–ARTICLE 4/ WATER

SECTIONSection 4.1 INTRODUCTION

4.1.1 ———PURPOSE

A. ——The purposegoal of this the Water System Planning and Design Article is to provide technical management, comprehensive planning, and sound engineering to expand and maintain a reliable and safe water supply, distribution, and storage system. Engineering standards, guidelines, and geometric requirements for the design and construction of the public water system and maintain a reliable and safe water supply, distribution, and storage systemimprovements within the City of Prescott (COP), the Town of Prescott Valley (TOPV), and the Town of Chino Valley (TOCV). Adherence to these standards will result in reliable waterhigh-quality customer service and fire protection capabilities. This

B. ——Alterations or modifications to the standards of this section shall be through the procedure described in Article is complimentary and supplemental to the Quad City Standard Details (QCSD), Prescott City Code (PCC): Title 2, Chapter 1 Public Works Department, Title 10 Land Development Code (LDC), and Title 16 Street and Utility and Drainage Requirements, and all other Articles of the General Engineering Standards (GES), the Town of Prescott Valley Town Code, specifically Chapter 9 – Health and Sanitation and Chapter 16 – Engineering, and the Town of Chino Valley Town Code. of this document.

4.1.2 ———APPLICABILITY

A. ——The standards and guidelines of this Article shall apply to the construction, modification, replacement, and extension of all water distribution mains, pump stations, and other appurtenances as well as any modification of the public water system to be owned, operated, and maintained, by the City of Prescott, Town of Prescott Valley, or Town of Chino Valley (Agency). (COP). Privately funded water mains that are proposed to be connected to the Agency'sCity of Prescott's system are reviewed for compliance with Agency City of Prescott standards. Private water mains shall be extended to new users in a logical and cost-effective manner without adversely affecting existing customers and system performance. This Article is intended for use in plan design, preparation, and review processes. The information provided in this Article is not intended to cover all situations that arise, nor may it be a substitute for sound engineering principles and judgment. process.

B. ——Developers are required to install all improvements necessary, including off-site improvements to provide water service for domestic and fire fighting purposes to their development. This includes any water distribution mains, pump stations, or other facilities, and all required appurtenances, including the payment of all applicable development fees. Developers shall also adhere to the Agency standards for extension of the Agency's water system to newly developed areas, subdivisions, and in-fill areas inside the Agency's service area in accordance with the Agency Water Model.Prescott City Code (PCC), this Article, and the most current water and wastewater model study.

4.1.3 ———DESIGN STANDARDS AND GUIDELINES

A. New public and private water supply distribution and storage facilities shall be designed in accordance with Article 1 and Article 4.

B. A civil engineer registered in the State of Arizona shall analyze, design, and seal all proposed water system project plans and specifications. that are determined by the City Engineer to have an impact on the water distribution system. The effects of peak and fire flow demands shall be examined to ensure proper sizing and layout of proposed water system facilities, including impacts to existing off-site facilities where deemed appropriate by the City/Town Engineer.

A. C. The operation, maintenance, and repair of private water systems are the responsibility of the water service provider (provider). Water Service Provider (Provider). The provider Provider shall pay the cost for the operation, maintenance, repair, and replacement of private systems. These private systems are connected to main lines operated by the Agency City of Prescott, as identified on the final approved plans. The Agency City of Prescott shall have no obligation or requirement to assist or provide labor or equipment to perform or supplement any responsibilities pertaining to said private water systems, all of which are those of the provider.

For private water systems, the Provider. The Provider shall provide, on a yearly basis, shall submit the firm, contact name, business phone number, and emergency phone number for the private system operator, who shall be certified by the Arizona Department of Environmental Quality (ADEQ) at the required level. All private water systems connected to the Agency's water system, even if not required by ADEQ to have an onsite operator, shall be subject to the applicable Articles of the Quad City General Engineering Standards (GES). at the required level.

D. All components and related appurtenances for construction and repair of water infrastructure shall be domestically manufactured, certified, and submitted to the Agency City for review and approval prior to installation.

4.1.4 STATE AND LOCAL REGULATIONS

A. Arizona Department of Water Resources (ADWR)

ADWR regulations are contained within Arizona Revised Statutes (A.R.S.), Title. § 45 – Waters. They and they encompass requirements for water supplies and the management thereof. In 1999, the Prescott Active Management Area (PrAMA) was declared to be out of "safe-yield" which", this enacted more regulations including the Assured Water Supply (AWS) rules. For the COP City, this resulted in a Decision and Order of AWS. All new water connections made to the COP's City's system require the confirmation that the supply exists and that there is entitlement to it.

For the TOPV, the same statutory requirements apply, yet the TOPV meets assured water supply rules by developers providing certificates of assured water supply (CAWS).

B. Arizona Department of Environmental Quality (ADEQ)

ADEQ's Engineering Manual Bulletins Bulletin No. 8 "Disinfection of Water Systems" and No. 10, "Guidelines for the Construction of Water Systems" and the Arizona Administrative Code (AAC), , "Title 18-5-505.B - Approval to Construct," contain specific requirements for submittals, approvals, and notifications when extension of a public water main is proposed. The developer and the Engineer of Record (EOR) are expected to be aware of

and comply with the above referenced regulations. Additional information can be found on the ADEQ website at www.azdeq.gov/. www.azdeq.gov/

1. Yavapai County Environmental Services Department (YCESD)

Before civil infrastructure construction permits are issued, the developer shall submit to the City/Town Engineer an Approval to Construct (ATC) from ADEQ through their delegateor the local delegated authority.

2. Prior to the City/Town Engineer issuing an Approval to Operate (ATO) and release from the AgencyCity of Prescott, the developer shall deliver to the City a signed Approval of Construction (AOC) from ADEQ or the local delegated authority.

C. Yavapai County Environmental Services Department (YCESD)

Agency: A1. Before civil infrastructure construction permits are issued, the developer shall submit to the City Engineer an Approval to Construct (ATC) from ADEQ through the YCESD delegation.

2. Prior to the City Engineer issuing an Approval to Operate (ATO) and release from the City of Prescott, the developer shall deliver to the City a signed Approval of Construction (AOC) from ADEQ through the YCESD delegation.

D. Agency Approval (City of Prescott, Town of Prescott Valley, or Town of Chino Valley) (COP)

1. Issuance of an Approval to Construct by YCEDSYCESD or ADEQ does not constitute an approval of plans and reports by the Agency.City of Prescott. No construction shall commence prior to the AgencyCity of Prescott City Engineer issuing a permit.

1. 2. An as-built plan submittal is required prior to receiving an "Approval to Operate and Release from the Agency. As-built submittals shall be in accordance with Article 10.

In the COP, a Contractor/Developer may need to energize water mains or set a water meter for fire, life or safety purposes, prior to the COP's final acceptance of the sitework. In these cases, the COP, at its discretion, may offer an Extension Agreement. The Extension Agreement affords the Contractor/Developer an additional three (3) month period to complete the sitework and provide the COP with required documentation. During this time, the Contractor/Developer must make every effort to complete" from the work and provide the documentation for final acceptance of the site. If the work is not completed to the COP's satisfaction by the end of the agreement, the COP, at its discretion, may shut off water and remove the water meter. When ADEQ Water and Sewer approvals are required, Extension Agreements shall not be issued until ADEQ approvals have been received and accepted by the COPCity of Prescott.

SECTIONSection 4.2 GENERAL INFORMATION

4.2.1 WATER AVAILABILITY

A. Prescott Active Management Area (PrAMA)

The Agencies areCity of Prescott is located within the Prescott Active Management Area (PrAMA), established under the Arizona Groundwater Code of 1980 (A.R.S., Title. § 45). Water The City and other water providers in

the PrAMAAMA are required to follow Arizona Revised Statutes (A.R.S.) and Arizona Administrative Codes.state laws and the water management plans (MP) specific to the AMA. State statute identifiesoutlines five (5) water management planMPs, they are issued for ten (10) year periods for initial Active Management Area (AMA)'s, PrAMA included. The starting in 1980; the fifth management plan for each initial AMA was adopted in 2022, and the conservation requirements in those plans and final MP will become effective on January 1,be 2020 to 2025. Pursuant to A.R.S. §45-568(C), these will remain in effect "until the legislature determines otherwise."

B. Water Service Area

The Agency'sCity of Prescott water service area is located within the PrAMA. The City of Prescott water service area accounts for approximately ten (10%) percent of the land within the PrAMA and includes the cityCity limits of Prescott, town limits of Prescott Valley, town limits of Chino Valley, certain surrounding areas of the unincorporated part of Yavapai County, portions of Chino Valley, and the Yavapai-Prescott Indian Tribe Reservation. All water service is subject to water contracts or settlements and known under theа general termsterm of water service agreements.

C. Private Water Companies and Water Districts

1. Within the Agency'sCity's water service area, there are private water companies and water districts using water from their own sources or master metered by the AgencyCity of Prescott (all are documented with ADWR). These include Home Owners Associations (HOA), Limited Liability Companies (LLC),) or other entities established to provide ownership, operation, and maintenance responsibilities.

2. Proposed private water mains located within the Agency's right-City of-way (ROW) Prescott's rights-of-ways or easement shalleasements will require an agreement between the AgencyCity of Prescott and the private water company delineating liability and maintenance responsibilities. Private water line design and materials shall comply with the GES and QCSDsCity of Prescott, General Engineering Standards.

3. Private water companies shall review and approve the construction of, and modification to, water systems within their franchise areas. The developer shallwill submit to the AgencyCity Engineer written documentation that the private water company has approved facilities shown on the final plans before the AgencyCity of Prescott grants approval of the project.

4. The AgencyCity Engineer shall review development plans, which contemplate new water demands, prior to construction. The AgencyCity of Prescott cannot provide water service within private water company, franchise areas. If the work occurswill occur within the Agency's ROW or easementCity of Prescott's rights-of-way, easements, or the private system connects to the Agency'sCity of Prescott public water system, then plans shall be reviewed by the AgencyCity and meet AgencyCity standards, as outlined in Prescott City Code (PCC) and this Article. In cases where the AgencyCity of Prescott reviews private water systems, the applicable review fees shall be paid. A note shallwill be placed on the final construction and as-built plans stating that the operation and maintenance of private main lines and appurtenances is not the responsibility of the Agency.City of Prescott. Additionally, the establishment of Conditions, Covenants, and Restrictions (CCR) and/or a Limited Liability Company (an LLC) or Home Owner's Association (HOA) shall be required in accordance with AgencyPrescott City Code. (PCC). The responsibility to blue stake water mains within a private district shall lie with the private entity.

4.2.2 AGREEMENTS

COPD. Water Service Agreement

1. All new water connections made to the COP's City's system require the confirmation that the supply exists and that there is entitlement to it. The COP's City's Decision and Order is the document that outlines the supplies while Prescott City Code (PCC)s and the Water Management Policy outline the rules and policies for water service. Developers making application for a Water Service Agreement (WSA) application are encouraged to meet with staff prior to applyingapplication due to the complexity of the issues related to the allocation of water.

2. An application and fee shall be required for all WSAwater service agreement requests. These may be found on the COP's City of Prescott website at www.prescott-az.gov/documents.www.prescott-az.gov/documents/.

A. TOPV Water Service Connection

1. All new water connections made to the TOPV's system require the confirmation that the supply exists and that there is entitlement to it. Developers applying for new water service connections for their subdivision are required to apply for a certificate of assured water supply CAWS through ADWR. Multi-family and commercial site developers are encouraged to meet with staff prior to application due to the complexity of the issues related to the availability of water.

2. An application and fee shall be required for all water service connection requests. These may be found on the TOPV's website at https://www.prescottvalley-az.gov/DocumentCenter/.

B. Reimbursement District Agreement

~~4.2.2 AGREEMENTS~~

Developers and property owners who install improvements to the public water system may be eligible to request the formation of a reimbursement district allowing for partial reimbursement of costs to design and construct the improvements. Agency may haveThe City of Prescott has specific reimbursement district criteria for developers or property owners that allow them to collect main reimbursement charges and compensation for the cost of oversizingover sizing or extending water mains in accordance with Agency, refer to Prescott City Code (PCC), Section 2-1-10.

PCC **Section** 2-1-10
TOPV Town Code Article 9-05a

SECTION 4.3 PLAN SUBMITTAL REQUIREMENTS

Improvement plans submitted to the AgencyCity of Prescott for approval shall adhere to professional engineering standards governed by the State of Arizona Board of Technical Registration. Improvement plans shall be complete

and shall comply with AgencyCity of Prescott and State Board requirements. Improvement plans that do not meet industry standards or are incomplete shall be returned by the AgencyCity of Prescott without review comments and shall be determined to be an incomplete project submittal. Repetitive submittals of non-compliant and incomplete improvement documents may be subject to State of Arizona Board of Technical Registration review.

SECTIONSection 4.4 WATER SYSTEM REPORTS

4.4.1 GENERAL INFORMATION

A. All projects shall be required to submit a Water Master Plan Report and/or a Water System Design Report. The purpose of these reports is to provide the AgencyCity of Prescott with information regarding the potential water demands of the project and verify the capability of the AgencyCity of Prescott to provide the domestic water use and fire flow demands that will be required.

B. All Water System Reports shall be prepared under the direction of a licensed civil engineer in the State of Arizona. The report shall be sealed and signed by the EOREngineer of Record in accordance with the requirements of the State of Arizona Board of Technical Registration, and submitted to the City/Town Engineer.

C. Reports shall provide an analysis of the impact that a development will have on the Agency'sCity of Prescott's water system. The objectives of the Water Reports are to verify the water demand and, the system's ability to supply and maintain sufficient fire flow. Demands will be based on the Agency's most recently adopted International Fire Code (IFC), sprinkler flow/hose stream allowance andflows, and the available system flows, pressures, and proposed hydraulic regimes. All reports submitted to the AgencyCity of Prescott for review shall be prepared in accordance with Article 1, Section 1.3, in addition to the the following guidelines:

1. Format:

a. The report and all supporting or supplemental material shall be PDF documents withon letter-sized, paper eight and one-a half inches by eleven inches (8.5" x ½" X 11") inch pages.

b. All reports shall have a table of contents, including page numbers.

a. Larger exhibits or maps shall be provided in PDF format at their full size, generated from the original drawing files.

c. Maps and other supporting materials larger than folded ledger size paper eleven inches by seventeen inches (11" X 17") shall be placed into sleeves as an appendix to the report

d. A civil engineer licensed to practice in the State of Arizona shall seal each report in accordance with

e. The project name shall be located on the requirements of the State Board of Technical Registration. cover

b. The report cover shall contain the following:

1) Project Name

2) Project Location

f. The name, address, and phone number of the developer/owner and the EOR. Engineer of Record shall be stated on the cover

g. The original submittal date and all subsequent revision dates. shall be located on the cover

h. Common spreadsheet formats shall be compatible with Microsoft MS Excel.

2. Existing Conditions:

a. Reference any existing master plans or design reports applicable to adjacent development.

b. Include excerpts from existing plans or reports as applicable.

c. Indicate the dates, times and results of certified flow testing of the existing water system.

d. Include a description based on all parts or reference within a platted development.

e. Describe the existing topography, and landform features.

f. Include the location and description of existing utilities in the vicinity.

~~g.~~ Describe the existing and proposed site zoning and land uses.

~~h.~~ Include reference to elements of the Agency's~~City of Prescott's~~ General Plan and identify any designated character area or studies that will affect the project's design.

3. ~~.~~ Proposed Conditions:

~~a.~~ Summarize the proposed development. Include a site plan that indicates the layout of the proposed development with a survey, a minimum of one-hundred (100') feet beyond the project limits, or as determined by the City/Town Engineer.

~~b.~~ Identify the location and size of all proposed connection(s) to the Agency's~~City of Prescott's~~ water system.

~~1)~~ Show all looping and/or extension of water mains into the site.

~~2)~~ Indicate the location of all pressure zone boundary lines.

~~c.~~ Provide a looped system for all water supply demands needed to meet the minimum requirements of the Fire Department, maintain water quality standards, and maintain system redundancy for operational flexibility. For new subdivisions or phases, this would translate to a minimum of two connections off the existing system. Single feeds are not permitted unless otherwise approved by City/Town Engineer.

~~d.~~ Reference which water zone the site is within and address all required fire flows and system pressures.

~~e.~~ Address any maintenance responsibilities of the proposed water system.

4. ~~.~~ Mapping:

~~a.~~ All mapping shall conform to Agency~~City of Prescott~~ adopted CADD standards and the GES Article 8, Survey Controls.

~~b.~~ The project name shall be located on each sheet.

c. The name, address, and phone number of the developer/owner and EOR Engineer of Record shall be stated on each sheet.

d. The original submittal date and all subsequent revision dates shall be located on each sheet. the exhibits

e. All maps shall be prepared to an appropriate scale that is sufficient to show all required information clearly. legible

f. All proposed or existing on-site and off-site facilities including, but not limited to, pump stations, transmission and distribution mains, and reservoirs shall be shown.

g. All proposed or existing street locations, parcel boundaries, and proposed lots within each parcel. All property

a. h. Label contour lines, ROW, tracts, and easement lines shall be clearly labeled.

Contour lines shall have a maximum of at two (2') foot intervals and ten (10') foot labels.

i. Indicate pressure zone boundaries, pressure-reducing valves (PRV PRV'S), and corresponding zone valves.

j. Include size and pressure settings for all PRVs. pressure reducing valves (PRV).

k. Include a small vicinity and a more detailed location map showing the general location of the project with major arterial existing and proposed streets labeled along with geographic orientation to a distance of one (1) mile from the exterior boundaries of the project.

b. Graphics shall present existing utilities as dashed lines and proposed utilities as bold, solid lines.

4.4.2 WATER MASTER PLAN REPORT CONTENT

A. When phasing is contemplated or when required by the City/Town Engineer, a Water Master Plan Report shall be prepared in accordance with the requirements in Section 4.4.1. of the General Engineering Standards (GES), Section 4.4. The report shall also address, but not be limited to the following:

1. The report shall specify the terms and requirements for water service to the development, including any off-site improvements.

2. All development project owners shall be responsible for determining their specific water system needs between interim and build-out.buildout

a. Include the projections for future surrounding developments based on the adopted General Plan Land Use Map to ensure there is no adverse impact on the system.

3. A computer water network model, which is compliant with Section 4.4.4the GES Section 4.4.4 shall be used for the analysis of pressure and flow within the distribution system, verifying that adequate pressures, domestic and fire flows will be available within the proposed development based on projected demands and shall include the following:

a. If certified flow tests performed on the system during peak demand to which the project is to be connected do not show that sufficient capacity exists, the computer model shallwill be used to determine the required on-site and off-site facilities, such as pump stations and pipelines, necessary to serve the project.

b. If the proposed development requires a change in zoning that increases density or proposes a water system different from the Agency'sCity of Prescott's Water Master Plan, then additional upstream and downstream off-site analysis shallwill be required.

c. Modification of existing or creation of new pressure zones shall require approval of the City/Town Engineer.

4. Master plan mapping shall demonstrate the following:

a. Demonstrate compliance with the Agency'sCity of Prescott's Water Model, which encompasses the respective area.

b. Master planned developments that design a distribution system that will be phased shall provide a synopsis of the phasing with modeling backup to the COP Public Works Department or TOPV Utilities Department, as applicable, prior to acceptance of the development'sdevelopments Water Master Plan.

c. Each phase of the master plan shall must be a standalone document when submitted to the Agency City of Prescott for review of that specific phase.

4.4.3 WATER DESIGN REPORT CONTENT

A. A Water Design Report shall be prepared in accordance with the requirements of Section 4.4.1. the General Engineering Standards (GES) Section 4.4.1.

B. The system design shall comply with the Arizona Department of Environmental Quality (ADEQ), Engineering Manual Bulletin No. 10, American Water Works Association (AWWA) 10 and the Arizona Administrative Code (AAC) R18-5 requirements for system performance and redundancy. The developer shall coordinate water system improvements with the Agency's Water Model City of Prescott water model and the Capital Improvement Plan.

C. In addition to the general requirements in Sections 4.3.1 the GES Section 4.3.1 and 4.4.1, 4.4.1, the Water Design Report shall, at a minimum, include the following:

1. Design Documentation

a. Note the design compliance with the latest revision of this manual and all other applicable design standards and codes.

b. Include a narrative of which design procedures, policies and methodologies will be incorporated into the design engineering of the water system.

c. List the title and version of any software used in the design analysis.

2. A summary of the anticipated water demands for the project:

a. The priority of obtaining water design flows for a non-residential facility is:, 1) flow measurements from the actual facility; 2) the use of flows from similar facilities in the immediate area; 3) the use of similar flows from similar facilities in other areas; and 4) flow tables as listed in Table 4-1. the GES, Article 4, Table 4-1

b. Flows may be calculated on a sub-area basis, however, total flows for the entire development shall also be provided.

c. Flow rates shall include average day, maximum day, peak hour flows, and fire demand.flow demands

a. Fire Flow shall be defined as the flow rate of a water supply, measured while maintaining 20 psi system residual pressure, that is available for fire fighting.
b. Fire Demand shall be defined as the greater water demand of either the required fire flow or fire sprinkler demand, including hose stream allowances as required for a development. The design professional shall provide highest water demand for review as the fire demand.

d. Include fire flowflows and fire sprinkler system demands that will be required for the development in accordance with the adopted fire code, COP or Central Arizona Fire and Medical Authority (CAFMA) amendmentsFire Code, City of Prescott Amendments, and site-specific criteria as may be established by the COP or CAFMACity of Prescott Fire Marshal.

3. All projects shall be required to provide a fire analysis that shall demonstrate that there isare adequate waterfire flows available from the Agency'sCity of Prescott's existing system to meet the required fire demands of the proposed development, considering the building construction type, height, layout, etc.

a. The EOREngineer of Record shall use a hydraulic model to evaluate the ability of the water distribution system to deliver fire demandflows to the development.

b. The developer is responsible for understanding the fire demandflow requirements of the structures that are to be built and shall assure that the water distribution system within the development is capable of delivering the required fire flows.

c. Improvements, including off-site improvements, may be required to meet these criteria.

d. The fire flow demands shall be included in the overall water demand and summarized in the water design report.

a. The fire demands shall be the greater of either the required fire flows or fire sprinkler demand, including hose stream allowances as required for the development in accordance with the adopted fire code and Authority Having Jurisdiction.

4. Site Specific Analysis

a. The fire flow demand shall comply with the currently adopted International Fire Code (IFC) and the National Fire Protection Association (NFPA) Standards), Standard 13, 13R and 13D, the standards for the installation of sprinkler systems,Installation of Sprinkler Systems as adopted by the AgencyCity of Prescott and the Board of Technical Registration Substantive Policy Statement for fire sprinkler systems. The report shall list the applicable codes and standards and the appropriate engineering practices.

b. The "fire flow demand" section shall provide the following information:

EOR1) Engineer of Records name, company, address, city, stateCity, State, zip code, and phone number.

2) Project name, limits, and address, general location and& proposed uses.

3) Detail physical aspects of the proposed on-site structures including:

i. Building height (feet)

ii. Number of stories above finished grade

iii. International Building Code (IBC) construction type

iv. Building area (square feet)

4) The "fire demandflow" design report shall provide:

i. Revised International Fire Code (IFC) and most recent COP/CAFMA amendmentsCity of Prescott Amendments for required fire demand.flow

The percentage of fire flowii. Percentage of reduction allowed for the installation of a fire sprinkler system and resultant system demand as approved by the Fire Marshal, if the fire flow is determined to be the fire demand as defined.

5) Projects that install fire sprinkler systems shall be in accordance with the Arizona Board of Technical Registration Substantive Policy Statement regarding fire sprinkler systems. The following information shall be included:

i. Range of the fire hazards of the project.

ii. The hazard classification of the intended occupancy, including any special hazards.

iii. The appropriate engineering practices.

iv. The availability and adequacy of the water supply.

v. Based on a hazard analysis for the proposed use of each building (including special hazards), the appropriate fire sprinkler design density and area of operation shall be provided for each hazard area.

vi. Anticipated fire sprinkler demand pounds per square inch (psi) and gallons per minute (gpm).)

vii. Required fire flow and anticipated fire sprinkler demand shall be provided for the project in accordance with the IFC and most recent COP/CAFMA amendments.current City of Prescott Amendments

e. In order to ascertain the availability and adequacy of the water supply for the project, the report shall provide field fire hydrant flow and pressure test results performed in accordance with AWWA M17M 17 based on a certified test of the existing water system within the previous sixty ((60) days. A flow test shall be witnessed by the design engineer and valves operated by the COPCity of Prescott Water Operations by calling (928) -777-1118 or the TOPV Operations Contractor by calling (928) 759-9062. The flow test information shall include:

1) Test date

2) Test time

3) Test locations

4) Test and residual hydrants

5) Orifice size

6) Orifice coefficient

7) Flow test data:

i. Static pressure (psi)

ii. Residual pressure (psi)

iii. Pitot measurement (psi)

iv. Recorded flow rate (gpm)

v. Flow rate (gpm) converted to twenty (20) (psi)

8) Testing technician

9) A copy of the written Agency City of Prescott Water Operations or Fire Department report showing the flow test was witnessed by Agency City personnel.

