time-share developments, etc.).
3. All parking area structures (underground or aboveground).
4. All single-family residences constructed after January 1, 1986.

SPRINKLER SYSTEM DESIGN

6-1.506

Base building sprinkler system design on a certified flow test. A copy of the flow test shall be submitted with the improvement plans or shop drawings for city review. The drawings will be of uniform size (24 inch by 36 inch, or 30 inch by 42 inch) and drawn to scale. One set of the approved civil water final plans need to accompany these submittals. Also include on the working drawings any applicable City of Scottsdale and International Fire Code construction notes. The building sprinkler contractor shall submit 3 sets of shop drawings and a minimum of one set of calculations and supporting documents to the One Stop Shop for review by the Fire Department.

Include the following note on the final plans:

Installation will be per approved final plans. Any deviation from approved final plans will require written permission of the authority having jurisdiction.

The professional registrant in charge or fire code official may require a technical opinion and report prepared by a qualified party, and/or a professional registrant activities report containing all professional registrant duties as assigned by the State Board of Technical Registration with seal and signature of an Arizona Registrant, who is qualified in fire sprinkler design to accompany the plan submittal.

The professional registrant in charge is responsible to coordinate deferred submittals, professional registrant activities, technical assistance reports, modifications, alternative materials and methods, and to determine that the deferred submittal documents are in general conformance to the design of the building.

Inspections will be per National Fire Protection Association Standards (NFPA) 24 and as required by the Fire Department.

FIRE DEPARTMENT CONNECTION

If a remote Fire Department connection for a sprinkler system is required, it must be installed between 4 and 8 feet from the back of curb of a public or private roadway, on-site driveway or sidewalk. The location of the sprinkler system connection must be unobstructed and readily accessible to the Fire Department. Refer to the standard details in COS Interpretations and Applications of NFPA 13, 13R, 13D current adopted edition and COS Standard Detail No. 2367. This connection must also be within an appropriate distance of a fire hydrant as determined by the Fire Department, refer to www.ScottsdaleAZgov/codes/fireord.

Fire Department connections, whether remote or wall mounted, need to be identified and coordinated on the improvement plans and on the building plans site plan for relationship to fire lanes and fire hydrants. All Fire Department connections must be appropriately clear of glazing and other hazards and protected from vehicular damage. Refer to Scottsdale Revised Code. www.ScottsdaleAZ.gov/code/fireord.

Pavement markers for Fire Department sprinkler system connections must be provided as shown in COS Standard Detail No. 2363*.

AUXILIARY STORAGE TANKS

Water pressures and discharge flow required by the Fire Department will be for a minimum of 2 hours for commercial projects. A fire pump package installation may be required when the building's construction type, occupancy fire load commodities' classification, volumetric building areas, building height, and individual square footage areas per floor level produce a pressurized fire flow demand in excess of the water transmission mains capabilities.

6-1.507

6-1.508

For residential sprinkler requirements, refer to the Scottsdale Interpretations and Applications of NFPA 13, 13R, 13D current adopted edition and www.ScottsdaleAZ.gov/codes/fireord.

FINAL PLANS PREPARATION

General requirements for the preparation of final plans in the City of Scottsdale are described in the Construction Plan Submittal Requirements in Section 1-2.100. The following information is required, in addition to the items noted in Section 1-1.000.

A. Ordinance Requirements

Upon development of the property for which city water service is desired and available, the developer will submit a plan for the water system prepared by a professional engineer licensed in the State of Arizona.

B. Design Policy

Any variance to these standards will require written approval from Water Resources.

6-1.600

GENERAL REQUIREMENTS

All extensions of the distribution system require pressure and flow testing. Include the results of the testing on the final plans cover sheet.

When a water line is to be connected to an existing system, the following note shall be placed on the final plans:

Contractor shall verify the location of the existing water line and type of material before proceeding with trenching.

6-1.601

SPECIFIC WATER PLAN REQUIREMENTS

For transmission and distribution lines, submit the following for city approval:

1. For permitting purposes, include quantities on the cover sheet of the final plans for all items of work within the public rights-of-way, private street tract and public easements. The engineer will submit an estimate of probable cost for any pressure reducing valve assemblies to establish those permit inspection fees.
2. Station water lines along the centerline of the street or the pipe. Profile all water lines 12 inches and larger with line gradients and elevations, showing in profile the finish ground elevations over the water line where the water line is constructed outside of paving, or show in profile the finish pavement design elevations where the water line is constructed under paving.
3. Where water lines cross sewer lines, storm drains or drainage culverts show the relationship in both plan and profile with minimum clearances dimensioned. Identify all pipes, valves and appurtenances, etc.
4. Identify water line service locations with a meter station and offset.
5. Show meters to scale.
6. Drawings shall show all utility locations, sizes, easements, rights-of-way and other structural features of the water line. Note pressure reducing valve settings and sizes on the plan.

6-1.602

7. Show in plan view all easements, including the county recording numbers.

All construction documents will be prepared by a registered professional civil engineer licensed in the State of Arizona under the provisions of ARS 32:141-145.

Booster Pump Stations and Reservoirs require separate plans submittals.

REVIEWS AND APPROVALS

All final plans that include connection to or extension of the city’s water system, or on a system that is to be dedicated to the city, must be submitted to the One Stop Shop for review and approval. Plan review fees must be paid at the time of plan submittal. No final plans will be submitted to the city unless accompanied by a copy of the fire flow test results, or, when stipulated, the accepted basis of design report.

Maricopa County Environmental Services Department approval is required, prior to approval of final plans by Plan Review Services, when extension of the public water system is proposed. No permits for public water line construction will be issued until the owner or developer has provided the necessary easements or right-of-way. The instruments of dedication must be approved and submitted to the city for recording at the Maricopa County Recorder’s Office.

AS-BUILT DRAWINGS

At a minimum, record drawings shall represent the as-constructed information noted in Section 6-1.602.

Plans information, changed or unchanged, shall be noted with a bold A.B. lettered next to the item. Lettering shall be legible and a minimum 1/8 inch height
The pipe material installed shall be indicated in both plan and profile. Any pipes, conduits or structures abandoned, removed, or discovered during construction shall be shown and noted as such.

6-1.603

6-1.700