4.4.4 .4 WATER MODELING

A. Water System Model Analysis

1. The EOR Engineer of Record shall provide a model of the planned Water System Master Plan Report or Water System Design Report as delineated in Sections 4.4.1 and 4.4.2. the GES Sections 4.4.1 and 4.4.2. This modeling shall be required where new public water mains are being added, modified or extended in the Agency's City of Prescott system. The model shall provide the data necessary to validate that water demands are met to support the project. A water model is also required to demonstrate the required fire flow is adequate in accordance with the adopted fire code and most recent COP/CAFMA amendments. Fire Code and City of Prescott Amendments.

2. Infill projects may not require a model. Infill projects include single lot development where fire and domestic flows are taken directly from existing Agency City of Prescott mains and where the zoning is in conformance with the Agency's City of Prescott General Plan. If a model is not required, include narrative of the proposed connections to the Agency's system. City of Prescott.

B. When water hydraulic modeling information is needed, the following requirements shall be met to deliver model data to the Agency: City of Prescott.

1. Model Software

The Agency City of Prescott currently uses the Aquanuity and Innovyze water H2OMAP Water software. The modeling software, which is EPA-NET compatible. All modeling used to evaluate a proposed development does not need to be the same software, but the data shall be compatible with the Agency's software provided to the City of Prescott in EPA-NET 2.0 format.

2. Model Development

The developer or developer's developer's engineer shall create and utilize a hydraulic model to demonstrate that the proposed infrastructure size, hydraulics, etc. are adequate and satisfy the Agency's City of Prescott's requirements for domestic and fire flow demands. The Agency City of Prescott may provide specific boundary conditions upon request. The model information shall be delivered to the Agency City of Prescott to be added to the Agency's City of Prescott's model, where modeling evaluations may be performed to verify that the proposed infrastructure and demands will not negatively affect the existing Agency's COP system. Proposed water systems shall evaluate the Agency's City of Prescott's overall water supply, pumping, and storage requirements.

C. Hydraulic Model Data

Developer or developer's engineer1. All drawings and model data shall coordinate withuse the Agency for the appropriateCity of Prescott coordinate system and datum for all drawings and model data. in the GES, Article 8.

2. Model data shall be free of topologyTopology errors in accordance with commonly accepted engineering practices prior to submission to the AgencyCity of Prescott.

3. Water Distribution System Attributes:

a. Mains – Diameter, length, material, location, connectivity with other entities.

b. Reservoirs – Base elevation, height, volume, location, connectivity with other entities.

c. Pump Stations – Layout, number of pumps, pump curve or design point, elevation, location, connectivity with other entities, pump control scheme.

d. Nodes (Connection Points) – Location, elevation, demand.

e. Pressure Reducing Valves and Tank Fill Valves – Location, connectivity with other entities, elevation, number of valves, diameter and valve set points.

f. Wells – Location, connectivity, design flow, control scheme.

g. Polygons – Pressure zone boundaries, zoning/density.

4. All model data shall include the following:

a. Demands shall be calculated per Section 4.4.3.CGES Section 4.4.3.C using average day water demands in gallons per day.

b. The system shall be capable of providing maximum day demand plus required fire demand.flow

e. Verification of the ability of the proposed system to provide adequate flow and pressures under the various demand combinations shall be provided.

d. Verification that the minimum required pressure throughout the water distribution system is achieved at the highest finished floor elevation or service point in the fire sprinkler line. If the minimum residual pressure under fire flow conditions cannot be achieved, additional private improvements may be required.

e. Pipes and nodes – Include item identification, demands, elevation, hydraulic grades, length, status, diameter, velocity, headloss/1,000 feet.1000 ft

f. Reservoirs and pumps – Provide identification, diameter, height, elevation, upstream and downstream hydraulic grade, number of pumps, pump capacity and proposed pump curves.

g. Pressure Reducing Valves (PRV's) – Provide identification, size, elevation, upstream and downstream hydraulic grade settings.

5. Hydraulic Evaluation

a. New developments that do not constitute infill shall be modeled to determine if the infrastructure is adequate to serve the development and provide the level of service as defined by the Agency'sCity of Prescott's performance criteria.

b. The Agency'sCity will use the City of Prescott's water model shall be used to verify the ability of the existing water distribution system to deliver adequate water to the proposed development per the design engineer'sEngineer's proposal. Supplemental fire hydrant tests shall also be used to make this determination. The developer is responsible to make certain that all fire water demandflow requirements (hydrants and/or sprinklers) within the development satisfies the Quad City GESCity of Prescott General Engineering Standards and adopted fire codeFire Code requirements.

e. The following scenarios shall be modeled:

1) Average Day Demands

2) Maximum Day Demands

3) Fire Flow Demands (Which are defined as the maximum daily demand plus the appropriate fire flow demand)

d. Model simulations shall be documented in a graphical and tabular format to demonstrate that the water distribution system shall provide the required flow at suitable pressures and water main velocities.

e. Fire flow modeling results shall will be documented as follows:

1) Junction Report

i. Static Pressures

ii. Residual Pressures

iii. Demands

iv. Calculated Minimum Pressure

v. Elevation

vi. Pressure Head

vii. Hydraulic grade

2) Pipe Report

i. Length

ii. Type

iii. Diameter

iv. Velocities

v. C-Factor

vi. Control Status

vii. Discharge

viii. Head Loss

ix. Head Loss Gradient

f. Boundary conditions that represent the interface between the development and the rest of the distribution system, shall be explained clearly.

TABLE 4-1

UNIT DESIGN FLOWS FOR WATER

TYPE OF FACILITY SERVED	APPLICABLE UNIT	WATER DESIGN FLOW PER APPLICABLE UNIT GALLONS PER DAY (GPD)
Airport	Passenger (average daily number)	5
	Employee	18

TYPE OF FACILITY SERVED	APPLICABLE UNIT	WATER DESIGN FLOW PER APPLICABLE UNIT GALLONS PER DAY (GPD)
Auto Wash	Facility	Per manufacturer, if consistent with this Article
Bar/Loung Lounge	Seat	36
Barber Shop	Chair	42
Beauty Parlor	Chair	120
Bowling Alley (snack bar only)	Lane	90
Camp		
Day Camp, No Cooking Facilities camp, no cooking facilities	Camping Unit	36
Campground, Overnight, Flush Toilets overnight, flush toilets	Camping Unit	90
Campground, Overnight, Flush Toilets overnight, flush toilets and Shower shower	Camping Unit	180
Campground, Luxury luxury	Person	120 — 180
Camp, Youth, Summer youth, summer, or Seasonal seasonal	Person	60
Church, Without Kitchen	Person (maximum Maximum attendance)	7
Church, With Kitchen	Person (maximum Maximum attendance)	8
Country Club	Resident Member member	120
	Person (maximum attendance) Non-resident member	12
Dance Hall	Patron	6
Dental Office	Chair	600
Dog Kennel	Animal (Maximum Occupancy), Max occupancy	180 18
Dwellings	Person	96
Fire Station	Employee	54
Hospital, All Flows AllFlows	Bed	300
Hospital, Kitchen Waste Only	Bed	30
Hospital, Laundry Waste Only	Bed	48
Hotel/Motel, Without Kitchen	Bed (2 Person person)	60
Hotel/Motel, With Kitchen	Bed (2 Person person)	72
Industrial Facility, Without without Showers	Employee	30

TYPE OF FACILITY SERVED	APPLICABLE UNIT	WATER DESIGN FLOW PER APPLICABLE UNIT GALLONS PER DAY (GPD)
Industrial Facility, Withwith Showers	Employee	42
Industrial Facility, Cafeteria Addedadded	Employee	6
Institutions, Resident	Person	90
Institutions, Nursing Home	Person	150
Institutions, Rest Home	Person	150
Institutions, Laundry, Self Service	Wash Cycle	15060
Institutions, Laundry, Commercial	Washing Machine	Per manufacturerManufacturer, if consistent with this Article
Office Building	Employee	24
Park (Temporary Use)		
Picnic, With Showers, Flush Toiletswith showers, flush toilets	Parking Space	48
Picnic, With Flush Toilets Onlywith flush toilets only	Parking Space	24
Recreational Vehicle, With No Waterwith no water and Sewer Connectionssewer connections	Vehicle Space	90
Recreational Vehicle, With Waterwith water and Sewer Connectionssewer connections	Vehicle Space	120
Mobile Home/Trailer	Space	300
Restaurant/Cafeteria	Employee	24
___With Toilet, Addtoilet, add	Customer	8
___Kitchen Waste, Addadd	Meal	7
___Garbage Disposal, Addadd	Meal	1
___Cocktail Lounge, Addadd	Customer	2
___Kitchen Waste Disposal Service, Addadd	Meal	2
Restroom, Public	Toilet	240
School, Staff and Office	Person	24
___Elementary, Addadd	Student	18
___Middle and High, Addadd	Student	24
___With Gym and& Showers, Addadd	Student	6

TYPE OF FACILITY SERVED	APPLICABLE UNIT	WATER DESIGN FLOW PER APPLICABLE UNIT GALLONS PER DAY (GPD)
With Cafeteria, Addadd	Student	4
Boarding, Total Flow	Person	120
Service Station, Withwith Toilets	First Bay	1200
	Each Additional Bay	600
Shopping Center, Nono Food or Laundry	Square Foot of Retail Space	0.1
Store	Employee	24
Store, Public Restroom, Addadd	Square Foot of Retail Space	0.1
Swimming Pool, Public	Person	12
Theater, Indoor	Seat	6
Theater, Drive-In	Car Space	12

SECTIONSection 4.5 WATER SYSTEM DEMAND

4.5.1 SYSTEM DEMAND

The water system demand describes the standards against which the water infrastructure is measured to determine the criteria of the proposed infrastructure. This water system demand criteria is based on the AACArizona Administrative Code (AAC) and other applicable regulatory standards.

4.5.2 INFRASTRUCTURE SIZING

Infrastructure shall be sized to supply the maximum day demand plus fire demandflow. This shallwill be determined by using the average daily demands listed in Table 4-1Table 4-1 and includingadding a maximum day peaking factor of two (2.0).one point eight (1.8). Fire demandflows shall be determined by the IFC and most recent COP/CAFMA amendmentscurrently adopted International Fire Code and identified by the City Fire Marshal. Table 4-1Table 4-1 lists water usage in categories that are correlated to sewage collection Unit Design flows as shown in the (AAC.).

SECTIONSection 4.6 PLANNING

4.6.1 COMPREHENSIVE PLANNING

A. The AgencyCity of Prescott has developed a Water System Model to ensure that future improvement requirements are achieved through an orderly development of the AgencyCity of Prescott planning areas. Any engineer working on the design of public or private water infrastructure shall develop plans consistent with the appropriate sections of the Agency'sCity of Prescott's Model.

B. Water mains shall be installed along the entire length of the property line frontage of the property being developed.

A. Water mains shall be installed along the entire length of the property line frontage in accordance with section 4.7.1B.

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 may be required to be installed along all frontages.

4.6.2 WATER FACILITIES

A. Water facilities (i.e. wells, reservoirs, booster pump stations, etc.) are designed and constructed by the AgencyCity of Prescott through its Capital Improvement Program.capital improvement program. Developers needing to construct water facilities shall contact the COP Public Works/TOPV Utilities Department and request a meeting to coordinate the design of these facilities. The developer shall be prepared to address how the proposed system will conform to the Agency'sCity of Prescott's Water Master Plan. The Agency shallCity of Prescott will address design issues and the review process for these facilities.

B. Unless otherwise agreed to in writing by the City/Town Engineer, water facilities shall be located on a tract or lot dedicated to the AgencyCity of Prescott (conveyed by a general warranty deed) and accompanied by a title policy in favor of the AgencyCity of Prescott.

C. Wells

1. ADWR issues the authority to drill groundwater wells both exempt and non-exempt. Before drilling a well, a Notice of Intent to Drill shall be filed with ADWR and a "drill card" shallmust be obtained from ADWR. Non-exempt wells require greater ADWR review and public noticing. Post drilling, and well and pump installation, required well logs, and pump completion report shallmust be filed with ADWR.

2. In the event a property has an existing exempt well, and the use continues while a connection is made to the Agency'sCity's potable water system, a backflow prevention device is requiredrequire by AgencyPrescott City Code. (PCC), Section 3-6-2 (International Plumbing Code, Amendments).

PCC, Section 3-6-2 (International Plumbing Code, Amendments)
TOPV Town Code Article 9-05a-090

1. A property owner currently using an exempt well that seeks to discontinue its use for which the AgencyCity is able to provide water supplies, then the well owner shall complete ADWR well abandonment requirements.

In the COP, water Water service to the property shallwill require a water service agreement to document the volume to be served and conditions of the service. Refer to the adopted COPCity of Prescott Water Management Policy. Refer to Section 4.7.1 for information regarding the drilling of new exempt wells.

4. Refer to GES Section 4.7.1 for information regarding the drilling of new exempt wells.

D. Tanks

Storage facilities shall provide operational storage for peak demands above maximum daily demands, emergency storage for power outages and line breaks, and fire protection storage. Facilities shall be designed to maximize the efficient use of water production wells and pumping facilities. Therefore, storage in each designated service area shall exceed the volume of the sum of 1, 2 and 3 below or the average day demand for the area(s) served, whichever is greater.

1. Operational storage equaling twenty (20%) percent of maximum daily demand.

2. Fire storage as determined by the fire department ranges from four (4) to ten (10) hours for multiple fire occurrences within a pressure zone. Fire demand rates and storage volumes are determined using criteria established by the American Insurance Association according to the following equation: G=1,020 √ P(1-.01√ P).)

P = Population of the Area

G = Storage in Gallons

3. Emergency storage equaling ten (10%) percent of maximum daily demand.

4. The City/Town Engineer shall determine final sizing and dimensions.

E. Booster Pump Stations

1. Booster pumps shall be designed to maintain adequate pressure for domestic and fire protection water supply. At a minimum allAll stations shall provide at a minimum; variable frequency drives, backup power supply, separate electrical room and supervisory control and data acquisition (SCADA) compatible with the Agency'sCity of Prescott's current system. Designers shall refer to ADEQ Engineering Bulletin No. 10, Arizona Department of Environmental Quality, for additional design criteria. The City/Town Engineer shall determine final sizing, number of pumps, pump capacity, SCADA requirements, and building dimensions.

2. A preliminary design report shall be prepared and submitted to the City/Town Engineer for review by the COP Public Works/TOPV Utilities Department prior to submittal of final plans for review. This report shall outline the type of equipment and controls proposed Piping and Instrumentation Diagram (PI&D) and SCADA for the station along with the proposed hydraulics. A final design report prepared by a registered civil engineer licensed in the State of Arizona shall accompany the construction drawings and specifications.

SECTIONSection 4.7 TRANSMISSION AND DISTRIBUTION SYSTEMS

4.7.1 GENERAL INFORMATION

In accordance withA. Effective January 1, 2006 A.R.S. 45§ 45-454 (C) and ADWR's Substantive Policy Statement GW43,prohibits the drilling of an exempt well (e.g., maximummax. pump capacity of not more than thirty-five (35) gpm and that is used only for non-irrigation purposes) is prohibited on land if any part of the land is within one-hundred (100')100 feet of an operating distribution system with a Decision and Order of AWS. For additional detail, see the statute referenced and ADWR Substantive Policy Statement GW43.

Water mains shall be installed along the entire length of the property line frontage of the property being developed.
B. The City of Prescott 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 the, that portion of a parcel of property that abuts a street, easement, or public ROW.rights-of-way. If a parcel to be developed has more than one property line frontage, improvements may be required to be installed along all frontages to improveif required flow, system redundancy, or water quality or paving issues conflict.

C. Design Policy

The1. The City of Prescott will require the extension of water mains along a frontage, or through a subdivided parcel, shall be required to the boundary where future extension of the water main is possible, providing a point of service to adjacent properties, or as determined necessary by the City/Town Engineer. Reconstruction of residential or commercial structures requires compliance with all current ordinances and design guidelines relating to water main extensions, main sizing, and service lines.

2. Each lot shall have safe, reliable, and potable water in sufficient volume and pressure for domestic use and fire protection. The EOREngineer of Record shall verify this by performing a flow and pressure test during peak demand period, of that part of the potable system to be extended or connected onto. The flows and pressure shall meet minimum requirements for domestic and fire flow per applicable regulatory standards. The EOREngineer of Record shall place a statement verifying this within the design report along with copies of the tests.

3. The AgencyCity of Prescott maintains multipleover eighty (80) pressure zones and care shall be taken to identify boundary conditions when designing near a zone line. The EOREngineer of Record shall contact the COP Public Works/TOPV Utilities Department for verification of water pressure zone boundaries. Static and dynamic water pressure and flow tests shall be performed on fire hydrants located on each leg of the existing water system between zone boundaries where connections are proposed.

D. Design Standards

1. The EOREngineer of Record shall design proposed water infrastructure in accordance with the design standards listed in the GES and QCSDs. These documents contain construction related specifications and details that impact the design of water systems including but not limited to trenching, bedding, backfill and pavement replacement, etc.

2. Water system expansion and extension requirements to serve both new and existing development are outlined in the Agency's CodePrescott City Code (PCC), Article 2, Chapter, 2-1.

PCC, Article 2, Chapter, 2-1
TOPV Town Code Article 9-05a

4.7.2 WATER MAIN PIPES AND MATERIALS

A. Pipe Sizing

1. The minimum size of a water main for providing fire protection and serving fire hydrants shall be six (6") inches in diameter when service is provided from two (2) directions., or where the maximum length of six (6") inch pipe serving the hydrant from one (1) direction does not exceed two-hundred fifty (250') feet. A minimum eight (8") inch water main shall be required where service is provided from one (1) direction only and does not exceed two-hundred-fifty (250') feet in length.. Larger size mains shall be requiredprovided as necessary to meet all other design criteria, the development's design report, specific water demands, or the Agency'sCity of Prescott Water System Master Plan.

The2. Refer to the adopted Fire Code and City of Prescott Amendments for the maximum length of dead-end fire lines that may be used for fire protection shall be in accordance with the adopted fire code and most recent Agency amendments. Fire lines shall be calculated from the street tap to the building for determining sprinkler design.

Public3. One (1") inch, two (2") inch or three (3") inch water mains shall are not permitted for new construction as public water mains. Four (4") inch mains may be a minimum of six (6") inches unless otherwise approved by considered with approval from the City/Town Engineer.

B. Pipe Materials

All water mains shall be1. Preferred Material: Class 350 (CL350) Ductile Iron Pipe (DIP) cement mortar lined and seal coated or is preferred for all water main installations.

2. The use of Polyvinyl Chloride (PVC) pipe as approved by the Agencyshall not be allowed.

1. The COP shall not allow the use of PVC pipe within the COP service area per PCC.

3. Service connections for meters shall be one (1") inch minimum, Type K copper without splices.

4. Remote Fire Department connection piping shall be CL350 DIP. Below the vertical section at the street, an approved drip valve shall be installed over a bed of gravel as per QCSD 365Q-1 and 365Q-2Fire Department COP Standard Detail "Remote Fire Department Connection". The line shall include tracer wire per QCSDCOP Standard Detail 319Q-1 and 319Q-2.

In the COP, fire5. Fire line services three (3") inches and smaller shall be connected to the main with a minimum four (4") inch DIP, CL350 with a resilient seat valve. The DIP pipe shall be extended beyond the resilient seat valve to the property or easement boundary.

6. Design analysis for wall thickness shall be performed for external loads. These include, but are not limited to, pipelines crossing under stormdrain lines greater than thirty-six (36") inches in diameter, pipelines in the roadway alignment that would be exposed to construction vehicle loads prior to paving, and installations exceeding the pipe manufacturer's maximum depth of bury.

7. All aggregate material within the trench envelope of water mains and/or fire lines shall be noncorrosive as determined by the Arizona Department of Transportation (ADOT) Standard Specification Manual 501 3.02 for pH and resistivity, presence of chlorides and presence of sulfide ions. Resistivity test shall be greater than three-thousand (3,000) ohm-cm, chlorides shall be less than fifty (50) ppm and sulfide ions shall be less than 1ppm. Lime treated AB shall not be permitted when utilizing DIP or other ferrous pipe material.. Test results shall be submitted to the City/Town Engineer prior to construction.

4.7.3 SYSTEM LAYOUT

A. To provide appropriate water pressure, water circulation and redundancy, all new water mains shall be designed in a looped configuration where feasible, as determined by the City/Town Engineer, providing a minimum of two (2) sources that can be isolated by gate valves.

A. Maximum number of water connections or dwelling units to be served from a non-looped water main shall be twenty-five (25) or as defined by the Agency.

B. Water mains shall not be located within ten (10') feet of a building or retaining wall.

C. For purposes of horizontal and vertical separation, stormdrains, non-potable water systems, and sewer service lines shall be treated as sewer mains. Separation shall be required in accordance with QCSD 402Q. pursuant COP Standard Detail 404P-1 and 404P-2.

D. Existing water main stubs and service lines adjacent to a proposed development that are not used shall be removed. For mains, this includes removing all valves, capping the tee and removing the pipe at the main. For services, this includes removing the saddle and its appurtenances and installing a full circle stainless steel clamp.

E. Main Locations:

1. Public water mains and appurtenances shallare required to be located within a dedicated public ROWright-of-way or easement.easements

2. Horizontal Location: All water mains shall be aligned parallel to property lines or street center lines to the maximum extent possible and shall not cross and re-cross the centerline.

a. Water mains located beneath streets within the public ROWright-of-way shall refer to QCSD 601Q through 606Q.COP Standard Details 601P thru 606P

b. Public water mains in commercial, multifamily, and industrial developments shall be located under driveways, or drive aisles and a minimum of ten (10') feet from any structure, including overhangs.

c. A minimum twenty (20') foot easement shall be provided, and the water main shall be located in the center of the water main easement unless otherwise approved by the City/Town Engineer.

d. Horizontal alignment changes shall be made with eleven and one-quarter (11¼°), ¼), twenty-two and one-half (22½°), ½), forty-five (45°),), or ninety (90°)) degree bends. Joint deflection shall not exceed fifty (50seventy-five (75%) percent of the pipe manufacturer's manufactures specification.

e. Horizontal and verticalVertical locations shall be consistent with QCSD 601Q through 606Q,COP Standard Detail 601P thru 606P and 402Q.404P-1

3. Vertical Location:

a. New water mains, fire lines, and water service lines shallare not allowed to pass under detention basins.

1) This does not apply to private landscape irrigation lines downstream of proposed backflow prevention devices or buildings.

b. Hydrants, meters, blow-offs and valves shall not be located in washes, detention areas, private driveways, sidewalks, curbs or valley gutters.

1) Hydrants shall have a maximum bury depth of six (6') feet.

c. Hydrants that require adjustment as a result of improvements shall be adjusted using a "GradelokGradlok" or approved equal when vertical adjustment is in excess of six (6") inches, per QCSDrefer to COP Standard Detail 363Q.

4.7.4 DEAD-END MAINS

A. The maximum length for a dead-end water distribution main shall be governed by water quality standards and shall be sufficient to provideprovided minimum pressures and fire flows.

B. Capped dead-end mains shall be fitted with a flushing device per QCSD 390QCOP Standard Detail 318P. Fire hydrants may be used as a flushing device. Flushing devices shall not be located in washes, detention areas, retention areas, sidewalks, driveways or paved areas.

4.7.5 DESIGN FLOWS

A. The ultimate design flow within the Agency'sCity of Prescott's water transmission and distribution system shallwill be based on the Agency'sCity of Prescott's current water master plan. Water demand for each development shallwill be calculated using the average day demands with appropriate peaking factors applied, as shown in Table 4-1Table 4-1 to ensure that the existing distribution supply is sufficient. Designs shallwill include all necessary improvements, including booster-pumping stations, reservoirs, mains and appurtenances to meet the system's ultimate demand. Design flow C-Factors factors shall be applied using Table 4-2.Table 4-2.

TABLE 4-2

C-FACTORS

DIAMETER	C-FACTOR
6	90

DIAMETER	C-FACTOR
8	110
10	115
12	120
14	120
16	130
18	130
20	130
24	130
30	130
36	130

1. Hydraulic analysis shall will demonstrate that the system will provide average day, maximum day demand, and maximum day demand plus fire flow. The average day to maximum day peaking factor is two (2.0) one point seven one (1.71), and the average max day to peak hour factor is three (3.0 one point eight (1.8).

2. A minimum of twenty (20) psi shall be maintained at the point of maximum fire flow demand during max day plus fire flow conditions. Impacts to surrounding areas shall also be considered.

a. Water velocity criteria under maximum day demand conditions are as follows:

1) Velocity ≤ 5 feet per second (fps) for pipes < 36 inches diameter (Head loss, HL= 2-7 feet/1,000 feet)

2) Velocity ≤ 6 fps for pipes ≥ 36 inches diameter (Head loss, HL= 1-2.5 feet/1,000 feet)

1. Velocity criteria under peak hour demand conditions is as follows:

Velocity ≤ 7 fps (Head loss, HL < 10 feet/1,000 feet)

b. Velocity criteria under maximum day plus fire demand conditions is as follows:

1) Velocity ≤ 10 fps

3. Design flows for all distribution systems shall will be based upon flow and pressure of the existing system as documented by the EOR Engineer of Record.

4. Prior to acceptance by the City/Town Engineer, all platted subdivisions shallwill conduct an additional flow test at the fire hydrants or flushing devices having the lowest and highest ground elevation within the subdivision.

5. Developments that cross pressure zone boundaries shall conduct a flow test within each pressure zone as outlined above. The results of this test, along with a copy of the final plans, shall be submitted to the City/Town Engineer for review and acceptance.

4.7.6 FIRE HYDRANT FLOW TEST REQUIREMENTS

A. Pressure and available flow information for existing water mains shall be obtained by having a flow test performed on the system at the developer's expense. Flow tests are required for all commercial projects, multi-family residential projects, and public extensions of the Agency'sCity of Prescott's water distribution system. A private fire protection company shall perform the tests in accordance with AWWA M17manual M-17 and certify the results. The design engineer shall witness all tests and valves shall be operated by AgencyCity of Prescott Water Operation's personnel. The certified flow test results shall be included in all master plans or design reports submitted to the COP Public Works/TOPV Utilities Department. A copy of the flow test report shall be included when fire sprinkler plans are submitted.

B. Flow tests shallmay be scheduled through the Agency, COP Water Operations at (928)-777-1118 and TOPV Operations Contractor at (928)759-9062 a minimum of 48 hours prior to the test.

4.7.7 PRESSURE REQUIREMENTS FOR NEW DEVELOPMENT

A. 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.

B. The static pressure in the distribution system shall not exceed one-hundred twenty (120) pounds per square inch (psi in the COP and one-hundred (100) psi in the TOPV), and the system shall be designed to maintain a minimum residual pressure of forty ((40) psi at the point of service (box and setter or meter) to be served by system pressure at maximum day demand conditions. The system shallwill be designed to maintain twenty (20) psi minimum pressure under design maximum day plus fire flow requirements. The twenty (20) psi minimum pressure design requirement accounts for the safety factor included in conservative "C-Factors" factors to account for aging infrastructure and flexibility in locating pressure zone boundaries.

C. All distribution water mains, appurtenances, and service lines shallwill be designed for a minimum normal internal working pressure of twoone-hundred (200fifty (150) psi. Working pressures for transmission mains shallwill be verified with the COP Public Works/TOPV Utilities Department.

D. Provisions shall be made to protect the system from water hammer pressures. The occurrence and severity of water hammer can be reduced by using pressure-release valves, combination air/vacuum valves, surge tanks, variable frequency drives, soft start motor controllers, and air chambers.

4.7.8 PRESSURE REDUCING VALVES (PRV)PRV'S)

A. Approximate pressure zone boundaries and their respective elevations are shown in the Agency'sCity of Prescott's water model. Within the distribution system or to interconnect to other zones, PRVPRV's shall be required to maintain pressure zones within the distribution system or to interconnect to other zones. Distribution systems shallwill not be designed to operate at pressures in excess of one-hundred twenty (120) psi in the COP and one-hundred (100) psi in the TOPV. PRV. PRV's shall be built in accordance with QCSDCOP Standard Detail 323Q-1, 323Q-2, and 323Q-3.. A minimum of one (1) PRV in each pressure zone shallwill be designed with a high-pressure relief valve.

B. Vaults shall be located outside of paved areas adjacent to the back of curb or sidewalk. PRVPRV's shall be located within the ROW,rights-of-way, an easement, or an easement within a private street tract, and shall be provided with unobstructed vehicular access, including parking. Curbs adjacent to PRV vaults shall be Type C or Type D in accordance with QCSDCOP Standard Detail 220Q-1, unless other access is provided that is acceptable to the AgencyCity. Site grading shall route storm water and discharge water from relief valves away from the vault. Site design shall consider and mitigate any impacts of discharge water on downstream improvements. The location of pressure relief risers shall be shown on the final plans.

C. The EOREngineer of Record shall specify in the design report and on final plans, the size of the main and low flow pressure reducing valves, the upstream system pressure, and the design downstream pressure setting.

D. The COPCity of Prescott requires all metered services to have a pressure-regulating valve installed on the private service line. The TOPV requires all metered service to have a pressure-regulating valve installed on the private service line only when static pressures exceed 80 psi.

E. The AgencyCity of Prescott requires the installation of isolation valves on all PRV stations to facilitate the operation, maintenance, and expansion of the water distribution system.

4.7.9 VALVES

A. The AgencyCity of Prescott requires the installation of isolation valves to facilitate the operation, maintenance, and expansion of the water distribution system. Water main valves shall meet or exceed the pressure classification of the water main.

B. Gate valves, required to control the operation of the water system, shall be installed per QCSDCOP Standard Detail 301Q.

All four (4") inch through fourteen (14") inchC. All valves shall be resilient seat/wedge gate valves, epoxy-coated interior in accordance with theAmerican Water Works Association (AWWA) C-550, and all supplemental requirements of MAG Specification 630.3.

A. Valves sixteen (16") inch and larger shall be butterfly valves, epoxy-coated interior in accordance with MAG Specification 630.5.

B. Valve operators shall not be placed in parking stalls.

4.7.10 FITTINGS

A. Joint deflection shall be evaluated and may be allowed for specific conditions and, shall not exceed fifty (50seventy-five (75%) percent of the pipe manufacturer'smanufactures specification. Fittings may be required where more than two (2) pipe lengths are deflected.

B. A minimum distance between fittings shall be specified on the final plans for constructability. All fittings shall be identified on both the plan and profile view with station and elevations. The EOREngineer of Record is responsible for verifying the minimum distance necessary for the type and diameter of pipe and related fittings specified for the project.

Couplings, joints, gaskets, and flanges shall conform to MAG Section 610.10, or equal, unless otherwise approved.

4.7.11 VALVE LOCATIONS

A. Shutoff valves shall be installed on water mains at locations within the distribution system that allow sections of the system to be taken out of service for repairs or maintenance without significantly curtailing service in other areas. Special consideration shall be given to the number of fire hydrants taken out of service. A sufficient number of valves shall be provided on water mains so that inconvenience and sanitary hazards will be minimized during repairs. Valves shallwill be located such that closing no more than four (4) valves can isolate any section of the system.

B. Valve Location

1. A valve shall be located on each side of a vertical alignment per QCSDCOP Standard Detail 370Q, creek, wash, railroad, or highway crossing.

2. Valves shall not be located in curbs, sidewalks, driveways, valley gutters, bike lanes, and vehicle wheel paths.

3. Provide a valve on each fire hydrant lateral and flange the valve to the tee. Provide a valve for all fire protection water supply connections in accordance with the adopted fire codeFire Code and most recent Agency amendments.City of Prescott Amendments. Refer to QCSDCOP Standard Detail 360Q.

4. The preferred locations of valves shall be set at the intersecting street adjacent to other valves, or at a fire hydrant location.

C. Spacing

1. Maximum spacing of water distribution main valves shall be as follows:

a. In commercialCommercial, multi-family, and industrial areas, valve spacing shallwill not exceed five-hundred (500') foot intervals.

b. In single family residential, valve spacing cannot exceed eight-hundred (800') foot intervals or one (1) per block, whichever is less.

2. Maximum spacing of water transmission main valves shallwill be as follows:

Valvea. Valves spacing shallwill not exceed one-thousand three-hundred-twenty (1,000'320') feet.

b. Intermediate access points shall be provided between valves for leak detection purposes.

D. Install all tees with a valve on the lateral main, so that the lateral can be taken out of service without interrupting the supply to other locations. At intersections of distribution mains valves shall be required on each leg.

E. All valves require valve boxes installed per QCSDCOP Standard Detail 391Q. All valves shall be installed with a debris cap. The debris cap handle shall be the appropriate color to indicate valve type. Refer to QCSDCOP Standard Detail 391Q.

F.

All valve frame and cover adjustments shallwill be per QCSDCOP Standard Detail 391Q.

4.7.12 AIR RELEASE VALVES

A. Air release valves shall be installed at all local high points of water mains four (4") inches or larger in diameter, as follows:

1. When water main changes from a positive slope to a zero slope or a negative slope.

2. Vertical alignment changes that cross under or over another facility, such as other utilities, drainage washes, etc.

3. All air release valves shall be per QCSDCOP Standard Detail 317Q-1 and 317Q-2 or 322P, as applicable for size.

A. Additional combination air/vacuum release valves shall be required whenever a surge analysis reveals the need for additional valves to protect against water hammer or transients in the water distribution system.

4.7.13 THRUST RESTRAINT

A. Thrust blocks shall not be allowed for new construction on the Agency'sCity of Prescott's water system unless approved in writing by the City/Town Engineer. Thrust restraint shall be met by:

1. Welded joints in steel pipelines.

Restrained mechanical2. Mechanical joints in concrete and ductile iron pipelines (e.g. Mega-lug or equal).Ductile Iron Pipelines

3. Locking gasket and ring systems acceptable to the City/Town Engineer (e.g. Field-Lok Gaskets or equal).

B. All valves shall be considered dead ends for thrust restraint.

QCSDC. COP Standard Details 303Q-1 and 303Q-2 include acceptable means of joint restraint for both horizontal and vertical deflections. Vertical slopes that exceed twenty (20%) percent require restrained joints, slopes exceeding twenty-five (25%) percent,%), require additional anchoring, in addition to restrained joints to prevent

pipe movement and minimize settling. The EOREngineer of Record shall verify the water pressures and earth bearing pressures assumed by the details. Where joint restraint is not proposed per QCSDCOP Standard Details 303Q-1 and 303Q-2, the EOREngineer of Record shall submit joint restraint analysis with the plans for review and comments. All restrained pipe lengths shall be specified on the plans and refer to QCSD 303Q-1 and 303Q-2., or referenced to a COP Standard Detail.

D. Couplings, Joints, Gaskets, and Flanges

1. Couplings, joints, gaskets, and flanges shall conform to Section 610.10 of the MAG Uniform Standard Specifications or equal, unless otherwise approved.

a. Thrust Restraint: Joint restraint shall be used at all bends, elbows, tees, crosses, dead ends, stubs, curb stops, fire hydrants, taps, and valve locations on water mains where water flow changes direction or is stopped. The joint restraint limits, both length of restrained pipe and limits of restraint with stationing, shall be shown on the plan and profile view. Restrained joint analysis shall be prepared and submitted when necessary, keeping in mind that concrete thrust blocks are not to be considered in the analysis in the COP..

b. Acceptable restrained joint systems include the following manufacturers or approved equivalentManufactures:

EBAA Iron Inc.

Ford Meter Box Company Inc.

Romac Industries

Tyler Union

US Pipe

McWanec. Ductile Iron

American Pipe

(F. DIP) joint restraint shall comply with QCSDCOP Standard Detail 303Q-1 and 303Q-2.

4.7.14 ELECTRONIC MARKERS

A. Tracer wire shall be placed above all public water mains, service connections and fire lines per QCSD 319Q-1 and 319Q-2. All splices of trace wire shall be Copperhead Snakebite or 3M DBR moisture displacement connectors.

B. A continuity test shallwill be performed at the completion of installation. Passing test results shall be provided for all pipe segments within the EOR'sEngineer of Record's as-built data and plan set.

TracerC. Trace wire stations shall be required on all mains without sufficient valves and other points necessary to access the wire to maintain accurate signal strength.

D. Maximum distance between test stations shall not exceed five-hundred (500') feet. Refer to QCSDCOP Standard Detail 319Q-2.

4.7.15 PIPE COVER

A. Water mains shall be installed to minimum and maximum depths measured from the proposed finished grade to top of pipe as follows:

1. Water main shall have a minimum cover of four (4') feet.

2. Public water mains that are installed through undeveloped property (i.e., locations where the final finished grade elevation is not known, particularly along future street alignments), shall have a minimum cover of five (5') feet from the existing grades.

3. Subsequent fills that produce a cover depth in excess of six (6') feet shall require the main to be vertically realigned within the four to six (4'-6') foot envelope.

4. Maximum cover over water mains shall be six (6') feet, except at vertical re-alignments necessary to avoid conflicts with other utilities. and stormdrains

B. If a water main is installed within an area to be filled at a later time, adequate pipe protection shall be provided. This may include a temporary berm or constructing the water main to a minimum cover below existing grade. The EOREngineer of Record shall notify the COP Public Works/TOPV Utilities Department of such occurrences and address them in the design report or master plan and civil plans.

C. Concrete encasement of water mains is prohibited to achieve separation from sewer.

4.7.16 WASH CROSSINGS

A. All wash crossings shallwill be constructed using restrained joint Class 350 (CL350) Ductile Iron Pipe (DIP.). Bury requirements to place water mains under washes or channels shall be based upon the scour depth of the one-hundred (100))-year peak design discharge (Q100) in the channel or wash. The minimum depth of bury below the design flow line of the channel or wash shall be per Table 5-7,GES, Table 5-7, unless site-specific geotechnical and hydraulic data is provided.

B. Wash crossings with a one-hundred (100) year flow above five- -hundred (500) cubic feet per second (cfs), shall have the scour depth estimated using Arizona State Standard Attachment SSA 5-96, Guideline 2, Level I, as published by ADWR. The EORthe Arizona Department of Water Resources. The engineer shall estimate the

depth of scour and design the top of pipe to be three (3') feet below the estimated scour depth. The EOR~~engineer~~ shall provide a detailed analysis of the scour depth with final plans for review and approval.

~~C.~~ All pipelines that must be located within the scour zone or do not meet the minimum required depth of bury, as indicated above, shall be protected by installing a cut-off wall, and energy dissipation downstream of the pipeline to stabilize the scour depth to a minimum of three (3') feet above the pipeline. The EOR~~engineer~~ shall design the cut-off wall energy dissipation and include details on the improvement plans. The City/Town Engineer shall review pipe protection and scour stabilization requirements on an individual project basis.

4.7.17 ~~_~~ ~~——~~SEPARATIONS AND VERTICAL REALIGNMENTS

A. Horizontal and vertical separation distances shall be maintained in accordance with ADEQ, MAG Specifications and QCSD 402Q, 404Q, and 405Q.

~~A.~~ For the protection of the public water supply from contamination, all water mains that are considered raw water mains and/or transmission mains (twelve (12") inch and greater) shall be governed by the well separation in the AAC R18-5-502 for separation from a septic tank or subsurface disposal system with a minimum separation~~Engineer~~ of one-hundred (100') feet in any direction~~Record shall maintain separation distances in accordance with the Arizona Department of Environmental Quality Engineering Bulletin 10, MAG Specification Section 610.5 and COP Standard Details 404P-1 and 404P-2 Water and Sanitary Sewer Separation/Protection~~.

Horizontal~~B. Vertical~~ separation from~~of~~ water mains and ~~sanitary~~ sewer mains shall be six feet zero inches (6'0") minimum from pipe outside diameter (OD) to pipe OD.~~comply with COP Standard Detail 404P-1.~~ Where ~~conditions prevent adequate~~ horizontal ~~and vertical~~ separation cannot be maintained, extra protection shall be designed per ADEQ Bulletin No. 11.~~:~~

B. Vertical separation between water mains and sewer mains at crossing locations shall utilize the proper water line exclusion and extra protection zones per MAG 404-1 and QCSD 402Q. Extra protection requirements shall be as follows:

Where both water and sewer main are proposed for new construction:~~1.~~ Both the water and sewer main shall~~will~~ be constructed of Class 350 (CL 350) ~~Ductile Iron Pipe (~~DIP~~)~~ with restrained joints. Crossing orientation shall be in accordance with MAG 404-2.~~ or~~

~~2.~~ Where ~~the~~ existing water main is not constructed of DIP: Water~~other than restrained ductile iron, the water~~ mains shall be replaced with restrained joint DIP per QCSD 404Q~~COP Standard Detail 404P~~-2.~~, and/or~~

Where3. Where the existing or proposed sewer main is other than restrained Ductile Iron Pipe, the sewer main is existing and is not constructed of DIP: Sewer main shall be replaced with Protecto 401epoxy lined DIP in accordance with QCSD 404Q., restrained DIP per COP Standard Detail 404P-2

C. Water mains shall not pass through or come into contact with any part of a sewer manhole and shall be separated six (6') feet horizontal from the outside edge of a sewer manhole.

Horizontal separation between water mains and storm drains shall be four feet zero inches (4'0") inches minimum from pipe OD to pipe OD. Where horizontal separation cannot be maintained, extra protection shall be designed for the water main as if there was a vertical C. Separation of water from all utilities will conform to COP Standard Detail 402P.

D. D. Water mains crossing.

Vertical separation between water mains and storm drains over culverts and stormdrains shall maintain both a minimum of twelve (12twenty-four (24") inches vertical separation and the minimum depth of bury. If the design cannot provide these clearances, a vertical realignment may be required.

E. Separation of water from all utilities shall conform to QCSD 402Q.

F. Vertical realignments shall be in accordance with QCSD 370Q and shall incorporate the following into the design:

E. Separation from Stormdrains and Culverts: Water mains shall maintain four (4') feet horizontal and two (2') feet vertical separations from stormdrains and culverts. Water mains crossing less than two (2') feet below a stormdrain or culvert shall require additional protection such as the use of restrained joint DIP or placing the water main in a casing pipe. Air release valves and isolation valves shall be installed per the following:

1. Isolation valves shallwill be installed on each side of the vertical realignment.

2. The COP Public Works/TOPV Utilities Department may consider the location of adjacent valves, fire hydrants, and water service mains to help minimize valves at vertical realignments.

Tees3. Install air release valves at localized high points where air entrapment or cavitation may occur

4. Do not place tees, fire hydrants, service lines, and/or other appurtenances shall not be placed within any portion of the vertical realignment.

1. Air release valves shall be installed at localized high points where air entrapment may occur.

2. Concrete encasement of water mains is prohibited to achieve separation from sewer.

4.7.18 SERVICE LINES AND METERS

A. The water service line and meter shall be sized based upon the total daily demands for the development and the recommended maximum capacity. The minimum size service tap, saddle, line and meter set shall be one (1") inch.

COP: B. The minimum size service tap, saddle, line and meter set shall be one (1") inch.

TOPV: The minimum size service tap, saddle, line and meter set shall be three-quarter (3/4") inch.

That portion of the water service from the water main, up to, and including the brass nipple downstream of the meter is public and shall be maintained by the Agency City of Prescott as shown in COP Standard Detail 316P. That portion of the water service beginning at the curb stop after the meter is private and shall be maintained by the property owner. Design of the private on-site portion of the water service shall comply with the current plumbing code and shall include a customer shutoff and pressure-regulating valve. Refer to QCSD 316P-1 and 316P-2 for services within the COP. Refer to QCSD 310PV-1, 310PV-2, 310PV-3 and 310PV-4 within the TOPV Refer to COP Standard Detail 316P.

C. Due to the Agency's City of Prescott's water billing rate structure, meter sizes shall not exceed the size of the service. (eE.g., a one and one-half (1-½") inch meter shall not be allowed on a one (1") inch service). Extra attention is required when sizing services for custom home lots where demands occasionally necessitate meter sizes exceeding one (1") inch.

D. Service lines are necessary to meet domestic, fire and irrigation demands. Residential fire sprinkler and irrigation demand is normally supplied through the domestic service line and meter. Commercial developments may use separate meters for building and landscape service but shall will provide separate lines for fire protection.

A. E. Installation of metered one (1") inch to two (2") inch metered water services shall be in accordance with QCSD COP Standard Detail 316P-1 and 316 P-2 within the COP and in accordance with QCSD 310PV-1 and 310PV-3 within the TOPV.

. Installation of three (3") inch to six (6") inch metered water services shall be in accordance with QCSD COP Standard Detail 321Q.

F. Final plans shall 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 line connections shall also be shown in the profile view. Service lines and meter boxes shall be located within a public ROW right-of-way or a utility easement per QCSD COP Standard Detail 316P-1 and 316P-2 within the COP or QCSD 310PV-1 and 310PV-3 within the TOPV.

G. Service taps are not permitted on a fire line, which is designed to service private fire sprinkler systems and/or a fire hydrant.

H. Water service services connections shall be designed perpendicular to the main. Lines shall be continuous from the main to the meter with no splices. Water service lines shall have six (6') feet minimum horizontal separation from sanitary sewer service lines. Multiple service taps at the main shall have a minimum separation of two (2') feet on DIP.

B. Taps on existing PVC mains shall have thirty-six (36") inches minimum separation per Uni-Bell PVC Pipe Association.

I. No service connections or fire protection systems shall be made directly to water transmission mains.

J. All non-copper water service lines in sizes three-quarter (¾") inch through two (2") inch which are exposed during construction, shall be replaced in their entirety with one (1") inch minimum Type "K" copper tubing. This includes the replacement of service saddles, box and setter and corporation stop in all cases. Refer to QCSD COP Standard Detail 316P-1 and 316P-2 within the COP or 310PV-1 and 310PV-3 within the TOPV.

K. The developer Developer shall install all water services, meter setter, and meter boxes in new development projects.

1. Water meter boxes shall be installed out of traffic areas and behind back of curb and sidewalk. Refer to QCSD 316P-1 and 316P-2 within the COP or 310PV-1 and 310PV-3 within the TOPV. Metered Services: COP Standard Detail 316P.

2. Metered Services:

a. Subdivision plans shall provide a typical water service location detail.

b. Where water services are being designed for isolated locations, provide stationing and offset to property line.

c. Minimum water service size is one (1") inch with a five-eighths inch (5/8") by three-quarter inch (5/8" x ¾") (¾") inch meter.

L. Existing water services not used shall will be noted on the approved civil plans and the as-built plan as abandoned at the main with full circle stainless steel repair clamp. The services shall be properly abandoned during construction.

C. A one (1") inch meter and setter at a minimum is required on domestic meter sets when supplying the water to fire sprinklers and domestic flows of a dwelling.

4.7.19 BACKFLOW PREVENTION AND& CROSS CONNECTION CONTROL

A. The installation of Backflow Prevention Assemblies is required for all developments with the exception of single family residential., unless the property has a groundwater well. The following types of service connections shall require backflow prevention to be installed: commercial meters, master metered systems, irrigation meters, construction meters, hydrant meters, multifamily residential meters, and fire protection connections.

B. Residential uses are required to have a Backflow Prevention Assembly when a well, pond, submerged make up line, automatic irrigation system or fire sprinkler is present, which may raise the degree of hazard for the site.

1. The type of backflow assembly required is determined by the degree of hazard. Reduced Pressure Zone Assemblies (RPZA) shall be required for all commercial, multifamily residential, master metered systems, private potable water systems and irrigation meters. A testable Double Check Valve Assembly (DCVA) shall be required for all fire protection connections.

2. The AgencyCity of Prescott Backflow Prevention Program, Prescott City Code (PCC,), Section 2-1-55 and TOPV Town Code Article 9-05a, requires that Backflow Prevention Assemblies be installed according to QCSDCOP Standard Details 324Q-1 and 324Q-2, as applicable for size and in accordance with the adopted plumbing code.

3. All backflow prevention assemblies shall be approved by the "Foundation for Cross Connection Control and Hydraulic Research of the University of Southern California", and the applicable AgencyCity of Prescott Public Works Department.

1. All backflow prevention assemblies shall be freeze protected by an ASSE 1060, Class 1 Hotbox (or approved equal) with electrical power for heat unless installed within a fire riser room or underground vault.

4. Initial certification testing is required upon establishment or restoration of water service to the meter. A certified backflow prevention device tester, approved by the COP Public Works Department/TOPV Utilities Department, shall make all testing, maintenance, and repairs to the backflow prevention assembly at the water service customer's expense. The initial testing and the required annual testing are the responsibility of the water service customer.

Water filled or dry fire5. Fire protection systems require the installation of an Agencya City of Prescott approved testable double check valve backflow prevention assembly (DCVA). An approved RPZA is required for any connection to chemical or anti-freeze filled systems.

a. Fire lines that feed building fire sprinkler systems may install a DCVA in an NFPA approved fire riser room if the distance from the public/private interface to the riser room is less than one-hundred and fifty (150') feet. In this case, the DCVA shall be mounted per manufactures instructions vertically on fire riser and prior to any piping that consists of material not International Plumbing Code (IPC) approved for potable water piping. The DCVA shall be installed to allow for clearances per the adopted fire code Fire Code.

b. Fire lines Lines that do not meet the criteria, shall in 4.7.19.e.1 require a double-check, detector-type assembly (DCDA) to that a DCVA shall be installed in a vault that straddles as close to the public/private interface. as practicable but not within the utility easement or ROW. The vault shall not be installed in any drainage, retention or detention area, driveway, or parking lot entrance/exit. If the vault is located within a paved area, the vault and lid shall be traffic rated. The DCDA DCVA shall be installed in the vault to provide at least minimum clearances per the adopted fire code. The DCDA shall be a Colt Series C500, FEBCO MasterSeries LF866, Watts Series 709DCDA, or approved equal (see the USC list of approved backflow prevention devices). Fire Code.

a. Developments that elect to install a private water system that feeds private fire hydrants shall install a detector-type testable DCVA (DCDA) as close to the public/private interface as practicable but not within the utility easement or ROW. DCDA shall be a Colt Series C500, FEBCO MasterSeries LF866, Watts Series 709DCDA or approved equal (see the USC list of approved backflow prevention devices).

c. The location of the backflow prevention assembly shall be indicated on the approved civil plans.

C. Every effort shall be made to locate the water meter and vault in an area that can accommodate a properly installed backflow assembly. When the location of a backflow preventer cannot be accommodated adjacent to the meter, the designer shall:

1. Request in writing to separate the backflow assembly from the meter with a detailed explanation why the applicable standard cannot be met as well as the proposed alternative location and measures that will be taken to ensure no taps can be made between the meter and the device.

2. Backfill the water line between the meter box and the backflow preventer with 1-sack slurry Controlled Low Strength Material (CLSM) per MAG Section 728. CLSM shall be placed to the full width of the trench and to six (6") inches above top of pipe.

3. Note on the plans that inspection of the water piping connecting the meter to the backflow preventer be inspected by an Agency a City of Prescott Water Protection Specialist prior to CLSM and backfill.

D. The Agency City of Prescott requires backflow prevention on temporary hydrant meters used to supply construction water, in accordance with the Agency's. For additional information, contact Water Operations at 928-777-1118 for "Hydrant Meter Policy".

4.7.20 EASEMENT, TRACT AND RIGHT-OF-WAY (ROW) EASEMENT REQUIREMENTS

Easements shall only be used for water mains in areas where parcels are already platted, or a sub-division already exists. Easements are not intended and shall not be used in newly platted subdivisions.

A. Easement Requirements:

1. Any A. All public water main or appurtenance that is not located within ROW or a mains and appurtenances located outside of a public right-of-way or a private street tract with easement dedication overlay shall be placed within an appropriately designated in the center of a minimum twenty (20') foot wide easement.

The water main shall be centered in the easement and shall be located a minimum of ten (10') feet from the edge of the easement. The minimum easement width shall be twenty (20') feet. easement. The easement shall have legal access from a public right-of-way, shall be free of obstructions, shall not be located in a fenced area, and will be accessible at all times to City of Prescott service equipment such as trucks, backhoes, etc. Water mains shall not have more than six (6') feet of cover in a twenty (20') foot easement. Water mains with more than six (6') feet of cover shall require additional easement area main easements located outside of paved areas shall have a twelve (12') foot wide all weather access road per COP Standard Detail 612P.

2. In an easement that contains both a water main and a sewer main, the minimum easement width shall be thirty (30') feet. Additional utilities B. The City Engineer may require additional easement width if in their opinion excessive laying depth of the pipe would require the additional width.

Utility easements containing water lines, but not sewer lines, may be fenced if unlocked gates with a minimum width of sixteen (16') feet are provided to allow free movement of excavating machines, for maintenance equipment, and personnel throughout the full length of the easement purposes.

3. Easements that contain a water main shall be free of obstructions at all times. Easement lines run vertically above and below the ground surface. Overhangs and building foundations, including footings, shall not protrude into the easement.

4. Fence posts shall not be installed within five (5') feet of the center of the pipeline, and the first post on either side of the pipe shall be set in hand dug holes. To perform normal inspections, maintenance, and repair, access through or around fences crossing the Easement Area must be provided.

5. No trees, or other permanent plantings are allowed in easements that contain a water main. Lawns, flower beds and vegetable gardens are C. Any re-vegetation within the easement shall consist of low growing shrubs or plant material acceptable uses of the easement area.

6. Easements located outside of paved areas shall have a twelve (12') foot wide all-weather access road per QCSD 612Q.

7. Excavation within any portion of an easement with a water main shall not be allowed without approval of the Agency. Excavating closer than two (2') feet vertically or horizontally to the pipeline shall be done by hand until the pipe is exposed and shall be done only under observation of an authorized Agency representative.

8. Grading within any portion of an easement with a water main shall not be allowed without a grading permit.

9. No well drilling, septic drain fields, septic tanks or septic treatment facilities are permitted in the easement area.

10. All other restrictions outlined in each specific easement document shall also apply.

B. Tract Requirements:

1. Any public water main or appurtenance located in a tract shall have the tract dedicated to Agency as either a public utility easement or water easement at the time of the plat.

The minimum tract width shall be twenty (20') feet if used for one (1) utility and a minimum of thirty (30') feet if used for two (2) utilities. Additional utilities may require additional width. The water main shall be City Engineer. Trees may be located a minimum of ten (10') feet from along the edge of the easement. Water mains shall not have more than six (6') feet of cover in a twenty (20') foot easement. Water mains with more than six (6') feet of cover shall require additional easement area but not within ten (10') feet of the water main as measured to the trunk of the tree.

2. Tracts that contain a water main shall not be walled or fenced in or over. Providing a gate over or a single chain with Agency access shall be allowed.

3. Tracts that contain a water main shall be free of obstructions at all times.

4. Trees and large shrubs shall be allowed in tracts that contain a water main but shall not be allowed within ten (10') feet of a water main.

5. Tracts located outside of paved areas shall have a twelve (12') foot wide all-weather access road per QCSD 612Q.

6. Excavation shall be allowed in tracts that contain a water main but shall not be allowed within ten (10') feet of a water main that has less than six (6') feet of cover and shall not be allowed within a distance equal to the depth of cover for water mains over six (6') feet of cover.

7. Grading shall be allowed in tracts that contain a water main but shall not be allowed within ten (10') feet of a water main that has less than six (6') feet of cover and shall not be allowed within a distance equal to the depth of cover for water mains over six (6') feet of cover.

C. Right-of-Way (ROW) Requirements:

1. Water mains or appurtenance shall be located in the public ROW whenever possible.

2. Water mains with less than six (6') feet of cover shall be a minimum of ten (10') feet from the edge of the ROW and placed in accordance with QCSDs 200Q-1 and 601Q through 606Q.

3. Water mains with more than six (6') feet of cover shall require additional separation from the edge of the ROW.

D. Excavation and grading shall be allowed in the ROW with a right-of-way permit.

SECTIONSection 4.8 FIRE PROTECTION

4.8.1 GENERAL INFORMATION

A. It is the intent of the COP and CAFMA Fire DepartmentsDepartment 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.

B. For information related to the most currently adopted plumbing and fire codes, see the Prescott City Code (PCC) and the International Fire Code (IFC,), with most recent Agency amendments.

C. If the property is to be supplied with domestic service and with fire flows from a storage tank or facility, the EOREngineer of Record shall provide a report indicating that the required pressures and volumes exist, as required by the Fire and COP Public Works/TOPV Utilities Departments, and are available to meet the required fire demands.

D. Particular attention shall be given to the fire hydrant locations on final plans for infrastructure where future building locations are not identified. Final building location and elevation may necessitate the addition of water mains, fire hydrants, and/or a fire pump to serve the structure. Compliance with the fire hydrant spacing and pressure requirements are the responsibility of the party requesting a building permit.

4.8.2 FIRE FLOW REQUIREMENTS

A. Water distribution facilities shall be sized to deliver the following minimum fire flows:

A. One-thousand (1,000) gpm minimum, for single-family residential properties under three-thousand six-hundred (3,600) square feet.

. One-thousand five-hundred (1,500) gallons, per minute (gpm) minimum for commercial, industrial, multi-family residential properties and single-family dwellings three-thousand six-hundred (3,600) square feet or greater.

2. One thousand (1,000) gallons, per minute (gpm) minimum, for single family residential properties under three thousand six hundred (3,600) square feet.

3. Larger structures over three-thousand six--hundred (3,600) square feet and non-sprinkled structures may require fire flow above one-thousand five-hundred (1,500) gpm depending on construction type.

4. The fire flow requirements are subject to change. All fire flows and structural calculations shall be met as stated in the currently adopted IFC and most recent Agency amendments International Fire Code shall be met.

4.8.3 HYDRANT LOCATIONS

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

B. The Fire Department shallwill stipulate fire hydrant locations during the site planning process or during planplans review. The following standards shall be used as a guide:

1. The Fire Department will stipulate fire hydrant final locations during the site planning process or during the plan review

2. Fire hydrants shall be provided along required fire apparatus access roads and adjacent public streets.

3. The minimum number of fire hydrants available to a building complex or subdivision shall not be less than that determined by spacing requirements listed in the currently adopted fire codeFire Code. Exception: The Fire Marshalfire chief is authorized to accept a deficiency of up to ten (10%) percent where existing fire hydrants provide all or a portion of the required fire hydrant service.

4. Existing fire hydrants on public streets may be considered for adjacent development. Existing fire hydrants on adjacent properties shall not be considered available unless fire apparatus access roads extendingextend between properties, and easements are established to prevent obstruction of such roads.

5. Regardless of the average spacing, fire hydrants shall be located such that all points on streets and access roads adjacent to a building are within the distances listed in the currently adopted fire code.Fire Code

4.8.4 FIRE LINES AND BUILDING SPRINKLER LINES

A. The location of on-site fire lines and taps shall be determined by the relative location of the fire department connection, riser location, emergency access, and fire hydrant locations and water main locations.

B. The size of fire lines shall be determined by the EOR Engineer of Record for design of the project based on required fire flow demands. Fire systems shall include a backflow preventer in accordance with 4.7.19. GES Section 4.7.19.A.2.e.

All C. Show all fire lines shall be shown on the approved civil site plan including underground remote fire department connection (FDC) lines.

D. Fire lines shall not be connected to transmission mains.

E. Installation of fire service lines: Fire Service Lines

1. Installation of two (2") inch and smaller fire service lines shall use a saddle connection per QCSD COP Standard Detail 316P-1 and 316P-.

1. 2 within the COP or 310PV-1 and 310PV-3.

. Installation of fire service lines three (3") inch and larger than two (2") inches shall fire service lines use a tapping sleeve tee and valve per QCSD COP Standard Detail 340Q-1.

At the discretion of the Agency, meters may be 3. Meters are not required on services used solely for fire sprinkler systems.

4. All private fire sprinkler lines shall be installed with trace wire per QCSD COP Standard Detail 319Q-1.

F. Fire service lines shall be installed perpendicular to the main within the ROW right-of-way or easement.

G. Excessive lengths of line, as determined by the City/Town Engineer, may require additional backflow protection near the main to prevent stagnant water flowing into the active portions of the Agency's City's system.

H. No service laterals or irrigation laterals shall be connected to fire lines.

4.8.5 FIRE DEPARTMENT CONNECTION

A. If a remote FDC Fire Department connection for a sprinkler system is required, it shall be installed between four (4') feet and eight (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 shall be unobstructed and readily accessible to the Fire Department. The This connection location shall also be approved within an appropriate distance of a fire hydrant as determined by the Fire Department.

FDCs B. Fire Department connections, whether remote or wall mounted, need to be identified and coordinated on the civil improvement plans and on the building site plan for relationship to fire lanes and fire hydrants. All FDCs Fire Department connections shall be appropriately clear of glazing and other hazards and shall be protected from vehicular damage.

Location C. Pavement markers for Fire Department sprinkler system connections shall be provided provide per the adopted International Fire Code (IFC and most recent Agency amendments.).

4.8.6 AUXILIARY STORAGE TANKS

Minimum water pressures and discharge flow shall be in accordance with the adopted fire code. Fire Code. A fire pump package with an auxiliary storage tank 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 require produce a pressurized fire flow supply in excess of the water transmission mains' mains capabilities.

ARTICLE 5/ WASTEWATER

SECTIONSection 5.1 INTRODUCTION

5.1.1 PURPOSE

A. The purpose of this Article is to provide engineering standards, guidelines, and geometric requirements for the design and construction of the public wastewater collection system and private sewer systems that discharge into the public collection system within the City of Prescott (COP), Town of Prescott Valley (TOPV), and Town of Chino Valley (TOCV).. This Article is complimentary and supplemental to the Prescott City Code (PCC): Title 2, Chapter 1/ Public Works Department, Title 10/ Land Development Code (LDC), and Title 16/ Street and Utility and Drainage Requirements, and all other Articles of the Quad City General Engineering Standards (GES), the Town). An electronic copy of the Prescott City Code (PCC) can be found on the City of Prescott Valley Town Code, specifically Chapter 9 – Health and Sanitation and Chapter 16 – Engineering, and the Town of Chino Valley Town Code. website at www.prescott-az.gov.

B. Alterations or modifications to the standards of this section shall be through the procedure described in Article 9 of this document.

5.1.2 APPLICABILITY

A. The standards and guidelines of this Article shall apply to the construction, modification, replacement, and extension of all wastewater mains, lift stations, and other appurtenances as well as any modification of the public wastewater collection system to be owned, operated, and maintained by the City of Prescott, Town of Prescott Valley, or Town of Chino Valley (Agency). Privately fundedand any private sewer mains that are proposed to be connected to the Agency's system are reviewed for compliance with Agency standards. Private sewer mains shall be extended to new users in a logical and cost-effective manner without adversely affecting existing customers andthat discharges into the public collection system performance. This Article is intended for use in plan design, plan preparation, and the plan review processesprocess. The information provided in this Article is not intended to cover all situations that arise, nor may it be a substitute for sound engineering principles and judgment.

B. Developers are required to install all improvements necessary to provide wastewater service to their development. This includes any sanitary sewer main, lift station, force main, manhole, vault, or other facilities and all required appurtenances, including the payment of all applicable development fees. Developers shall also adhere to the Agency standards for extension of the Agency's wastewater system to newly developed areas, subdivisions, and in-fill areas inside the Agency's service area in accordance with the Agency Wastewater Collection Model.

C. Developers shall also adhere to the City of Prescott's standards for extension of the City of Prescott's wastewater system to newly developed areas, subdivisions, and in-fill areas inside the City of Prescott's service area in accordance with the City of Prescott's Wastewater Collection Model.

5.1.3 DESIGN STANDARDS AND GUIDELINES

A. All public sanitary sewer systems shallare to be of a gravity flow design, unless other factors dictate the use of a force main and lift station. For lift station and force main requirements, refer to Section 5.7.2 and Section 5.7.3.GES, Section 5.7.2 (Wastewater Lift Station) and GES, Section 5.7.3 (Force Main). Developments that require the construction of lift station facilities and force mains shall address the facilities'facilities compatibility with the Agency'sCity of Prescott's Wastewater Collection Model.

B. A civil engineer registered in the State of Arizona shall analyze, design and seal all proposed wastewater system project plans, reports and specifications that are determined by the City/Town Engineer to have an impact on the wastewater collection system. The effects of peak flow shall be examined to ensure proper sizing and layout of proposed wastewater system facilities, including impacts to existing off-site facilities.

5.1.4 FEDERAL, STATE AND COUNTY REGULATIONS

U.S.A. Environmental Protection Agency (EPA) Regulations

1. The U.S. Environmental Protection Agency (EPA) requires the AgencyCity of Prescott to develop and implement a pretreatment program to control discharges that might harm publicly owned treatment facilities.the Publicly Owned Treatment Works (POTW). The program establishes local discharge limits for non-residential users, and provides a permitting process based on the users'users' discharges and types of businesses.

2. The EPA's "Onsite Wastewater Treatment Systems Manual"Environmental Protection Agency (EPA/) wastewater flow report (*EPA 625/R-00/0080008 – Chapter 3*), states "Greatgreat care shouldshall be exercised in predicting wastewater characteristics so as not to accumulate multiple factors of safety that would yield unreasonably high design flows…."..". Further, "…"..."actual measurement of wastewater flowflows and quality from a residential dwelling or nonresidential establishment always provides the most accurate estimate for sizing and designing…."..". Therefore, the priority of obtaining water and wastewater design flows is 1) flow measurements from the actual facility, 2) the use of flows from similar facilities in the immediate area, 3) the use of similar flows from similar facilities in other areas, and, 4) flow tables.

B. Arizona Department of Environmental Quality (ADEQ)

Engineering Bulletin No. 11, "Minimum Requirements for Design, Submission of Plans and Specifications of Sewage Works" published by the Arizona Department of Environmental Quality (ADEQ), and the Arizona Administrative Code (AAC), "Title18 - Environmental Quality" (R18-9), contain specific requirements for submittals, approvals, and notifications when extension of a public sanitary sewer main is proposed. Additional information can be found on the ADEQ website at www.adeq.gov/function/permits/index.html.www.adeq.gov/function/permits/index.html.

1. Before a permit is issued for the construction of civil infrastructure, the developer shall submit to the City Engineer, Construction Authorization from ADEQ.

2. Before the City Engineer will issue an Approval to Operate (ATO) and Release from the City of Prescott, the developer shall deliver to the City Engineer, a signed Discharge Authorization from ADEQ.

C. Yavapai County Environmental Services Department (YCESD)

1. Before a permit is issued for the construction of civil infrastructure, the developer shall submit to the City/Town Engineer, Construction Authorization from ADEQ. Before through the City/Town Engineer will issue an Approval to Operate (ATO) and release from the Agency, the developer shall deliver to the City/Town Engineer, a signed Discharge Authorization from ADEQ. YCESD delegation.

A. Yavapai County Environmental Services Department (YCESD)

2. Before a permit is issued for the construction of civil infrastructure, the developer shall submit to the City/Town Engineer, Construction Authorization from ADEQ through the Yavapai County Environmental Services Department (YCESD) delegation. Before the City/Town Engineer will issue an Approval to Operate (ATO) and release from the AgencyCity of Prescott, the developer shall deliver to the City/Town Engineer, a signed Discharge Authorization from ADEQ through the YCESD delegation.

D. City of Prescott (COP)

1. Issuance of an Approval to Construct by YCESD or ADEQ does not constitute an approval of plans and reports by the Agency.City of Prescott. No construction shall commence prior to the City/Town of Prescott City Engineer issuing a permit.

2. An as-built submittal is required prior to receiving an ATO and release from the Agency.

D. Agency Approval (City of Prescott, Town of Prescott Valley, or Town of Chino Valley)

1. Issuance of an Approval to Construct by YCEDS or ADEQ does not constitute an approval of plans and reports by the Agency. No construction shall commence prior to the Agency issuing a permit.

An as-built plan submittal is required prior to receiving an ATOOperate and Release from the Agency. As-built submittals shall be in accordance with Article City of Prescott.10.

Section 5.2 GENERAL INFORMATION

5.2.1 AVAILABILITY OF PUBLIC CITY/TOWN SEWER

A. The Engineer of Record (EOR) shall submit the required forms for ADEQ approval to the COP Public Works/TOPV Utilities Department.

1. ADEQ approval is delegated to YCESD.Yavapai County Environmental Services. Refer to Yavapai County'sCounty website https://yavapaiazwww.azdeq.gov/devserv/environmental-services-division for further information and applicable forms.

B. Average daily design flows shall be used for the Treatment Capacity Assurance, while appropriate peaking factors per Table 5-3(GES) Table 5-3 and Table 5-4Table 5-4 shall be applied to flows for the Collection Capacity Assurance.

C. In order to prevent the possibility of differing ADEQ and AgencyCity of Prescott approved plans, the AgencyCity of Prescott will **NOT** sign and release the Capacity Assurance Forms until all design and review comments have been resolved. Design and construction scheduling shall account for this requirement. Design issues relative to capacity shall be resolved prior to forms being signed.

5.2.2 PRIVATE WASTEWATER AREAS

A. Private wastewater collection providers serve portions of the Agency'sPrescott's municipal service area. Placing private sanitary sewer mains within Agency rightCity of Prescott rights-of-way (ROW) shall require a license agreement between the private wastewater company (e.g. LLC or HOA) and the Agency. The private wastewater company may be Home Owners Association (HOA), Limited Liability Companies (LLC), or other entities established to provide ownership, operation, and maintenance responsibilitiesCity of Prescott.

B. The private wastewater service provider shall review modifications or construction of wastewater systems within their service areas. When submitting final plans, the developer shall provide written documentation that the private wastewater service provider has reviewed and approved the sanitary sewer mains within its jurisdiction.

C. The AgencyCity of Prescott shall review all private wastewater systems as part of the plan review process. A note shall be placed on the recorded plat or lot split survey and on the construction drawings stating the sewer collection system is private or public as well as operation and maintenance responsibilities on each specific portion of the system constructed. The plan cover sheet shall include a signature block for the party responsible for maintenance.

D. Private wastewater system connections to the AgencyCity system shall be built to AgencyCity of Prescott standards for public sewer force main discharge as identified in Section 5.7.3.GES, Section 5.7.3. Required testing of the system shall be performed after backfill and compaction have been completed.

5.2.3 PRIVATE ON-SITE SYSTEMS/ALTERNATIVE TREATMENT FACILITIES

The Agency will review the site plan butThe City of Prescott does not issue approval for the installation of on-site treatment and disposal systems (i.e. septic or alternative systems). Approval for on-site systems, in lieu of connection to the AgencyCity of Prescott public sanitary sewer system is reviewed and permitted by Yavapai County Environmental Services Department (YCESD,), under Delegation Agreement from , Arizona Department of Environmental Quality (ADEQ). The City will also review the site plan. The property owner is responsible for the design, permitting, construction, operation, and maintenance of these systems in accordance with all permit conditions.

5.2.4 PRIVATE GRAVITY MAINS/LOW PRESSURE SEWER SYSTEMS

A. The AgencyCity of Prescott does not own, operate or maintain Low Pressure Sewer (LPS) Systems as these systems are considered private by the Agency.City of Prescott. For connection of an LPS to the AgencyCity of Prescott system for more than one home, the language from Section 5.2.4.B.15.2.4.B.1 is to be added to the project plans, final plat, Conditions, Covenants,CCR's and Restrictions (CCR's) andthe deeds. Formation of a Limited Liability Company (LLC), or other entity approved by the AgencyCity of Prescott Legal Department for perpetual maintenance responsibilities shall be required.

B. Operation, Maintenance and Repair of Common Elements and Units

1. 1. Operation, Maintenance and Repair of the Private Sewer System:

. The individual sewer customers are served by private sewer collection systems, located as shown on the final as-built project plans, the operation and maintenance of which are the responsibility of the Wastewater Service Provider (providerProvider) in perpetuity. The providerProvider shall pay the cost of all operation, maintenance, repair and replacement, of private systems. These private systems are connected to main lines operated by the AgencyCity of Prescott, as identified on the final approved plans. The AgencyCity of Prescott

shall have no obligation or requirement to assist or provide manpower or equipment to perform or supplement any responsibilities pertaining to said private sewer systems, all of which are those of the providerProvider. The provider,Provider shall provide on a yearly basis, shall submit the firm, contact name, business phone number and emergency phone number for the private system operator, who shall be certified by ADEQthe Arizona Department of Environmental Quality at the required level, to the Agency's wastewater operation's manager.

2. 2. Identification of Private Sewer System:

. All sewer clean out covers associated with the private system, per Quad CityCOP Standard Detail (QCSD) 270Q, shall be clearly marked "Private Sewer" with cast lettering on the cover.

3. 3. Homeowner Responsibilities:

. Homes within the private LPS area that have sewer ejector pumps shall be owned, operated and maintained by the individual homeowner. The AgencyCity of Prescott shall have no obligation or requirement to assist or provide manpower, equipment or assist the homeowner in maintaining sewer ejector pumpssaid duties.

4. Arizona 811 (formerly4. Arizona Bluestake) Responsibilities:

. The providerProvider shall, as the owner of underground facilities and as required by State law, join and maintain membership in the Arizona 811Bluestake Association at a membership level determined by the Arizona 811Bluestake Association, with all the rights and obligations set forth by law.

C. Acceptance of Private Sewer Systems for AgencyCity of Prescott Ownership, Operation, and Maintenance

1. The legal entity shall not petition the AgencyCity of Prescott to accept the private system or any portion thereof for ownership, operation, or maintenance until the systems are reconstructed to meet AgencyCity of Prescott standards in effect at the time of said petition.

Section 5.3 AGREEMENTS

Developers and property owners who install improvements to the public wastewater system may be eligible to request a credit, oversize or reimbursement agreement or development agreement with the AgencyCity of Prescott allowing for partial reimbursement of costs to design and construct those improvements. Only those system components identified in the Agency'sCity's then current Master Plan shall be eligible for such consideration.

Section 5.4 PLAN SUBMITTAL REQUIREMENTS

A. The improvement plans submitted to the AgencyCity of Prescott for approval shall adhere to professional engineering standards governed by the State of Arizona Board of Technical Registration. Improvement plans shall be complete and shall comply with AgencyCity of Prescott and State Board requirements. Improvement plans that do not meet industry standards, or are incomplete, shall be returned by the AgencyCity of Prescott without review comments and shall be determined to be an inadequate project submittal. Additional plan review fees may be required. Repetitive submittals of non-compliant and inadequate improvement documents may be subject to State of Arizona Board of Technical Registration review.

B. Plans for new sewer mains and extensions of existing sewer mains shall comply with the requirements of Agency Code:the Prescott City Code (PCC), Article 2, Chapter 2-1-11 and 2-1-37.

PCC, Title 2, Chapters 2-1-11 and 2-1-37
TOPV Town Code Article 9-05

C. A civil engineer registered in the State of Arizona is required to analyze the wastewater generation from a proposed development while determining the closest and best connection point through discussion with the City/Town Engineer. The EOREngineer of Record shall also determine its impact on the Agency'sCity of Prescott's wastewater collection system. This analysis is required from the development to the downstream system. The AgencyCity of Prescott is responsible for analysis of sanitary sewer mains shown in the Agency'sCity of Prescott's most recently adopted Water & Wastewater Model. Models.

Section 5.5 WASTEWATER SYSTEM REPORTS

5.5.1 GENERAL INFORMATION

All projects shall be required to submit a Wastewater Master Plan Report and/or a Wastewater System Design Report.A. The purpose of thesedevelopments wastewater master plan and design reports is to analyze provide an analysis of the impact that thea development will have on the Agency'sCity of Prescott's wastewater system. These reports are reviewed and accepted by the City Engineer.

All Wastewater System Reports shall be prepared under the direction of a licensed B. Analysis of all proposed development determined by the City of Prescott to have an impact on the wastewater system shall be performed by a civil engineer, registered in the State of Arizona. The reportanalysis shall be sealed and signed by the EOR in accordance withinclude the requirementseffects of peak flow to ensure proper sizing and layout of the State of Arizona Board of Technical Registration and submitted to the City/Town Engineer. proposed wastewater system facilities.

C. The objectives of the Wastewater System Reports are to verifydetermine the development's wastewater generation rate, analyze the hydraulics of the proposed sanitary sewer system to a point of connection within the Agency'sCity of Prescott's Wastewater System Model and demonstrate conformance for each phase of the development with the accepted master plan for that development. All reports submitted to the AgencyCity of Prescott for review shall be prepared in accordance with Article 1, Section 1.3, in addition to the following guidelines:

1. Format:

a. The report and all supporting or supplemental material shall be PDF documents with on letter-sized, paper eight and one-half inches by eleven inches (8.5" x ½" X 11") inch pages.

b. All reports shall have a table of contents, including page numbers.

a. Larger exhibits or maps shall be provided in PDF format at their full size, generated from the original drawing files.

c. Maps and other supporting materials larger than folded ledger size paper eleven inches by seventeen inches (11" X 17") shall be placed into sleeves as an appendix to the report

d. A civil engineer licensed to practice in the State of Arizona shall seal each report in accordance with

e. The project name shall be located on the requirements of the State Board of Technical Registration. cover

b. The report cover shall contain the following:

1) Project Name

2) Project Location

f. The name, address, and phone number of the developer/owner and engineer shall be on the EOR.cover

g. The original submittal date and all subsequent revision dates. shall be located on the cover

h. Common spreadsheet formats shall be compatible with MicrosoftMS Excel.

2. Existing Conditions:

a. Reference any existing master plans or design reports applicable to adjacent development.

b. Include excerpts from existing plans or reports as applicable.

c. Indicate the dates, times and results of certified flow monitoring of the existing wastewater system.

d. Include a description based on all parts or reference within a platted development.

a. Provide a site description, size, addresses, major streets, township, range and section, relationship to other developments or significant sewer features

b. State the existing zoning and land use

c. Describe the existing, topography, and naturallandform features, site slope and other conditions affecting gravity sewer installation.

e. Include the location and description of existing utilities in the vicinity.

f. Describe the existing and proposed site zoning and land uses.

g. Include reference to elements of the Agency's General Plan and identify any designated character area or studies that will affect the project's design.

h. d. Describe the existing wastewater collection system infrastructure affected by the development.

Identify lift stations and downstream trunk mains that will be used to convey wastewater from the development.

e. Reference any existing master plan(s) or design report(s)), applicable from adjacent development. Include excerpts from existing plans or reports, as applicable.

3. Proposed Conditions:

a. Summarize the proposed development, including project name, size and type of development. Include a site plan that indicates the layout of the proposed development with a survey, a minimum of one-hundred (100') feet beyond the project limits, or as determined by the City/Town Engineer.

a. Identify the location and size of all proposed connection(s) to the Agency's wastewater system.

b. Describe any infrastructure required to convey wastewater from the development to the wastewater treatment plant. Show all proposed connection(s) to the City of Prescott's wastewater system. Show extension of sanitary sewer mains into and within the site

b. Show all extensions of sanitary sewer mains into and within. Summarize the site.

The ADEQ and/or Agency's City of Prescott's design standard requirements that were applied to this project shall be summarized.

c. Reference which sewer subbasin the site is within and address all required facilities needed to convey the projects generated wastewater to the ultimate outfall via gravity flow or pressurized force mains and lift stations.

d. Address ownership, operation, and maintenance responsibilities of the proposed wastewater system.

1. Mapping:

a. All mapping shall conform to Agency adopted CADD standards and the GES Article 8, Survey Controls.

b. ~~e.~~ The project name shall be located on each sheet.

c. The name, address, and phone number of the developer/owner and EOR shall be stated on each sheet.

d. The original submittal date and all subsequent revision dates shall be located on each sheet.

e. All maps shall be prepared to an appropriate scale that is sufficient to show all required information clearly.

f. Include all proposed or existing on-site and off-site facilities, including, but not limited to, wastewater gravity mains, force mains, lift stations, manholes, clean-outs, etc.

g. Include all proposed or existing street locations, parcel boundaries, and proposed lots within each parcel. All property lines, ROW, tracts, and easement lines shall be clearly labeled.

h. Contour lines shall have a maximum of two (2') foot intervals and ten (10') foot labels.

i. Include a small vicinity map and a more detailed location map showing the general location of the project with major arterial streets labeled along with geographic orientation to a distance of one mile from the exterior boundaries of the project.

j. Graphics shall present existing utilities as dashed lines and proposed utilities as bold, solid lines.

Design Methodology:

~~1)~~ Sanitary sewer main design shall provide gravity collection and buildout flows from the ultimate service area and shall allow for future extension of service to adjacent parcels when possible.

~~2)~~ Modeling – The~~Identify the~~ software used and specific assumptions in the model shall be identified.

~~3)~~ Wastewater Flows – Land~~Identify land~~ use, population, population density, loads and peaking factors shall be identified.

4) Collection System Network – Mains Identify and describe mains that will be required to serve the development shall be identified and described.

5) Lift Stations – Temporary

i. Describe temporary and/or permanent lift stations, where required, shall be described. Design

ii. Provide design parameters, and layouts, when appropriate, shall be provided.

iii. Lift stations shall be designed in accordance with Agency City standards for materials, equipment, communication and backup power.

6) Outfalls – Location Identify and describe location and size shall be identified and described.

f. Wastewater Model and Results:

1) Identify main sizes, slopes, and other results as obtained from the model.

2) Include a map of the collection system for each simulation where pipes are color coded or appropriately labeled.

Identify any 3) Any interim areas that do not have sufficient self-cleansing velocity and may require additional maintenance activities until build out. shall be clearly identified

Provide a table g. Table summarizing parcels, acreages, land use, and population.

4. Mapping & Exhibits

a. All mapping shall conform to City of Prescott adopted CADD standards and the GES Article 8

b. The project name shall be located on each sheet

c. The name, address, and phone number of the Engineer of Record shall be stated on each sheet

d. The original submittal date and all subsequent revision dates shall be located on the cover

e. All maps shall be to scale

f. Include a vicinity map identifying the projects location with respect to major cross streets

g. All proposed or existing on-site and off-site facilities, including, but not limited to, wastewater mains, lift stations, manholes, etc

h. All proposed or existing street locations, parcel boundaries, and proposed lots within each parcel. Show dimension and label clearly all property lines, rights-of-way, tracts and easement lines

i. Contour lines, shall have a maximum of two (2') foot intervals and ten (10') foot labels

j. Graphics shall present existing utilities as dashed lines and proposed utilities as bold solid lines

k. Screen existing topography into the background. Clearly label existing and proposed contour lines at ten (10') foot intervals. Show sufficient information to evaluate pipe cover

5.5.2 WASTEWATER MASTER PLAN REPORT CONTENT

A. A wastewater master plan is required when phased construction is proposed or if required by the City/Town Engineer. The Wastewater System Master plan shall show compliance with the Agency's City of Prescott's design criteria and development policies for each phase of the project and establish a skeletal system for the phased development of a master planned planed project.

B. The Wastewater Master Plan Report shall specify the terms and requirements for wastewater service to the development.

C. All development projects shall be responsible for determining their specific wastewater discharge and shall include buildout flows from any upstream developments to ensure the system is designed properly.

D. If the proposed development contemplates a change in the original master plan or zoning, which increases density or increases wastewater system flows differently different from the Agency's City of Prescott's existing Wastewater System Master Plan, then additional downstream analysis shall be required.

E. Flows shall be calculated according to the hierarchy established in Section 5.1.4. the GES, Section 5.1.4.A.2.

An electronic submittal F. Along with the model report, a computer disk containing all analysis and model files modeling shall be submitted along with the model report if the project is determined to be of sufficient complexity. Model files shall be and compatible with EPA-NET model software or Aquanuity or Innovyze.

G. Each model Model map shall show the following:

1. All proposed on-site and off-site facilities including, but not limited to, lift stations, trunk mains and service connections and laterals.

2. Proposed street locations, parcel boundaries and proposed lots within each parcel.

3. Contour lines, with a maximum of two (2') foot intervals.

4. A separate area location map showing existing and proposed streets, as well as existing parcels surrounding the project to a distance of one (1) mile from the exterior boundaries of the project.

An appropriate5. A scale that is sufficient to show all required information clearly.

H. The AgencyCity of Prescott requires wastewater mains to be installed along the entire length of the property line frontage of the property being developed. The property line frontage is defined as that portion of a parcel of property that abuts a street, easement, or public ROWrights-of-way. If a parcel to be developed has more than one frontage, improvements shall be installed along all frontages where future connectivity is possible.

I. A construction phase matrix shall be included in a table format for all wastewater related infrastructure required to serve the development. The table shall include each phase, parcel, and each system component. A mark in each box shall specify when infrastructure is anticipated to be required, for each phase of the development.

J. The masterplan report shall comply with the adopted AgencyCity of Prescott Wastewater System Master PlanMasterplan encompassing the respective area.

5.5.3 WASTEWATER DESIGN REPORT CONTENT

A. All development projects shall be required to provide an analysis of the projectprojects impact on the Agency'sCity of Prescott wastewater system. If the project involves a subdivision plat or lot split, a preliminary design report is required with submission of the preliminary plat or lot split survey. The final sewer system design report, shall be submitted with the civil plans. The civil plans shall not be approved until the sewer system design report has been approved.

A. B. The report shall determine the development's wastewater hydraulic load, and analyze the hydraulics of the proposed sanitary sewer system and its impact to the Agency'sCity's existing system. Additionally, commercial and industrial developments shall include both hydraulic and concentration loads.

The analysis shall include the effects of the peak flow to ensure correct sizing and layout of the new wastewater facilities.

C. Design Documentation

A summary of1. Summarize the proposed development shall include. Include a description based on aliquot parts or reference within a platted development and describe the proposed uses.

A2. Include a narrative of which design procedures, policies and methodologies will be incorporated into the design of the proposed wastewater system shall be provided.

Compliance3. Note compliance with the General Engineering Standards (GES) and all other applicable standards and codes shall be noted on the design report.

The4. List the title and version of any software used in the design analysis shall be listed.

D. Analysis

1. Analysis shall include engineering evaluation and summary tables for all gravity mains, manholes, lift stations, force mains and all other sewer system appurtenances including but not limited to design flow, capacity, velocity, peaking factors, diameter, alignment and other design criteria.

Wastewater design 1. Base wastewater flows shall be in accordance with Section 5.6.2. AnyGES Section 5.6.2.

2. Verify any variance from the stated design flows shall be verified with the COP Public Works/TOPV Utilities Department.

3. Identify wastewater peaking factors and peak flows

4. Scour analysis shall be provided if drainage crossings are required

5. Gravity Main

6. Force Main

7. Lift Station

8. Appurtenances

9. Summary Tables

10. . Wastewater modeling results with exhibits shall be included as applicable.

5.5.5.4 SEWER SYSTEM MODEL ANALYSIS

A. Provide a model of the planned wastewater system as delineated in Section 5.5this section of this manual. This modeling shall be required where new wastewater infrastructure is being added to the existing AgencyCity of Prescott system. The model shall be provided in a format compatible with the Agency'sCity of Prescott's master model and verify flows in the AgencyCity of Prescott system. Minor infill projects may not require a model at the discretion of the City/Town Engineer.

1. Wastewater Model Requirements

The developer or developer's~~developer's~~ engineer shall create and utilize a hydraulic model to demonstrate that the proposed infrastructure of the wastewater system is adequate and satisfies the performance criteria. Hydraulic modeling information shall be provided to the City/Town Engineer.

~~2.~~ Model Software

The Agency~~City of Prescott~~ currently uses the Aquanuity and Innovyze sewer modeling~~H2OMAP Sewer~~ software, which is EPA-NET compatible. All modeling shall be compatible with the Agency's~~City of Prescott's~~ software.

~~3.~~ Hydraulic Model Data

~~a.~~ All final drawings and model data to be submitted ~~to the City~~ shall use the Agency's~~City of Prescott GES, Article 8 for~~ coordinate system information.

~~b. Attributes:~~

~~1)~~ Each physical entity in the Wastewater Collection System model of the proposed development shall require information and attributes as defined below:

~~2) Wastewater Collection System~~

~~3)~~ Gravity Mains – Diameter, material, length, slope, Manning's coefficient, location, connectivity with mains and manholes, upstream invert elevation, and downstream invert elevation.

~~4)~~ Manholes – Diameter, location, manhole losses (minimum one-tenth (0.1) foot drop connecting mains),~~,~~ drop manhole details, wastewater load, and invert elevations.

~~5)~~ Lift Stations – Layout, location, and connectivity with other entities, number of pumps, pump curve, pump start/stop controls, rim elevation, wet well dimensions, wet well invert, outfall location, and elevation.

~~6)~~ Force Mains – Diameter, material, length, Hazen William's~~Manning's~~ coefficient, location, connectivity and manholes, upstream invert elevation, and downstream invert elevation.

~~7)~~ Diversion Structures – Diameter, invert elevation, location, connectivity, weir height and size, control scheme, and desired flow through each diversion.

~~8)~~ Outfalls – Location, connectivity, and invert elevation.

4. Hydraulic Evaluation

a. New developments shall be modeled to determine if the proposed infrastructure is adequate to service the development and provide the level of service as defined by the Agency's designCity of Prescott's performance criteria in Table 5-1. . Refer to Table 5-1.

b. The City/Town Engineer shallwill use the Agency'sCity of Prescott's model to determine the available capacity in the Agency'sCity's existing downstream sewer collection system to convey wastewater from the development per the design engineer's proposal. The developer shallwill model proposed collector mains and shallwill be responsible to make certain that wastewater can be safely conveyed from the points of origin to the Agency'sCity of Prescott's trunk mains. Off-site improvements to the collection system and lift stations may be required for safe conveyance.

e. Boundary conditions that represent the interface between the development and the rest of the collection system need to be identified and any deficiencies made clear.

d. All improvements required to provide sufficient capacity for project flows shall be identified.

e. Steady-state simulations shall be completed utilizing dry weather average day flow multiplied by the appropriate upstream population peaking factor plus ten (10%) percent inflowInflow and infiltrationInfiltration (I&I) factor for new construction. Design documentation shall show that the collection system mains are sized adequately and that slopes are greater than the minimum slope to maintain self-cleansing velocities.

TABLE 5-1

DESIGN CRITERIA

Gravity Mains City of Prescott Gravity Mains Town of Prescott Valley Force Mains	2.5 fps<V<10 fps 2 fps<V<10 fps 3 fps3fps<V<7 fps
Flow Depth, d/D d/D for New Sewer Mains with Diameters less than twelve (12") inches	– 0.5

Flow Depth, d/D d/D for New Sewer Mains with Diameters less than twelve (12") inches d/D for New Sewer Mains with Diameters greater than or equal to twelve (12") inches d/D for Evaluating Existing Mains in Developed Areas d/D for Evaluating Existing Mains in Developed Areas	 =0.50 =0.75 =0.90 0.9
Headloss in Existing Mains Gravity Mains Headloss in Existing Mains Gravity Mains Force Mains	– Manning's N=0.013 Manning's N=0.013 Hazen William's C = 120 Max
Changes in Main Size Changes in Main Size When a Smaller Main Joins a Larger Main	– Match Crowns (at a minimum)
Headloss At Manholes Headloss At Manholes Manholes with Mains Intersecting from 0 to 45 Degrees Manholes with Mains Intersecting from 46 toat 90 Degrees or Greater	– Provide a Minimum of 0.1' Invert Drop Provide a Minimum of 0.2' Invert Drop

Section 5.6 WASTEWATER DESIGN FLOWS

5.6.1 WASTEWATER COLLECTION ANALYSIS

This section shall describe the measurement standards for gravity sewer mains that are to be used to evaluate the suitability of wastewater collection system improvements and additions.

5.6.2 WASTEWATER SYSTEM LOADS

A. All projects shall provide a summary of the anticipated sewer loads for the project. Provide an analysis of the anticipated sewer flows. This analysis shall be based on actual flows from similar facilities or the hierarchy established in Section 5.4.1.GES, Section 5.4.1.A.2. If flows are unavailable from similar facilities the unit factors listed in Table 5-2Table 5-2 shall be used. If the proposed use does not match the tables, provide an estimate of what the flows shall be from other sources and provide a justification for their use. Flows may be calculated on a sub-area basis, but provide a total flow for the entire development as well.

Table 5-2~~B. Table 5-2~~ lists unit loads that can be easily correlated to acreages for types of land use. The AAC~~Arizona Administrative Code~~ also provides guidelines on appropriate unit loads for different types of development that is not easily related to acreages for types of land use.

TABLE 5-2

UNIT DAILY DESIGN FLOWS FOR SEWER

TYPE OF FACILITY SERVED	APPLICABLE UNIT	WATER DESIGN FLOW PER APPLICABLE UNIT GALLONS PER DAY (GPD)
Airport	Passenger (average daily number)	4
	Employee	15
Auto Wash	Facility	Per manufacturer, if consistent with this Article
Bar/Lounge	Seat	30
Barber Shop	Chair	35
Beauty Parlor	Chair	100
Bowling Alley (snack bar only)	Lane	75
Day Camp~~camp~~, no cooking facilities	Camping Unit	30
Campground, Overnight, Flush Toilets~~overnight, flush toilets~~	Camping Unit	75
Campground, Overnight, Flush Toilets~~overnight, flush toilets~~ and Shower~~shower~~	Camping Unit	150
Campground, Luxury~~luxury~~	Person	100-150
Camp, Youth, Summer~~youth, summer~~, or Seasonal ~~seasonal~~	Person	60
Church, Without Kitchen	Person (Maximum attendance)	5
Church, With Kitchen	Person (Maximum attendance)	7
Country Club	Resident Member Non-resident Member~~member~~	100 10
	~~Non-resident member~~	~~10~~
Dance Hall	Patron	5
Dental Office	Chair	500
Dog Kennel	Animal, Max occupancy	15
Dwellings	Person	80
Fire Station	Employee	45

TYPE OF FACILITY SERVED	APPLICABLE UNIT	WATER DESIGN FLOW PER APPLICABLE UNIT GALLONS PER DAY (GPD)
Hospital, All FlowsAllFlows	Bed	250
Hospital, Kitchen Waste Only	Bed	25
Hospital, Laundry Waste Only	Bed	40
Hotel/Motel, Without Kitchen	Bed (2 person)	50
Hotel/Motel, With Kitchen	Bed (2 person)	60
Industrial Facility, Withoutwithout Showers	Employee	25
Industrial Facility, Withwith Showers	Employee	35
Industrial Facility, Cafeteria Addedadded	Employee	5
Institutions, Resident	Person	75
Institutions, Nursing Home	Person	125
Institutions, Rest Home	Person	125
Institutions, Laundry, Self Service	Wash Cycle	50
Institutions, Laundry, Commercial	Washing Machine	Per Manufacturer, if consistent with this Article
Office Building	Employee	20
Park (Temporary Use)		
Picnic, With Showers, Flush Toiletswith showers, flush toilets	Parking Space	40
Picnic, With Flush Toilets Onlywith flush toilets only	Parking Space	20
Recreational Vehicle, Withwith no Waterwater and Sewer Connectionssewer connections	Vehicle Space	75
Recreational Vehicle, With Waterwith water and Sewer Connectionssewer connections	Vehicle Space	100
Mobile Home/Trailer	Space	250
Restaurant/Cafeteria	Employee	20
___With Toilet, Addtoilet, add	Customer	7
___Kitchen Waste, Addadd	Meal	6
___Garbage Disposal, Addadd	Meal	1
___Cocktail Lounge, Addadd	Customer	2
___Kitchen Waste Disposal Service, Addadd	Meal	2
Restroom, Public	Toilet	200
School, Staff and Office	Person	20

TYPE OF FACILITY SERVED	APPLICABLE UNIT	WATER DESIGN FLOW PER APPLICABLE UNIT GALLONS PER DAY (GPD)
Elementary, Addadd	Student	15
Middle and High, Addadd	Student	20
With Gym and& Showers, Addadd	Student	5
With Cafeteria, Addadd	Student	3
Boarding, Total Flow	Person	100
Service Station, with Toilets	First Bay	1,0001000
	Each Additional Bay	500
Shopping Center, Nono Food or Laundry	Square Foot of Retail Space	0.1
Store	Employee	20
Store, Public Restroom, Addadd	Square Foot of Retail Space	0.1
Swimming Pool, Public	Person	10
Theater, Indoor	Seat	5
Theater, Drive-In	Car Space	10

5.6.3 PEAKING FACTOR

A. The peaking factor shall be as defined in the AAC,Arizona Administrative Code Section R18-9-E301.D.1.b, and Table 5-4GES Table 5-3.

B. In addition to dry weather peaking factors, ten (10%) percent shall be added for wet weather inflow and infiltration (I&I.).

C. Where population estimates are not available or non-residential loads prevail, dry weather peaking factors can be calculated using: $PF=C(Qavg)^{-m}$

PF=C(Q)

Where:

C = constant (empirical coefficient)

Qavg = average flow rate (ft^3/s, m^3/s)

M = exponent

TABLE 5-3

NON-RESIDENTIAL DRY WEATHER PEAKING FACTORS

FOR WASTEWATER COLLECTION SYSTEMS

Average Flow (ft^3/s)	C	M
0.012< Qavg	1.78	0.16
0.120< Qavg	1.79	0.15
1.20120< Qavg < 35.0	1.76	0.05

Section 5.7 INDIVIDUAL WASTEWATER FACILITIES

5.7.1 ON-SITE TREATMENT AND DISPOSAL FACILITIES

A. When wastewater service is not available from the AgencyCity of Prescott system, an on-site treatment and disposal system, (septic or alternative system), is required. Permitting is required through the YCESDYavapai County Environmental Services Department (YCESD) for all on-site treatment.

B. The property owner is responsible for the design, construction, operation and maintenance of septic systems/on-site wastewater treatment and disposal facilities. The AgencyCity of Prescott shall not accept any type of on-site system for operation and maintenance, but may provide input to the YCESD regarding environmental concerns.

C. All on-site wastewater treatment and disposal facilities shall be designed, constructed, and maintained by the property owner compliant with the applicable requirements of YCESD.

5.7.2 WASTEWATER LIFT STATIONS

A. When lift stations are contemplated, the EOREngineer of Record shall meet with the City/Town Engineer to discuss development options and design requirements prior to any design completion. The Agency may deny lift station installations when gravity sewer options are available. .

1. Site selection for wastewater lift stations shall consider accessibility, drainage patterns, visual and neighborhood impact, three-phase power availability, function, and design constraints.

2. The potential for flooding shall be considered when selecting a wastewater lift station location. The station's equipment, vaults and manholes shall be protected from damage and remain operable during a one-hundred (100) year flood event.

3. Each tract or lot used for lift station facilities shall include all weather ingress/egress, as shown on QCSD 612QCOP Standard Detail 612P.

4. Wastewater facilities shall be located on a tract or lot dedicated to the AgencyCity of Prescott (conveyed by a general warranty deed) and accompanied by a title policy accepted by the AgencyCity of Prescott.

B. Lift Station Requirements

AAC1. Arizona Administrative Code, Title 18, Chapter 9, "Water Pollution Control," and ADEQ, Bulletin 11 contain minimum requirements for a wastewater lift station. Additional requirements specific to the AgencyCity of Prescott (including but not limited to wetwell coating, SCADA, electricalElectrical, pump preferences, etc.)) shall be obtained from the City/Town Engineer before beginning design. At a minimum telemetry, pump and wet well redundancy, backup power supply, three-phase power, odor control, and security perimeter walls shall be required. The site shall be large enough to fully contain all the facilities and service equipment for repairs and maintenance.

2. A preliminary design report shall be prepared and submitted to the City/Town Engineer for review with the preliminary plat. The preliminary report shall outline the type of equipment and controls proposed for the station, that meets the AgencyCity of Prescott equipment standards.

3. A final design report prepared by a registered professional engineer, licensed in the State of Arizona, shall accompany all lift station design drawings and specifications submitted to the AgencyCity of Prescott for review with the final plat.

C. Lift Station Design

1. In addition to stateState requirements lift stations shall be sized per the following:

a. The wetwellwet well shall be sized so that the number of duty pump starts per hour does not exceed three (3) during max day flows, including I&I.Inflow & Infiltration (I&I)

2. Design shall includefor current, interim, and build outultimate conditions.

3. Station shall have a minimum of two (2) pumps and be capable of operating at the designed flow with any one pump out of service.

4. The individual pump capabilities shall be identical to facilitate operation and maintenanceO&M.

5. Pumps shall be submersible type designed for wastewater applications. All pumps shall be of the same manufacturer. Pump manufacturer shall be or flooded suction dry pit (Flygt, Fairbanks Morse or other approved equal. All pumps shall be self-cleaning and capable of handling fibrous material) and shall pass a minimum three (3") inch sphere, or are grinder pumps.

Valve6. Include valve vault with shut-off and check valves shall be included.

7. Aeration and odor control:

a. The odor controlOdor Control system (e.g., biofilter, biofilter with optional secondary activated carbon polishing unit, or stand-alone activated carbon filter unit) shall will be sized commensurate with hydrogen sulfide concentrations, wetwell size, pumping cycles, and other factors as may be appropriate.

b. The unit must be in a non-corrosive enclosurecontainer with a four (4") inch minimum static air vent, or a variable frequency drive (VFD) controlled centrifugal fan installed with a sound attenuation enclosure, as determined by the sizing requirements.

Retention time c. Aeration of the wetwell shall not exceedbe required where the retention time exceeds thirty (-(30) minutes.

When aeration is required by the Agency, ad. A compressor with diffuser bar shall be placed in the wetwell, with the compressor sized for two (2) standard cubic feet per minute (SCFM) per one-thousand (1,000) gallons of wetwell storage.

e. The diffuser piping shall be constructed of stainless steel with coarse bubble diffusion and deflector shield.

8. Lockable aluminum access covers shall be located directly over the pumps and shall be a minimum of twenty-four (24") inches clear of any equipment in order to remove and replace pumps. Aluminum hatches shall include non-corrosive hardware and internal safety netting.

9. Electrical control unit (EG Controls)), shall not be located on the wetwell or adjacent manholes and shall have separate mounting pad and enclosure.

10. Pre-cast or cast-in-place concrete walls shall be protected against corrosion. Per the COP, all All interior walls shall be lined using Sewer Shield 150, Sewer Guard 210S, or Raven 405 and installed by a certified installer in accordance with manufacturers specifications. Per the TOPV, all manhole concrete shall be constructed with Conmicshield additive and mixed and installed by a certified installer in accordance with manufacturers specifications.

11. Controls shall have hour meters, cycle meters, magnetic flow meter, and run and failure lights with audible alarm and rotating beacon light, hand off auto switches, and provide for alternating sequencing of pumps.

12. All pump rails and hardware shall be stainless steel.

13. A diversion by-pass line and manhole with diversion piping and valves shall be included for routine maintenance and emergency pumping.

14. An emergency power source shall be provided that will supply immediate service and have an automatic transfer switch.

15. Communication from the lift station to the Agency's City of Prescott's SCADA monitoring system shall be established, for operations, monitoring, and security. Nonproprietary hardware and software shall be used.

The lift station shall be equipped 16. Equipped with visual or audible alarms when high water levels are detected.

17. Level controls shall be controlled by a level transducer with avocado style floats, normally open for redundancy. .

5.7.3 FORCE MAINS

A. Force mains shall be located within a public ROW right-of-way, or a utility easement. The main shall be located under pavement where possible.

A. B. The flow velocity in the force main shall be between three (3') feet and seven (7') feet per second (fps).

Force main detention times and the potential for hydrogen sulfide generation shall be calculated for any interim phasing and full project buildout. Parallel mains of differing sizes may be required if interim/startup conditions result in insufficient discharge rates, velocities and excessive retention times.

C. All pipe material used in design of the force mains shall have established American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), American Water Works Association (AWWA), and National Sanitation Foundation (NSF) standards of manufacture or seals of approval. All pipes shall be designated as pressure sanitary sewer pipe. Acceptable materials shall include epoxy lined Ductile Iron Pipe (DIP) or fused High Density Polyethylene Pipe (HDPE), or epoxy lined Ductile Iron Pipe (DIP).

1. Continuously fused HDPE pipe does not require additional joint restraint.

2. Force mains shall be restrained in accordance with QCSDs 303Q-1 and 303Q-2. Force mains smaller than four (4") inches in diameter shall be restrained to the requirements of a four (4") inch nominal pipe size. Discharge location of force main shall be treated as a dead-end condition.

D. Air/vacuum valve(s) and all appurtenances designed for wastewater shall be stainless steel. Air/vacuum valve(s) shall be provided on force mains at all local high points in accordance with QCSD. Refer to COP Standard Detail 416Q.

E. Cleanouts and flushing points may be required based on length, flow, and topography.

F. Refer to QCSDCOP Standard Detail 426Q-1 for details regarding discharge into a manhole from a force main.

G. The separation between the force mains and water mains shall be six (6') feet exterior wall-to-wall vertically and six (6') feet horizontally. Where a force main crosses above, or less than six (6') feet below a water main, refer toas identified in MAG Standard Details 404-1 and MAG 404-2. Both, both the water and sewer main shall have additional protection where required per AAC Title 18, Chapter 5, Section 502(C).

H. Odor control and epoxy lining shall be required at the receiving manhole. Odor control shall be sized according to receiving manhole air volume, pumping rate, and pumping frequency. Additional odor control and epoxy lining may be required on downstream facilities. Acceptable means of odor control include bio-filtration, filtration by media such as activated carbon, Chlorine Dioxide, Permanganate, Alumina, or Sulfatreat, or other method approved by the City/Town Engineer.

I. A tracertrace wire shall be attached to the force main as part of the installation per QCSDsCOP Standard Detail 319Q-1 and 319Q-2. Tracer wire shall be terminated at tracer wire stations and shall not enter any structure that can potentially have a corrosive environment.

5.7.4 FLOW METERING STRUCTURE

A. The COP Public Works/TOPV Utilities Department may require the installation of a flow metering structure. In the COP, all flow produced from Prop 400 annexations shall require flow metering. When required, the EORengineer shall design the flow metering structure as part of the projectprojects improvements. The flow metering structure design shall include:

1. Adequate land area for the structure with access to public ROW.right-of-way

2. Security perimeter fence for site.

3. Locking structure for appurtenances.

4. SCADA radio monitoring system.

5. Electrical control system, to include software.

6. Flow measurement and recording (magnetic, laser or ultrasonic type).)

7. Pipe and conduit penetrations in flow metering structure shall be core drilled. Pipe penetrations shall be sealed with Link Seal.

8. Aluminum access hatches with minimum five (5'four (4²) feet by five (5'six (6²) feet clear opening.

9. Fiberglass reinforced polymer (FRP)polyester grating.

In the COP a protective liner10. All vault interior walls, shall be applied to all interior vault surfaces (vaults constructed of Pre-Cast-Polymer Concrete do not require lining). Surface preparation shall be completed per manufacturer's recommendation. Acceptable liners are limited to Raven 405,lined using Sewer Shield 150, Sewer Guard 210S or SewerGard 210XHBRaven 405 and shall be installed by a certified installer in accordance with manufacturers'manufacturers specifications. All liners shall be holiday tested and any discontinuities shall be repaired to manufacturer's recommendation.

In the TOPV an antimicrobial additive shall be included in both precast and cast-in-place concrete mixtures. The amount of additive shall be per the manufacturer's recommendations and included in the concrete mix water per QCSD 446PV. The TOPV's acceptable additive is Conmicshield or approved equal.

Section 5.8 COLLECTION SYSTEM

5.8.1 GENERAL REQUIREMENTS

A. Property shall be abutting a sewer main for a service connection to be made, unless otherwise allowed pursuant to this section. In cases where the main is not abutting, the main shall be extended at the expense of the property owner before a connection is made.

B. The AgencyCity of Prescott requires sewer mains to be installed along the entire length of the property line frontage of that property being developed, unless constrained by topography. The property line frontage is that portion of the property that abuts a street, public utility easement or public ROWright-of-way. If a parcel to be developed has more than one property line frontage the AgencyCity of Prescott may require a sanitary sewer main be installed along the entire length of all frontages where parcel development paving is required and future connectivity is possible.

C. Developers shall install at their expense, all on-site and off-site sewer improvements necessary to serve their developments, including but not limited to gravity mains, force mains, lift stations, and any improvements to existing AgencyCity facilities. Developers shall, obtain all necessary permits, and meet all regulatory compliance.

D. All building sanitary sewer service lines shall be privately owned, operated, and maintained.

E. Extension of sewer mains, which are adjacent to undeveloped parcels, shall be reviewed by the AgencyCity and may be required to install sewer main stubs from the adjoining manhole(s) to facilitate the future extension of the public sewer system to serve future developments. Stubs from the manholes are to be extended to the ROWright-of-way line and be eight (8") inches minimum in diameter and finished with a vertical clean-out riser and monument per QCSDCOP Standard Detail 270Q monument.

A. F. Users who discharge non-residential wastewater shall install monitoring manholes in accordance with AgencyPrescott City Code.

(PCC, Title 2,), Chapter 2-1-68-1-C .

TOPV Town Code Article 9-05.

G. Any sewer mains not built to AgencyCity standards, shall be privately owned, operated, and maintained in accordance with Section 5.2.2. Refer to GES 5.2 for additional requirements.

5.8.2 DESIGN POLICY

A. Reconstruction of residential or commercial structures requires compliance with all current ordinances and design guidelines relating to sewer main extension.

B. For developments where an existing sanitary sewer is not available, a dry sanitary sewer main shall be installed and tested in conformance with all the design requirements for a public sanitary sewer main. In theUse COP, QCSDs Standard Detail 440P-1 or 440P-2 may be used, as applicable to locate the ends of service line stubs on a dry system; in the TOPV MAG 440-1 shall be used. Temporary. Design a temporary on-site wastewater treatment systems shall be designed andsystem, located such that future removal and connection to the AgencyCity system is possible when sanitary sewer service becomes available.

C. Wastewater systems shall be designed to serve the ultimate population density expected in the collection basin. The design shall be in conformance with the current AgencyCity of Prescott approved Wastewater System Model and take into consideration future connections. Where a wastewater collection system extension is possible upstream of a subdivision, extend the sanitary sewer shall extend through the subdivision to the platted boundary to a point of connection that shall provide wastewater service to adjacent properties. Regulatory guidelines shall be met in order to provide adequate capacity for upstream flows without future reconstruction.

5.8.3 DESIGN STANDARDS

Wastewater collection systems shall be designed in compliance with AACthe Arizona Administrative Code, Title 18, Chapter 9, "Water Pollution Control", Arizona Department of Environmental Quality (ADEQ,), Bulletin 11, and the Agency GESCity of Prescott General Engineering Standards.

Section 5.9 MATERIALS

5.9.1 PIPE SELECTION MATERIALS

In selecting pipe material for sanitary sewer mains, consideration shall be given to the chemical characteristics of wastewater, especially industrial wastes. Consideration shall be given toConsider velocity, the possibility of septicity, external and internal pipeline forces, and preventing infiltration, abrasion, and similar type problems.

5.9.2 MATERIALS

A. The following types of material shall be used for gravitysanitary sewer mains and force mains may be used:

Polyvinyl Chloride (PVC) (ASTM D3034) SDR35 up to1. Vitrified clay pipe (VCP), fifteen (15") inches in diameter, where cover is twelve (12') feet or less.and larger

PVC (ASTM D3034) SDR262. Polyvinyl Chloride (PVC) SDR35, up to fifteen (15") inches in diameter, where cover is greater than twelve (12') feet.

1. Centrifugally Cast Fiberglass Reinforced Polymer Mortar (CCFRPM) pipe as manufactured by HOBAS, or approved equal, including eighteen (18") inches and larger in diameter.

3. PVC (meeting ASTM F679) SDR 26 T1) between and including eighteen (18") inches and twenty-seven (27") inches in diameter.; or

2. Ductile Iron Pipe (DIP) Class 350 (CL350) ceramic epoxy lined with Protecto 401 or approved equal only used with Agency approval. Where cover is greater than twelve (12') feet, the City/Town Engineer may require DIP CL350 sewer.

A. The following types of material shall be used for sewer force mains:

In the COP projects shall utilize fused4. Class 350 (CL350) Ductile Iron Pipe (DIP) epoxy coated and seal coated

5. High Density Polyethylene Pipe (HDPE) DR17 (or 50psi above maximum working pressure).

In the TOPV projects shall utilize fused High Density Polyethylene6. Centrifugally Cast Fiberglass Reinforced Polymer Mortar (CCFRPM) pipe as manufactured by HOBAS or approved equal

1. B. Pipe (HDPE) DR17 minimum (or 50psi above maximum working pressure), Polyvinyl Chloride Pipe (PVC) DR14 minimum, or fusible PVC.

Pipe materials shallmay not change between manholes, unless extra protection is required for utility separation.

C. Trench loading conditions shall be analyzed for each pipe type used. The pipe used, including bedding requirements, shall meet AgencyCity and manufacturers specifications for each condition.

D. Pipe material used in design shall have established ASTM, ANSI, or NSF standards of manufacture or seals of approval, and shall be designated for use with wastewater.

5.9.2 3 SYSTEM LAYOUT

A. Public sanitary sewer mains within commercial, industrial, or multi-family developments shall be located within drive aisles and a minimum of ten (10') feet from any structure, including overhead projections and footings/foundations.. The main shall also be located a minimum of five (5') feet from any parking stall. Public sanitary sewer mains shall be located within Agency ROWCity of Prescott right-of-way or public utility easementeasements. No private services are allowed longitudinally within a public utility easement or Agency ROWCity of Prescott right-of-way.

B. If the horizontal direction, slope, material, or size of the sanitary sewer main changes, a manhole shall be constructed. The horizontal angle formed between an inlet and outlet pipe shall not be less than ninety (90°) degrees.

1. Curvilinear sanitary sewer mains are not permitted.

2. Horizontal location of sewer mains shall be aligned parallel to property lines or street center lines to the maximum extent possible and shall not cross and re-cross the centerline

C. The design report including water and sewer layouts shall be in accordance with the following criteria:

1. Sanitary sewer mains and manholes shall be located on the alignment shown in QCSDs 601Q through 606Q.COP Standard Details 601P thru 606P

2. Sanitary sewer mains shall maintain a minimum of four (4') feet horizontal and vertical clearance to dry utilities per QCSD 402Q.COP Standard Detail 402P

A. Gravity sewer main shall be installed when possible at a depth sufficient to promote gravity drainage of wastewater from each service line and shall anticipate the lowest potential finish floor elevation for each building pad to the maximum extent possible.

5.9.3 4 DESIGN FLOWS

A. Design flows shall be based on Table 5-2 Table 5-2 and 5-3 in Section 5.6.GES Section 5.6.3. The priority of obtaining wastewater design flows is 1) flow measurements from the actual facility, 2) the use of flows from similar facilities in the immediate area, 3) the use of similar flows from similar facilities in other areas and, 4) flow tables.

B. Peaking factors in accordance with Table 5-4Table 5-4 shall be used, plus ten (10%) percent inflow and infiltration (I&I.).

TABLE 5-4

WASTEWATER FLOW PEAKING FACTOR

Upstream Population	Dry Weather Peaking Factor
100	3.62
200	3.14
300	2.90
400	2.74
500	2.64
600	2.56
700	2.50
800	2.46
900	2.42

Upstream Population	Dry Weather Peaking Factor
1,000	2.38
1,001 to 10,000	PF = (6.330 x $p^{-0.231}$) + 1.094
10,001 to 100,000	PF = (6.177 x $p^{-0.233}$) + 1.128
More than 100,000	PF = (4.500 x $p^{-0.174}$) + 01.945
PF = Dry Weather Peaking Factor	**p = Upstream Population**

5.9.4 5 HYDRAULIC DESIGN

A. No public sanitary sewer mains shall be less than eight (8") inches in diameter.

In the COP sanitaryB. Sanitary sewer mains shall be designed and constructed to provide full flow velocities of not less than two and one-half (2.5) feet per second (fps), based upon Manning's Formula, using an "n" value of thirteen thousandths (0.013).

A. In the TOPV sanitary sewer mains shall be designed and constructed to provide full flow velocities of not less than two (2) fps, based upon Manning's Formula, using an "n" value of thirteen thousandths (0.013).

EORC. Engineer shall analyze all mains at average day and peak flow. and provide velocities as close to two (2) fps as possible (average day). Any velocities under two and a half (2.5) fps (average day) shall be noted as requiring additional maintenance.

D. To prevent abrasion and erosion of the pipe material, the maximum velocity shall be below ten (10) fps at estimated peak flow. Where velocities exceed ten (10) feet per second (fps,), the main shall be constructed of a pipe material that is abrasion resistant. In no case shall velocities greater than fifteen (15) fps be allowed.

E. The sanitary sewer system shall be designed to achieve uniform flow velocities through consistent slopes between manholes.

F. Minimum slopes shall comply with Table 5-5Table 5-5 and shall ensure a minimum self-cleaning velocity of two and one half (2.55') fps when flowing full.

TABLE 5-5

MINIMUM DESIGN SLOPES FOR CIRCULAR PIPES

Pipe Size (inches)	Minimum Slope[1] (ft/ft)
8	0.0050[4]
10	0.0025
12	0.0020
14	0.0016
15	0.0015
16	0.0014
18	0.0012
20	0.0010
21	0.0010
24	0.0008

Note:

(1) Mains larger than twenty-four (24") inches shall still have a slope no less than eight ten-thousandths (0.0008).)

(2) Pipe Capacity presented based on full capacity flow.

(3) Table assumes Manning'sManning's N coefficient of thirteen-thousandths (0.013).)

(4) Minimum slope for an eight (8") inch pipe shall be five-thousandths (0.0050) ft/ft unless specifically evaluated and approved by the City/Town Engineer.

G. Analyze junction losses and include them in the design report.

H. The depth to diameter (d/D) ratio for gravity sanitary sewer mains less than twelve (12") inches in diameter shall be no greater than five tenths (0.50) in the ultimate peak flow condition. The d/D ratio for sewer mains twelve (12") inches or greater in diameter shall be no greater than seventy-five hundredths (0.75) for the ultimate peak flow condition.

I. Each reach of pipe shall be analyzed for design flow (average day), peak flow, and full flow conditions and placed in a tabular form in the design report. The table shall include average, peak, and full flows, the corresponding velocities, flow depth, and flow depth/diameter ratios for each flow regime.

J. The Agency City may require that the wastewater design report includes include an analysis of the potential of the generation of hydrogen sulfide per EPA guidelines, and if so, the design shall provide mitigation.

5.9.5 6 MANHOLES AND CLEAN OUTS

A. Manholes in Agency City of Prescott streets shall be located in accordance with QCSDs 601Q through 606Q. COP Standard Details 601P thru 606P. Manholes shall not be located in wheel paths, sidewalks, crosswalks crosswalk crossings, valley gutters, parking stalls gutter, and curb and gutter. Horizontal location of sewer mains shall be aligned parallel to property lines or street center lines to the maximum extent possible and shall not cross and re-cross the centerline.

B. Manholes shall be are required at all changes of grade, pipe size, pipe material, or alignment and at distances not to exceed those shown below:

TABLE 5-6

MANHOLE SPACING

Pipe Size (Inches)	Maximum Spacing (Feet)
8 to 15 10	500 400
18 12 to less than 36 18	600 500
36 and larger Larger than 18	800 600

C. All manhole sections and cones shall be pre-cast concrete as detailed in QCSDs COP Standard Detail 420Q-1 and AND 420Q-2. Manhole bases can be precast or cast poured in place.

COP manhole D. Manhole covers shall be in accordance with QCSDs COP Standard Detail 423P-1 or 423P-2 as required, for applicable size. TOPV manhole covers shall be in accordance with MAG Standard Detail 423-1 and 423-2.

~~E.~~ Manholes shall be lined or coated at the discharge~~junction~~ of a force main, at all drop manholes, on sanitary sewer mains fifteen (15") inches in diameter and larger or in other design situations where corrosive conditions are anticipated. Manholes downstream from force mains and private ejector lines shall be evaluated for hydrogen sulfide and shall be lined or coated.~~, if warranted.~~ Manholes requiring linings or coatings shall be noted on the final plans.

~~F.~~ The manhole shall have a minimum one-tenth (0.10'~~10~~) foot drop across the trough. Inverts at junctions shall be designed to maintain the energy gradient across the junction and prevent backflow. Where pipe size increases through a manhole, pipe crowns shall be matched on each side.

~~G.~~ The difference in invert elevations between inflow and outflow mains shall not exceed two (2') feet, unless a drop connection is installed. If less than two (2') feet, QCSD 426Q-2 ~~COP Standard Details 427Q~~ shall be used. Drop connections greater than two (2') feet, shall be in accordance with QCSD~~COP Standard Detail~~ 426Q-1~~ AND 426Q-2 and~~ per manufacturer recommendation.

~~H.~~ Existing manholes shall be replaced to accept new mainline connections unless a drop inlet is designed.

A. Manholes with multiple inlets shall be configured so that inlet directions are a minimum of forty-five (45°) degrees apart for eight (8") inch mains. If larger sewer main diameters or smaller inlet angles are being proposed, then a larger diameter manhole or a redesign of the proposed sewer main is required.

~~I.~~ Manholes shall be protected from storm drainage and flooding conditions. Sanitary sewer mains shall not be permitted in washes or drainage areas unless otherwise approved in writing, by the City/Town Engineer.

~~1.~~ When approved by the City/Town Engineer:

~~a.~~ Manholes located within washes or drainage areas shall have bolted watertight covers, bases and barrels to prevent inflow in accordance with QCSD~~COP Standard Detail~~ 420Q-2.

~~b.~~ The rim elevation shall be a minimum of twelve (12") inches and a maximum of eighteen (18") inches above adjacent finish grade in accordance with QCSD~~. Refer to COP Standard Detail~~ 420Q-2.

Structural~~c. Provide structural~~ protection shall be provided against scour from a one-hundred (100) year storm event.

~~d.~~ The manhole shall be designed to structurally exceed the external forces acting upon the manhole from a one-hundred (100) year storm event.

~~e.~~ Manholes shall be verified as non-buoyant, or provisions provided to negate the effects of buoyancy.

2. Ingress/egress and maintenance roads shall be provided for all public sewer mains and appurtenances. Maintenance roads shall be in accordance with QCSD 612Q.COP Standard Detail 612P

B. New main construction in undeveloped areas shall only use a sewer manhole at main line terminations.

Agency may authorize an alteration for cleanoutsJ. Cleanouts per QCSDCOP Standard Detail 441Q at the terminationmay be used in place of sewermanholes at the end of mains that: 1) cannot be extended, 2) are less than one-hundred fifty (150') feet in length, and, 3) have less than four (4) service connections.

1. 1. Service connections shallare not be allowed inat the terminating manhole.

ends of main line cleanouts. Service connections shall not be allowed at the end of provided off the sanitary sewer main a minimum of three (3') feet downstream of the main line cleanoutscleanout.

5.9.6 7 PRETREATMENT MONITORING VAULTS AND MANHOLES

A. The City/Town Engineer has the sole discretion of when the installation of a monitoring vault and or sample collection point will be required for non-residential discharges. The following conditions shallwill automatically trigger monitoring point and or sample collection point requirements:

1. The projected process wastewater discharge is equal to or greater than twenty-five thousand gallons per day (25,000 gpd).)

2. The projected operation falls under Federal Categorical Classification under 40 CFR Parts 400 – 471.

3. The projected operation is otherwise classified by the City/Town Engineer, ADEQ,the Arizona Department of Environmental Quality (AZDEQ), or the US Environmental Protection Agency (EPA) as a Significant Industrial User (SIU).)

4. The projected operation is classified as a Food Service Facility (FSF) or Vehicle Service Facility (VSF) by the City/Town Engineer.

1. 5. Any other discharger regulated under the Agency's City's pretreatment program as described in AgencyPrescott City Code.

(PCC, Title 2,), Chapter 2-1-45 and 2-1-46.

TOPV Town Code Article 9-05

B. Any developments that meet the criteria in Section 5.9.7.A. are required to install a monitoring vault and sample collection point in accordance with the following provisions:

1. Monitoring vaults shall be constructed with a straight channel and no taps or bends for ten (10') feet upstream or downstream or as approved by the City/Town Engineer.

2. Monitoring vaults shall be located and designed for access at all times by monitoring crews and vehicles.

3. Monitoring vaults shall be installed to prevent inflow from surface runoff.

C. New developments that are classified as food service facilities (FSF,), vehicle service facilities (VSF,), or any other user as determined by the City/Town Engineer that shall beare required to install a sample collection point shall meet the following conditions:

1. The sampling point shall be of sufficient size to allow full access to an opening equal to the inside diameter of the discharge pipe.

2. The sampling point shall be accessible to AgencyCity of Prescott staff during regular working hours.

3. The sampling point shall be installed to prevent inflow from surface runoff.

4. The sampling point shall be installed immediately downstream of the sand/oil and sand interceptor(SO) separator, grease interceptor, (GI), or any other interceptor. Sampling point shall be and prior to any downstream connection.

5.9.7 8 PIPE COVER AND SEPARATIONS

A. Sanitary sewer main should be installed when possible at a depth sufficient to promote gravity drainage of wastewater from each service line and shall anticipate the lowest potential finish floor elevation for each building pad to the maximum extent possible. The depth shall include the additional height required for service tap placement at the ten (10) o'clock or two (2) o'clock position in accordance with QCSD 440Q-1 and an anticipated minimum slope of one-quarter (¼") inch per foot. The service lateral shall pass below water mains and other utilities where possible and shall not steeply rise within the right-of-way.

The standard minimum depth of gravity sewer mains shall be seven (7') feet of cover and in1. In no case shall a sanitary sewer main be installed with less than four (4') feet of cover over the top of the pipe.

2. All sanitary sewer mains and laterals shall be designed to resist superimposed live loads and backfill overburden without damage or deflection to the pipe material and without adversely affecting the hydraulic characteristics of the pipe. The engineer shall specify minimum depths of cover to be provided during the construction of roadways or other facilities affecting cover over the main and laterals.

1. All sewer service lines that cross under the flowline of a creek, wash, or drainageway shall be constructed to provide maximum cover within the drainage course. Pipe shall be mechanically restrained and hardened with concrete encasement against erosion or infiltration.

B. Caution shall be taken in the design and construction of the sanitary sewer mains to protect all water supplies from wastewater contamination. To minimize the potential of contamination, the EOREngineer of Record shall design the horizontal and vertical separation of water and sanitary sewer mains in accordance with Engineering Bulletin No. 10 "Guidelines for the Construction of Water Systems" published by ADEQ and the AACthe Arizona Department of Environmental Quality and the Arizona Administrative Code, Title 18, Chapter 5, "Environmental Reviews and Certification".

1. The minimum horizontal distance from a water main to a sanitary sewer main shall be six (6') feet, outside to outside. The minimum vertical clearance shall meet MAGCOP Standard Detail 404404P-1 and 404404P-2. WhenConcrete encasement, shall not be used, for extra protection is required, and the sewer line is constructed of PVC, the water main shall be constructed of Class 350 (CL350) DIP with restrained joints and the sewer shall be concrete encased per MAG Standard Detail 404-3.

When extra protection is required, and the sewer line is constructed of VCP,a. Both the water and sewer main shall be constructed of Class 350 (CL350) Ductile Iron Pipe (DIP) with restrained joints and the sewer shall be replaced with epoxy coated CL350 DIP with restrained joints. .

C. Sanitary sewer mains shall have a minimum of ten (10') feet of horizontal clearance from any structure, including but not limited to footings, landscaping, or plantings, which will obstruct maintenance access to the sewer main. Design shall consider any structural load imposed on the pipe.

SeparationD. For information about separation from other utilities shall be in accordance with QCSD 402Q, see COP Standard Detail 402P.

E. Sanitary sewer mains crossing less than one (1') foottwo (2') feet below a stormdrain culvert shall require the additional protection of controlled low strength material per MAG 728.(i.e. one sack slurry). Sanitary sewer mains crossing below large structures such as box culverts and bridges shall require casing pipe, be fully restrained, and have scour protection. Sanitary sewer mains crossing over stormdrains and culverts shall be a minimum of one (1') foot above and be adequately protected from freezing, and additional structural load that may be imposed on the sewer main.

5.9.8 9 WASH CROSSINGS

A. All wash crossings shall be constructed using restrained joint epoxy coated, Class 350 (CL350) Ductile Iron Pipe (DIP) or welded HDPE. Bury requirements to place sanitary sewer mains under washes or channels shall be based upon the one-hundred (100)) year peak design discharge (Q100) in the channel or wash. The minimum depth of bury below the design flow line of the channel or wash shall be in accordance with Table 5-7,shown in Table 5-7, unless site-specific geotechnical and hydraulic analyses are performed to document any reduction.

TABLE 5-7

BURY REQUIREMENTS FOR WASHES

100-Year Flow Rate	Minimum Depth of Bury
1 to 49 cfs	5 feet
50 to 99 cfs	6 feet
100 to 499 cfs	7 feet
Greater than 499 cfs	Scour depth based on scour analysis required

B. Wash crossings with a one-hundred (100)) year flow above five- hundred (500) cubic feet per second (cfs,), shall have the scour depth estimated using Arizona State Standard Attachment SSA 5-96, Guideline 2, Level I, as published by the Arizona Department of Water Resources. The engineer shall estimate the depth of scour and design the top of pipe to be three (3') feet below the estimated scour depth. The engineer shall provide a detailed analysis of the scour depth with final plans for review and approval.

C. All pipelines that must be located within the scour zone or do not meet the minimum required depth of bury as indicated above, shall be protected by installing a cut-off wall and energy dissipation downstream of the pipeline to stabilize the scour depth to a minimum of three (3') feet above the pipeline. The engineer shall design the cut-off wall, energy dissipation, and include details on the improvement plans. The City/Town Engineer shall review pipe protection and scour stabilization requirements on an individual project basis.

5.9.9 10 GRAVITY SANITARY SEWER SERVICE CONNECTIONS

A. The engineer shall make every effort to use existing sanitary sewer service connections that have been extended to a property through a "stub out" by previous construction. Where the use of a stub out is not feasible, the existing line shall be abandoned at the sanitary sewer main withby installing a glued cap at the appropriate method and materials as approved by the Agency.wye. Service connections shallwill not be allowed directly into a manhole.

B. Minimum diameter for a service connection shall beis four (4") inch inside diameter. (ID).

C. All service line connections shall be installed perpendicular to the sanitary sewer main in accordance with QCSDsCOP Standard Detail 440P-1 and 440P-2 for the COP and 440PV-1 and 440PV-2 for the TOPV.. In

addition, service line connections shall be extended to the back of the ROWright-of-way or public utility easement. No horizontal bends in the service line shallwill be allowed.

D. Location

1. All proposed service line connections shall be shown on the final plans with stations and dimensions or offsets, from sewer centerline.

a. a. Each lot or building shall be provided with its own individual service line unless exempt under AgencyPrescott City Code.

(PCC, Title 2, Chapter) 2-1-15.

TOPV Town Code Article 9-05-060

b. Future lot splitting shallwill require a separate service line connection for each lot created.

2. The service line location shall be coordinated to avoid conflicts with other utilities and driveway locations. Locations shall be on the lower elevation side of the lot, whenever possible.

3. A two (2') foot minimum separation between service taps shall beis required.

4. Sanitary sewer lines shall be designed to allow the sanitary sewer service lines to pass under water mains with twenty-four (24") inches of vertical clearance to minimize potential health hazards.

5. When minimum separation is not possible or the sanitary sewer service line passes over the water main, the sanitary sewer service line shall be Ductile Iron Pipe (DIP) for a minimum of nine (9') feet on each side of the water main. No joints shall bearе allowed within nine (9') feet of the water main.

1. All sewer services that have wash crossings shall meet the requirements of Section 5.9.9.

6. All sewer service laterals shall have a sewer backwater valve installed per the most recently adopted International Plumbing Code (IPC) and in accordance with QCSDCOP Standard Detail 440P-3 per the COP and 440PV-2 per the TOPV.

7. Water and sewer service laterals shall not be installed in the same trench. A minimum six (6') foot horizontal separation shall be maintained.

E. Sanitary sewer service connections shall be located a minimum of four (4') feet away from a manhole or four (4'two (2') feet from the bottom bend of a main line cleanout.

5.9.10 11 PRESSURIZED SANITARY SEWER SERVICE CONNECTIONS

A. Pressurized sanitary sewer ejector systems shall be, owned, operated and maintained, by the property owner. The EOR shall beEngineer of Record is responsible for the design and hydraulic analysis of the pressurized system.

B. The sanitary sewer service constructed within the ROWright-of-way shall be per QCSDsCOP Standard Detail 440P-1 or 440P-2, as applicable. Connection to the gravity service shall be at the cleanout connection located at the ROWright-of-way or easement line.

ExtendingC. The City of Prescott does not allow extending private ejector lines across the frontages of adjacent lots or properties or parallel within ROW is prohibited except where it is not feasible to extend the AgencyCity main due to controlling grades. Any such ejector line shall be placed within a private easement shown on the plat or lot split survey. The developer shall extend the AgencyCity of Prescott main to provide frontage to the maximum extent possible.

5.9.11 12 GREASE, OIL AND SAND INTERCEPTORS

A. A. The installation of interceptors shall be in accordance with AgencyPrescott City Code.

(PCC, Title 2, Chapter 2-1-46 2
TOPV Town Code), Article 9-05-0902.

B. Grease interceptors (GIs) shall be installed for all food service facilities (FSFs.). Oil and sand interceptors shall be provided for vehicle service facilities (VSFs,), laundry facilities, car washes, and other similar facilities. The EOREngineer of Record shall contact the City/Town Engineer to determine if an interceptor is required, and what type and size of interceptor is best suited for the proper handling of the projected waste streams. Interceptors shall be installed to be accessible to City of Prescott Utilities Operation staff and vehicles during operating hours.

C. Each business, restaurant, or establishment shall discharge to a separate interceptor. Each interceptor shall be, shown to scale and stationed on the plans.

D. The EOREngineer of Record shall coordinate with the mechanical engineer to ensureassure the following are considered in the design of grease interceptors:

1. Design shall beis compliant with the IPC International Plumbing Code as adopted by Agency, Prescott City Code (PCC) Title 2, and approved by the City/Town Engineer.

PCC, Title 2, Chapter 2-1-45-1-E
TOPV Town Code Article 9-05

. Tank size shall beis appropriate to the maximum projected flow from the establishment and anticipates a ninety (90) day maintenance schedule.

Design shall consider the potential3. Potential to develop odors.

Design shall provide separation4. Separation from pedestrian areas or corridors.

Design shall avoid5. Avoid locating grease interceptor in parking garages, streets, and under public parking spaces.

Design shall provide for ease6. Ease of cleanup after maintenance and pumping.

7. Kitchen garbage grinders, shall not be installed.

8. Dishwashing equipment shall not be installed as to cause temperatures in the grease interceptorGI to inhibit separation of fats, oil, and grease (FOG) in the interceptor.

9. Grease traps shallwill only be allowed in lieu of a grease interceptorGI in very small FSFs.FSF's

10. Interceptors shall be traffic rated and constructed of steel reinforced pre-cast concrete or other approved rigid corrosion resistant material.

EASEMENT, 5.9.13 TRACT AND RIGHT-OF-WAY (ROW)EASEMENT REQUIREMENTS

Easements shall only be used forA. All public sanitary sewer mains in areas where parcels are already platted or a subdivision already exists. Easements are not intended and shall not be used in new platted subdivisions.

A. Easement Requirements:

1. Any public sewer main or appurtenance that is notappurtenances located withinoutside the ROW or apublic rights-of-way or a private street tract with easement dedicationoverlay shall be placed within an appropriately designated easement.

2. The sewer main shall be centered in the center of a minimum twenty (20') foot easement and. The sanitary sewer main shall be located a minimum of ten (10') feet from the edge of the easement. The minimum easement width shall be twenty (20') feet. Sewer mains shall not have more than eight (8') feet of cover inlegal access from a twenty (20') foot easement. Sewer mains with more than eight (8') feet of cover shall require additional easement.

3. In an easement that contains both public right-of-way, shall be free of obstructions, shall not be located within a water main and a sewer main, the minimum easement width shall be thirty (30') feet. Additional utilities may require additional width.

fenced area, and shall be accessible at all times to City of Prescott service equipment such as trucks, backhoes, etc.
Sanitary sewer main easements located outside of paved areas shall have a twelve (12') foot wide all weather access road per QCSD 612QCOP Standard Detail 612P.

4. Fences shall be prohibited within easements containing sanitary sewer. Lateral crossings may be permitted with Agency approval.

5. Easements that contain a sewer main shall be free of obstructions at all times. Items that could restrict the access of sewer service equipment such as trucks, backhoes, CCTV vans, pump hoses, etc. shall not be allowed. Easement lines run vertically above and below the ground surface. Overhangs and building foundations, including footings, shall not protrude into the easement.

6. No trees, shrubs, or other permanent plantings are allowed in easements that contain a sewer main. Lawns, flower beds, and gardens are acceptable uses of the easement area but may be damaged or removed by the Agency if necessary, with no compensation to the owner for restoration.

7. Excavation within any portion of an easement with a sewer main shall not be allowed without approval of the Agency. Excavating closer than two (2') feet vertically or horizontally to the pipeline shall be done by hand until the pipe is exposed and shall be done only under observation of an authorized Agency representative.

8. Grading within any portion of an easement with a water main shall not be allowed without a grading permit.

9. Fence posts shall not be installed within five (5') feet of the center of the pipeline, and the first post on either side of the pipe shall be set in hand dug holes.

10. No well drilling, septic drain fields, septic tanks, or septic treatment facilities are permitted in the easement area.

11. All other restrictions outlined in each specific easement document shall be applicable to each specific easement.

B. Tract Requirements:

1. Any public sewer main or appurtenance located in a tract shall have the tract dedicated to the Agency as either a public utility easement or sewer easement at the time of the plat.

2. The minimum tract width shall be twenty (20') feet if used for one utility and a minimum of thirty (30') feet if used for two (2) utilities. Additional utilities may require additional width. The sewer main shall be located a minimum of ten (10') feet from the edge of the easement. Sewer mains shall not have more than eight (8') feet of cover in a twenty (20') foot easement. Sewer mains with more than eight (8') feet of cover shall require additional easement area.

3. Tracts that contain a sewer main shall not be walled or fenced in or over. Providing a gate over or a single chain with Agency access shall not be allowed unless approved by Agency.

4. Tracts that contain a sewer main shall be free of obstructions at all times. Items that could restrict the access of sewer service equipment such as trucks, backhoes, CCTV vans, pump hoses, equipment trailers, etc. shall not be allowed.

5. Trees and large shrubs shall be allowed in tracts that contain a sewer main but shall not be allowed within ten (10') feet of a sewer main that has less than eight (8') feet of cover and shall not be allowed within a distance equal to the depth of cover for sewer mains over eight (8') feet of cover.

6. Tracts located outside of paved areas shall have a twelve (12') foot wide all-weather access road per QCSD 612Q.

7. Excavation and/or grading shall be allowed in tracts that contain a sewer main but shall not be allowed within ten (10') feet of a sewer main that has less than eight (8') feet of cover and shall not be allowed within a distance equal to the depth of cover for sewer mains over eight (8') feet of cover.

C. Right-of-Way (ROW) Requirements:

1. Sewer mains or appurtenance shall be located in the ROW when possible.

2. Sewer mains with less than eight (8') feet of cover shall be a minimum of ten (10') feet from the edge of the ROW and placed per QCSDs 601Q through 606Q.

3. Sewer mains with more than eight (8') feet of cover shall require additional separation from the edge of the ROW.

4. Trees and large shrubs shall be allowed in ROWs that contain a sewer main but shall not be allowed within ten (10') foot of a sewer main that has less than eight (8') feet of cover and shall not be allowed within a distance equal to the depth of cover for sewer mains over eight (8') feet of cover.

5. Excavation and grading shall be allowed in the ROW with a right-of-way permit.

~~1. Sewer main depth of ten (10') feet or less: Minimum width shall be twenty (20') feet.~~

~~2. Sewer main depth greater than ten (10') feet: Minimum width shall be two (2) times the depth (centered in easement).~~

~~B. Vegetation within the easement may consist of hydroseed, grasses or other materials, required to comply, with erosion control requirements. Trees shall be located outside of the easement.~~

5.9.13 ~~14~~ EASEMENT ABANDONMENT REQUIREMENTS

When a property owner or developer believes a sanitary sewer easement or portion thereof is no longer required by the Agency,~~City of Prescott~~ abandonment may be requested through the City/Town Engineer. The owner or

developer shall submit the request in writing with detailed documentation identifying specifically the reasons for abandonment. The AgencyCity shall make the final decision based upon its long-term needs.

5.9.14 15 ALTERNATIVE SANITARY SEWER SYSTEMS

Developers or property owners may request that the City/Town Engineer consider the use of alternative wastewater systems upon the EOR'sEngineer of Records determination that conventional gravity or forced sanitary sewer systems cannot provide service to the development without conflicting with other provisions of these standards.

ARTICLE 6/ TRANSPORTATION AND TRAFFIC

SECTIONSection 6.1 INTRODUCTION

6.1.1 PURPOSE

A. The purpose of this Article is to provide transportation and traffic engineering standards, guidelines, and geometric requirements for the design and construction of both public and private project improvements within the City of Prescott (COP), Town of Prescott Valley (TOPV), and Town of Chino Valley (TOCV).. This Article is complimentary and supplemental to the Quad City Standard Details (QCSD), Prescott CityMunicipal Code (PCC):: Title 2, Chapter 1 Public Works Department,8 and Title 109, the Land Development Code (LDC), and Title 16 Street and Utility and Drainage Requirements, and all other Articles of these Quad Citythe General Engineering Standards (GES) and the Town of Prescott Valley Town Code, specifically Chapter 11 – Traffic and Chapter 16 – Engineering. .

6.1.2 APPLICABILITY

The B. Alterations or modifications to the standards and guidelines of this section shall be through the procedure described in Article shall apply to the construction, modification, replacement, and extension9 of all transportationthis document.

~~6.1.2 APPLICABILITY~~

~~Transportation~~ and traffic~~Traffic~~ facilities including~~may include~~ arterial, collector, ~~and~~ local and rural streets, alleys, traffic signals, roundabouts, medians, street lighting, street signing, pavement markings, public transit, pedestrian facilities, bicycle facilities, traffic calming devices, pedestrian trails, and other traffic related facilities as well as any modifications of a roadway to be owned, and maintained, by the City of Prescott, Town of Prescott Valley, or Town of Chino Valley (Agency). This Article is intended for use in plan design, preparation, and review processes. The information provided in this Article is not intended to cover all situations that arise, nor may it be a substitute for sound engineering principles and judgment. ~~The minimum requirements described herein are primarily based on safety considerations; therefore, under most circumstances, standards that provide a greater degree of safety may be used.~~

6.1.3 DESIGN STANDARDS AND GUIDELINES

This Article, and GES, Article 1, refer to design standards and guidelines contained in reference manuals published by various federal, state, and county government agencies, as well as recognized professional organizations. The most recently adopted editions of these~~the following~~ design standards and guidelines are approved references and shall be used in conjunction with this Article~~Manual~~.

A. ~~(AASHTO)~~ The American Association of State Highway and Transportation Officials Policies on Highway Design, Development of Bicycle Facilities, Roadside Design Guide, and Guide for the Planning, Design and Operation of Pedestrian Facilities (AASHTO).

B. (MUTCD) The Manual on Uniform Traffic Control Devices, prepared by the U.S. Department of transportation (MUTCD).

C. (COP) City of Prescott, Town of Prescott Valley, or Town of Chino Valley (Agency). Standard Details

A. City of Prescott (COP).

B. Town of Prescott Valley (TOPV).

D. (MAG) The Maricopa Association of Governments Uniform Standard, Specifications and Details for Public Works Construction (MAG).

E. (ADOT) Arizona Department of Transportation Manual of Approved Signs (ADOT).

F. (ITE) Institute of Transportation Engineers Trip Generation.

G. Transportation Research Board Highway Capacity Manual (ITE).

SECTIONSection 6.2 PLANNING

6.2.1 TRAFFIC IMPACT ANALYSIS

Traffic Impact Analysis (TIA) shall be required for proposed developments, or additions to existing developments, that generate more than one-hundred (100) vehicle trips during the morning or afternoon peak hour period. In addition, the City/Town Engineer may require a TIA when changes in land use, traffic, and roadways occur, such as proposed property rezoning, when the original TIA is more than two (2) years old or where the projected traffic volumes increase by more than ten (10%) percent. The City/Town Engineer shall make the final determination regarding TIA requirements and the applicable category. The TIA shall be in a format as described in Agency guidelines; COPSection 6.14 of the Prescott Land Development Code (LDC) Section 6.14 and TOPV Town Code Chapter 16. The TIA shall be prepared under the direction of a Professional Engineer (Civil) licensed to practice in the State of Arizona and qualified to prepare TIA reports. There shall be no deviation from these requirements.

6.2.2 ROADWAY CLASSIFICATION

A. The AgencyCity of Prescott has six (6) street classifications relating to land development. The location and street classification is determined as part of the site planning and platting process and shall be in conformance to the most recent COPCity of Prescott Street Classification Map available on the COP'sCity of Prescott website at https://www.prescott-az.gov/wp-content/uploads/2016/05/street_classification_2019.pdf.https://www.cityofprescott.net/services/streets/traffic/. The AgencyCity of Prescott shall review each subdivision plat or new development and shall specify any changes needed to conform towith previously planned and approved street alignments or impacts to existing infrastructure.. The City/Town Engineer shall also specify the classification for each street involved in the subdivision plat. Refer to QCSDs 601Q-606QCOP Standard Details for street typical sections. All land development shall provide for streets in accordance with Prescott City Code (PCC,), the LDCLand Development

Code and any other planning documents at their normal alignments, widths, and geometrics, as determined by the City/Town Engineer.

1. Major Arterial (7-Lane)

Facilitate relatively long trip lengths at high (45 MPH) posted operating speeds with limited access to adjacent properties. Major Arterials arterials serve major centers of activity in urban areas and have the highest traffic volume corridors. These streets are often major gateways to the community.

2. Minor Arterial (5-Lane)

Provide somewhat shorter trip lengths than Major Arterials major arterials, interconnected with and augment Major Arterial major arterial routes at moderate (35-40 MPH) posted operating speeds, and allow somewhat greater access to adjacent properties than Major Arterials. major arterials.

3. Commercial/Industrial Collectors

Collect, distribute, and provide direct access to commercial and industrial properties. The Commercial/Industrial Collector Provide direct access to commercial properties. The commercial/industrial collector street usually has lower volumes, moderate speeds (30-35 MPH) posted speeds,), trip lengths and minimal through traffic, but may experience a proportionally high percentage of truck traffic.

4. Residential Collector

Collect and distribute moderate amounts of traffic between arterials and local streets at relatively low (25-30 MPH) posted operating speeds with greater accessibility than major collectors.

5. Local Residential

Provide direct access to abutting properties. Local Residential residential streets possess relatively low volumes, posted operating speeds (25 MPH), trip lengths and minimal through traffic movements. Local streets shall be arranged as to discourage their use by traffic originating outside the immediate area.

6. Rural Local Residential

Provide direct access to rural abutting properties. Shares many of the properties of Local Residential local residential streets, but allows a rural option without curb and gutter and sidewalk.

6.2.3 ROADWAY RIGHT-OF-WAY (ROW) REQUIREMENTS

A. The public right-of-way (ROW) requirements shall be based upon recommendations of the Agency's City of Prescott's General Plan circulation element, Street Classification Map, Airport Area Transportation Plan, and the most recently adopted edition of the Central Yavapai Metropolitan Planning Organization (CYMPO) Regional Transportation Plan 2030 plan; and the ultimate needs of the development. The dedicated ROW right-of-way shall provide sufficient area for the installation of utilities, cut and fill of slopes, drainage, postal gang boxes, sidewalks and multi-use paths, traffic control devices, access management devices (medians), signs, fire hydrants, landscaping, auxiliary turn lanes, transit facilities and other facilities that may be located adjacent to street corridors. The minimum ROW right-of-way requirements are provided in QCSDs 601Q-606Q COP Standard Details 601P-606P and in Table 6-1: Table 6-1:

B. Standard Details for street typical sections are available on the City of Prescott website at http://www.cityofprescott.net/services/engineering/ or at the City of Prescott Public Works Department.

TABLE 6-1

STREET RIGHT-OF-WAY REQUIREMENTS

Classification	Minimum Right-of-Way (1)	Parking	Lanes	QCSD COP Detail
Major Arterial	130' 120'	None	7 (2 3)	606Q 606P
Minor Arterial	100' 110'	None	5 (2 3)	605Q 605P
Comm/ /Ind. Collector	70' (2)	None	3 (2 3)	604Q 604P
Residential Collector	60'	2 sides	2	603Q 603P
Local Residential	50'	1 side	2	602Q 602P
Rural Local Residential	50'	None	2	601Q 601P

(1) Additional right-of-way may be required in special circumstances. These may include the need for auxiliary traffic lanes, to facilitate transit facilities, offsets and/or roadways shifts.

(2) Bike lane required.

(3) Shared turn lane/median provided

6.2.4 INTERSECTION SIGHT VISIBILITY TRIANGLE EASEMENTS

Sight visibility triangle easements shall be used as a means to limit the height of structures, vegetation, and other improvements on the portion of property and/or ROW right-of-way immediately adjacent to intersections, alleys and driveways. However, these Section 6.3.10 and Table 6.3.9 of the Land Development Code (LDC) sets forth the minimum required corner easements by intersection type. These minimum sight visibility triangle easements however, shall not preclude the design engineer from calculating any additional ROW right-of-way, easements or easements needed for sight visibility triangle restrictions required per QCSD 611Q. COP projects shall

adhere to Section 6.3.10 and Table 6.3.9 of the LDC sets forth the minimum required corner easements by intersection typeStandard Detail 611P.

6.2.5 SUBDIVISION STREET PLANNING

A. The planning of subdivision streets shall discourage through traffic.

1. Street Location and Arrangement

a. Street layout shall provide for the continuation of arterial and collector streets in adjacent areas, and shall conform to a standard grid system, when possible., as specified in GES, and Section 7.4.3 B of the Land Development Code (LDC). In certain cases, paved street sections are required beyond the subdivision boundary to provide connectivity to the nearest AgencyCity of Prescott maintained and paved street. COP projects shall also adhere to Section 7.4.3 B of the LDC.

b. Other classifications shall be required to follow a circulating system as well.

c. Certain proposed streets, as designated by the COP'sCity of Prescott Street Classification Map, shall be extended to the sub-division boundary to provide future connection with adjoining un-platted lands. In general, these extensions shall not be farther apart than the maximum permitted length of a block. COP projects shall also adhere to, as specified in Section 7.4.5 A of the LDCLand Development Code.

Arrangement of locald. Local streets alignments shall be so arranged as to discourage their use as through routes by traffic originating outside the immediate area.

2. Partial Street Improvements

a. When a street is required adjacent to, and parallel with, two subdivision boundaries, the first subdivision to develop shall complete all required improvements. The first subdivision shall submit civil improvement plans to include, in dashed lines, the half street, which will be constructed in the future, and be responsible for the construction of full improvements, at a minimum from their boundary to centerline with the required AC structural section paved width no less than twenty-four (24') feet. Additionally, they shall be required to construct sidewalk, curb and gutter along their development frontage. (Dependent*(Dependant on ROWright-of-way width, circulation requirements and length of street, the first sub-divider may be required to construct beyond centerline).

b. Half-street improvements terminating at the roadway monument or centerline shall be constructed with a thickened edge per QCSDCOP Standard Detail 201Q.

c. For all projects, a full street cross-section is required for interior streets and a complete half-street cross-section for perimeter streets if the street centerline is the project's boundary line.

d. The half-street is to be designed to match existing or future construction as much as possible unless doing so is likely to create an unsatisfactory condition as determined by the City/Town Engineer. If changes are needed to correct conditions on an existing half-street to construct the other half of the street, the solutions must be developed in coordination with the City/Town Engineer on an individual project basis. The plans for the new half-street must contain sufficient information on the profile and cross-sections of the existing street to demonstrate that the new construction will match the old construction and result in a full street with proper cross-sections.

1. In lieu of half-street design terminating at the roadway centerline, the City/Town Engineer may specify that partial street improvements be constructed centered about the roadway to be widened symmetrically by later phases or developments. This may include constructing center medians in the initial phase of construction.

3. Subdivision Blocks

a. Block lengths, widths and shapes of blocks shall be determined with due regard to:

1) Provision of sites suitable to the type of use contemplated.

2) Zoning requirements, related to lot sizes and dimensions.

3) Need for convenient access, circulation, control and safety of street and pedestrian traffic.

4) Limitations and opportunities of topography.

5) Circulation within the subdivision, and access to the community facilities.

6) Emergency vehicle access and circulation.

7) Lengths as short as practicable, and the discouragement of excessive vehicular speeds, but not to exceed one-thousand two-hundred (1,200') feet, measured along the centerline of street and between intersecting street centerlines.

8) Cul-de-sac lengths less than one-thousand three-hundred (1,300') feet in length., as specified in Section 7.4.3 D of the Land Development Code

4. Traffic Calming

Traffic calming measures can be implemented in accordance with Agency policy, as part of new communities, or retrofitted into existing neighborhoods. In the COP, using the Council adopted Traffic Calming Policy is available on the COP's City of Prescott website at COP Traffic Calming Policy http://www.cityofprescott.net/services/streets/traffic or at the COP's City of Prescott Public Works Department. If a community design calls for traffic calming elements, as required by Prescott City Code (PCC,), the City/Town Engineer shall work with the project engineer on suggestions and guidance for on acceptable treatments. Traffic calming measures can vary, depending on the specific application and can . Example, traffic-calming measures include medians, traffic circles, and roundabouts, speed humps per QCSD COP Standard Detail 210Q, raised crosswalks/intersections, chicanes, and street narrowing. The City/Town Engineer must approve the use of traffic calming measures within the Agency ROW. City of Prescott right-of-way.

SECTION Section 6.3 HORIZONTAL ALIGNMENT

A horizontal curve is required when the angle of change in horizontal alignment is equal to or greater than zero point five (0.5°) degrees. The nature of the surrounding development and topography, and the street classification will establish the factors that determine the radius of the curve for small deflection angles.

6.3.1 MINIMUM CURVE RADIUS

A. The minimum radius of curvature is determined by the design speed or by the stopping distance unless otherwise approved by the City/Town Engineer.

B. Minimum Radii Based on Design Speed:

Table 6-2 Table 6-2 contains the minimum radius of curvature for each street classification with and without a super elevation of two-percent (2% or tenths (0.02) ft/ft) as derived from Exhibit 3-40 in Chapter 3 of the AASHTO "Green Book." ". Wherever possible, the radii used should be larger than that specified. If stopping sight distance conditions require a larger radius than that shown, then that larger radius becomes the minimum radius for the curve.

TABLE 6-2

MINIMUM HORIZONTAL CURVE RADIUS

	Major Arterial	Minor Arterial	Comm Com/Ind Collector	Residential Collector	Local Residential	Rural Local Residential
Minimum Radius of Horizontal Curve W/O without Super Elevation elevation	1000'	600'	450'	320'	205'	135'
Minimum Radius of Horizontal Curve with 2% Super Elevation elevation	800'	500'	~~500'~~ 375'	~~375'~~ 270'	~~270'~~ 150'	~~150'~~ 100'

	Major Arterial	Minor Arterial	Comm/Ind Collector	Residential Collector	Local Residential	Rural Local Residential
Minimum Horizontal Curve Length	500’	400’	200’	150’	100’	80’
Stopping Sight Distance	495’	425’	305’	250’	200’	155’
Design Speed (MPH)	55	50	40	35	30	25
Posted Speed (MPH)	45	45-35	35-30	30-25	25	25

C. Stopping Sight Distance

When walls, buildings, bridge piers, cut slopes, vegetation, or other obstructions are near the roadway on the inside of a curve, they can block a driver's driver's view of the road ahead. If they are too close, the driver will not have sufficient distance along the curved roadway to stop when a hazardous condition comes into view. For design purposes, the driver's driver's eye is assumed to be three and one-half (3½’) feet above the center of the inside lane (the driving lane closest to the inside of the curve) and a hazardous condition is assumed to be an object two (2’) feet high in the center of the inside lane, or most recent accepted AASHTO standards. The clear distance is measured from the center of the inside lane to the view obstruction. All designs shall ensure that sufficient sight distance exists. Refer to Table 6-3 Table 6-3 for the minimum stopping sight distances for various street classifications.

TABLE 6-3

MINIMUM STOPPING SIGHT DISTANCE

(Various Street Classifications)

Street Classification	Design Speed (MPH)	Stopping Sight Distance
Major Arterial	55	495’
Minor Arterial	50	425’
Comm/Ind Collector	40	305’
Residential Collector	35	250’
Local Residential	30	200’
Rural Local Residential	25	155’

6.3.2 SUPER ELEVATION IN CURVES

A. Super elevation may be used in conjunction with the minimum radius on horizontal curves to provide improved comfort for the road user. Additionally super elevation of two (2%) percent (2%) may be used when the minimum radius cannot be provided due to circumstances beyond the control of the City/Town Engineer, such as when the general alignment cannot be changed, if approved by as determined through the Agency. GES, Article 9, process. Super elevation greater than four (4%) percent (4%) shall may not be used. , except when approved through the GES, Article 9, process.

1. Run-out and Run-off: For super elevation transitions, refer to the AASHTO publication, "A Policy on Geometric Design of Highways and Streets."".

2. Stormdrain Requirement: Whenever super elevation is allowed a storm drainage system to collect the runoffrun off along the median curb shall be provided to ensure that nuisance water from the higher traveled way is not allowed to cross the lower traveled way.

6.3.3 COMPOUND CURVES

A. Compound curves (two curves with different radii in same direction) shallshould be avoided unless approved by. However if site conditions make the City/Town Engineer.

If approveduse of compound curve unavoidable, the shorter radius of the compound curve shall be at least two-thirds (⅔)( ) the length of the longer radius when the shorter radius is one-thousand (1,000') feet or less. Compound curves are not permitted when design speeds require the shorter radius to be greater than one-thousand (1,000') feet.

6.3.4 SPECIAL TANGENT SECTIONS BETWEEN CURVES IN THE SAME DIRECTION

A. On two-lane roads, tangent sections should be provided between two curves in the same direction. If the pavement cross-sections throughout the curves do not have super elevation, then the minimum lengths for tangent sections are per Table 6-4. Table 6-4.

TABLE 6-4

TANGENT SECTIONS

(Curves in Same Direction)

Design Speed Roadway Type	Minimum Tangent Section (ft)
40 MPH Commercial/Industrial Collector	300'
35 MPH Residential Collector	200'
30 MPH Local Residential	150'
25 MPH Rural/Local Residential	100'

B. If super elevation is provided in the curved portions of the roadway, then the super elevation transition lengths per AASHTO will determine the tangent lengths.

C. The City/Town Engineer may approve the elimination of the tangent section between curves in the same direction on an individual project basis, when justified by terrain challenges or special topographic constraint.

6.3.5 TANGENT SECTIONS BETWEEN REVERSE CURVES

A. Tangent section should be provided between two curves that curve in the opposite direction. Abrupt reversals in alignment should be avoided when possible. The distance between reverse curves should be at least the sum of the super elevation run out length and the tangent run out lengths. The required minimum lengths for tangent sections between reverse curves without super elevation are provided in Table 6-5:Table 6-5:

TABLE 6-5

MINIMUM TANGENT SECTIONS

(Reverse Curves)

Street Classification	Minimum Tangent Section (ft)
Major Arterial	300’
Minor Arterial	300’
Comm./.Ind. Collector	200’
Residential Commercial	200’
Local Residential	100’

B. The City/Town Engineer may approve the elimination of the tangent section between reverse curves on an individual project basis when justified by terrain challenges or special topographic constraint.

6.3.6 TANGENT SECTIONS APPROACHING INTERSECTIONS

A tangent section shall be provided between a street intersection and a curve unless otherwise approved by the City/Town Engineer. The minimum tangent length is shown in Table 6-6. Table 6-6.

TABLE 6-6

TANGENT SECTIONS AT INTERSECTIONS

Street Classification	Minimum Tangent Section (ft)
Major Arterial	200’
Minor Arterial	200’
Comm./Ind. Collector	150’
Residential Collector	100’
Local Residential	50’
Rural Local Residential	50’

SECTIONSection 6.4 VERTICAL ALIGNMENT

Vertical curves shall be designed to provide adequate sight distance, public safety and effective street drainage. Refer to AASHTO for sight distance requirements.

6.4.1 VERTICAL CURVES

All straight grades, which deflect by more than one (1%) percent must be joined by a parabolic vertical curve. The length shall be determined using the current AASHTO “A Policy on Geometric Design of Highways and Streets.” The minimum vertical curve length for a given design speed is determined as the greater of the value in the ‘Minimum Length’ column in Table 6-7,Table 6-7, Minimum Vertical Curve Length or the length calculated from the ‘Rate of Vertical Curvature’ column by the formula:

L = K x A where:

L = minimum curve length (ft)
K = rate of vertical curvature (ft/%)
A = algebraic difference in grades (%)

TABLE 6-7
VERTICAL CURVES REQUIREMENTS

L = K x A (where:

L = minimum curve length (ft)

Design Speed (mph)	Minimum Length (Ft.)	Rate of Vertical Curvature K (ft. per % grade change) (Crest)	Rate of Vertical Curvature K (ft. per % grade change) (Sag)

A = algebraic difference in grades (%)

TABLE 6-7

VERTICAL CURVES REQUIREMENTS

Design Speed (mph)	Minimum Length (Ft.)	Rate of Vertical Curvature K (ft. per % grade change) (Crest)	Rate of Vertical Curvature K (ft. per % grade change) (Sag)
20	60	7	17
25	75	12	26
30	90	19	37
35	105	29	49
40	120	44	64
45	135	61	79
50	150	84	96
55	165	114	115

In all cases, every section of a street's vertical alignment must meet passing and stopping sight distance requirements for the design speed established for the street.

6.4.2 HORIZONTAL AND VERTICAL CURVES

When horizontal and vertical curves are combined, the horizontal curve should lead or follow the vertical curve, and not be introduced near the top of a crest vertical curve or near the bottom of a sag vertical curve.

6.4.3 LONGITUDINAL STREET GRADES

The maximum longitudinal street grade requirements are per Table 6-8.Table 6-8.

TABLE 6-8

LONGITUDINAL STREET GRADE

Street Classification	Maximum	Minimum
Major Arterial	6%	0.50%
Minor Arterial	6%	0.50%
Comm/Ind Collector	8%	0.50%
Residential Collector	8%	0.50%
Local Residential	12%	0.50%

Street Classification	Maximum	Minimum
Rural Local Residential	12%	0.50%

6.4.4 SPEED LIMITS

A. Setting Speed Limits

1. On new roadway construction, speed limits are typically to be set within the following range as in Table 6-9:

TABLE 6-9
SETTING SPEED LIMITS

Rural Local Residential:	25 mph
Local Residential:	25 mph
Residential Collector Collectors:	25 – 30 mph
Comm/Com./Ind Collector Collectors:	30 – 35 mph
Minor Arterial Arterials:	35 – 45 mph
Major Arterial Arterials:	45 mph

2. A reduction in speed limit shall not normally be considered due to topographic, alignment or grade issues that can be resolved through traditional grading or construction techniques. However, with exceptional circumstances a modification may be considered by the City Engineer.

A. Final posted speed limits shall be approved by the City/Town Engineer.

6.4.5 STREET INTERSECTION SPACING

A. Separation of street intersections shall be designed to enhance safe ingress and egress, promote traffic circulation on the roadway system, and conform to the standards noted in Table 6-10.Table 6-9. The following schedule shall serve as a guide for allowable street intersection spacing unless otherwise justified by a TIA and approved by the City/Town EngineerTraffic Impact Analysis.

1. Street Intersections Spacing on State Highways and Major Arterials:

A minimum one-half (1/2) mile spacing shall be required for all full access, signalized or roundabout controlled street intersections in all cases, except where subject to a highway access management plan or as otherwise approved by the Agency.City. Consideration for intersection spacing as close as one-quarter (1/4) mile may be considered through the GES, Article 9, process. Recorded easements for shared access, provision of acceleration/deceleration lanes, traffic signals and other ROWright-of-way improvements, for these cuts may be required prior to approval.

2. Street Intersection Spacing on Minor Arterials:

A minimum, one-quarter (1/4) mile spacing shall be required for all full access, signalized or roundabout controlled street intersections in all cases. Consideration for intersection spacing as close as one-quarter (1/4) mile to six-hundred sixty (660') feet may be considered to provide required access through the GES, Article 9, process. Recorded easements for shared access may be required prior to approval for adjoining. Adjoining parcels. under common ownership may be required to share a curb cut.

3. Street Intersection Spacing on Commercial/Industrial Collectors and Residential Collectors:

Street Intersectionintersection Spacing on Residential Collectors shall be spaced between one-quarter (1/4) mile and six-hundred sixty (660') feet and is subject to the approval of the City/Town Engineer.

4. Street Intersection Spacing on Local Residential and Rural Local Residential Streets:

Street Intersection Spacing on Local ResidentialCommercial/Industrial Collectors and Rural Local Residential Streets shall be spaced between six-hundred sixty (660') feet and two-hundred fifty (250') feet.

TABLE 6-109

STREET INTERSECTION AND CURB CUT SEPARATION

Street Classification	Minimum Street Spacing
State Highway & Major Arterial	½ Mile (1/2 to ¼ mile)*
Minor Arterial	¼ Mile (1/4 mile to 660' feet)*
Comm./Ind. And Residential Collector	¼ Mile to 660' feet
Local and Rural Local Residential Streets	660' to 250' feet

* Consideration for reduced spacing as indicated can be made through the GES, Article 9, process.

6.4.6 AUXILIARY TRAFFIC LANES

A. Auxiliary turning lanes permit the separation of conflicting traffic movements and remove vehicles from the flow of through traffic. Auxiliary lanes apply to both right and left turn lanes at street intersections and for deceleration lanes at mid-block driveways. The requirements for an auxiliary lane may necessitate additional ROW rights-of-way in addition to the standard sections. Determination of the need for any auxiliary turn lane shall normally be made using the TIA Traffic Impact Analysis process, or when determined by the City/Town Engineer. Exceptions to the storage and transition lengths may be granted through the GES, Article 9, process, where conditions do not allow the full recommended design standard to be met.

1. General Auxiliary Lane Design Considerations

a. Lane width: Auxiliary lanes shall equal that of the through lanes but shall be at least twelve (12') feet wide for new construction. For modifications to an existing roadway, auxiliary lanes may be ten (10') feet wide or as approved by the City/Town Engineer. .

b. Lane length: The length of the auxiliary lanes for turning vehicles consists of two (2) components, entering taper and storage length.

1) Entering Taper

AIt is common practice to use a taper rate ofthat is between eight to one (8:1) ()(longitudinal: transverse) shall be used for low speed roadways classified as Major Collectors major collectors and lower. Fifteen and fifteen to one (15:1) (longitudinal: transverse) taper rate shall be used for higher speed roadways classified as Minor minor and Major Arterials major arterials. When these standards cannot be met, a standard taper length of ninety (90') feet for a single turn lane or and one-hundred fifty (150') feet for a dual turn lane may be considered for urban streets by the City/Town Engineer.

2) Storage Length

At signalized intersections, the storage length needed depends on the signal cycle length, the signal phasing arrangement, and the rate of arrivals and departures of left and right-turning vehicles. The storage length is a function of the probability of occurrence of events and shall usually be based on one and one-half (1 ½) to two (2) times the average number of vehicles that would store per cycle, which is predicated on the design volume. The storageThis length shall be sufficient to serve heavy surges that occur as determined by a TIA but no less than the lengths outlined in this section. Auxiliary lanesfrom time to time. As in the case of an un-signalized intersection, provision shall be made for storing at least two vehicles. A minimum left turn storage length of one-hundred-fifty (150') feet shall be provided on streets with a design speed greater than forty-five (45 mph) MPH or at signalized intersections shall be a minimum of one hundred , all other driveway and fifty (150') feet and at nonstreets shall be sixty (60') feet. A minimum right turn, storage length of one-hundred (100') feet shall be provided on all streets with a design speed greater than forty-five (45) MPH or at signalized intersections, all other driveways and streets shall be a minimum of one hundred (100'sixty (60') feet. A maximum storage of three-hundred (300') feet is allowed for a single left turn lane.

2. Right-turn lanes

Dedicated right-turn lanes are required at all arterial intersections and may be required by the City/Town Engineer at other intersection and driveway locations as determined by a TIATraffic Impact Analysis. Right-turn lanes are required on roadways where right-turning vehicles create delays or safety problems for other traffic movements. The need for a right-turn lane at a site access intersection depends on the speed of traffic on the road, the volume of traffic turning right, and the through traffic volume in the same lane as the right-turning traffic. Right turn deceleration lanes shall be required based on Table 6-11. the ADOT Traffic Engineering Policies, Guidelines and Procedures (PGP), Section 245 and Table 6-10.

TABLE 6-1110

RIGHT-TURN LANE WARRANTS

Peak Hour Traffic Volume on the Highway in Advancing Direction	Minimum Peak Hour Right-Turn Traffic Volume				
	# of thru lanes per direction				
	1		2 (Undivided)		3
	< 35 MPH Posted Speed	> 35 MPH Posted Speed	< 35 MPH Posted Speed	> 35 MPH Posted Speed	All Speeds
< 200					

201-300	-	30	-	-	-
301-400	-	19	-	55	-
401-500	85	14	-	30	-
501-600	58	12	140	25	-
601-700	27	9	80	18	-
701-800	20	8	53	15	-
801-900	12	7	40	12	-
901-1000	9	6	30	11	-
1001-1100	8	5	23	9	18
1101-1200	7	5	18	8	16
1201-1300	6	4	14	8	15
1301-1400	6	4	11	6	12
1400+	5	3	8	6	10

Right-Turn Lane Warrants

Peak Hour Traffic Volume on the Highway in Advancing Direction	Minimum Peak Hour Right-turn Traffic Volume				
	# of thru lanes per direction				
	1		2		3
	< 45 MPH Posted Speed	≥ 45 MPH Posted Speed	< 45 MPH Posted Speed	≥ 45 MPH Posted Speed	All Speeds
≤ 200					
201 - 300	-	30	-	-	-
301 - 400	-	19	-	55	-
401 - 500	85	14	-	30	-
501 - 600	58	12	140	25	-
601 - 700	27	9	80	18	-
701 - 800	20	8	53	15	-
801 - 900	12	7	40	12	-
901 - 1000	9	6	30	11	-
1001 - 1100	8	5	23	9	18
1101 - 1200	7	5	18	8	16
1201 - 1300	6	4	14	8	15
1301 - 1400	6	4	11	6	12
1400+	5	3	8	6	10

3. Left-Turn Lanes

Left-turn lanes are required at all Arterialsarterials and Commercial/Industrial Collectorcommercial/industrial collector intersections. Left-turn lanes may also be required at street intersections on Residential Collectorsresidential collectors and Local Residentiallocal residential streets based on projected left-turn volume and conflicting through volume, or other safety issues. Left-turn lanes are required on roadways where left-turning vehicles create delays or safety problems for other traffic movements. The need for a left-turn lane at a site access or intersection depends on the speed of traffic on the road, the volume of traffic turning left, and the through traffic volume in the same lane as the left-turning traffic. Left-turn lanes can be accommodated with a two-way left-turn lane on most collector streets at uncontrolled minor intersections. Dual left turn lanes should be considered when the turning volume exceeds three-hundred (300) vehicles per hour; or physical constraints signal timing or the TIATraffic Impact Analysis, indicates a need as determined by the City/Town Engineer. Left turn lanes shall be required based on Table 6-12. the ADOT Traffic Engineering Policies, Guidelines and Procedures (PGP), Section 245 and Table 6-11.

TABLE 6-1211

LEFT-TURN LANE WARRANTS

Peak Hour Traffic Volume on the Highway in Advancing Direction	Minimum Peak Hour Left-Turn Traffic Volume			
	# of thru lanes per direction			
	1		2 (Undivided)*	
	< 35 MPH Posted Speed	> 35 MPH Posted Speed	< 35 MPH Posted Speed	> 35 MPH Posted Speed
< 200	30	15	-	-
201-300	12	12	40	30
301-400	12	12	30	25
401-500	12	12	25	18
501-600	12	12	15	12
601-1000	12	12	10	8
1000+	12	8	10	8

**On non-freeway divided highways, left-turn or U-turn lanes should be provided at median breaks.*

Left-Turn Lane Warrants

Peak Hour Traffic Volume on the Highway in Advancing Direction	Minimum Peak Hour Left-turn Traffic Volume			
	# of thru lanes per direction			
	1		2 (Undivided)*	
	< 45 MPH Posted Speed	≥ 45 MPH Posted Speed	≤ 45 MPH Posted Speed	≥ 45 MPH Posted Speed
≤ 200	30	15	-	-
201 – 300	12	12	40	30
301 – 400	12	12	30	25
401 – 500	12	12	25	18
501 – 600	12	12	15	12
601 – 1000	12	12	10	8
1000+	12	8	10	8

* On non-freeway divided highways, left-turn or U-turn lanes should be provided at median breaks.

4. Acceleration Lanes

Acceleration lanes allow vehicles to make the necessary change between the speed of operation on a highway or street and the lower speed on the intersecting roadway. These lane types may beare only required on Arterialsarterials or State Highways as with high speed limits. Determination of the need for an acceleration lane shall be determined by the TIA and approved by the City/Town Engineer. Traffic Impact Analysis.

6.4.7 DRIVEWAY ACCESS GUIDELINES

To promote efficient traffic circulation, designersA. Driveways shall be designed and located in such a way to provide safe ingress and egress into their project while limitingwith the totalfewest number of driveways offwhile promoting efficient traffic circulation on the Agency'sCity of Prescott's roadway system.

1. Driveway Spacing

Minimum commercial driveway spacing shall conform to the standards noted in Table 6-13.Table 6-12 unless otherwise approved by the City Engineer. This minimum spacing applies to proposed site driveway separation, as well as separation from existing or planned driveways on adjacent parcels and across the street. To provide safe turning movements from driveways, on streets without raised medians, new driveways shall align with existing driveways on the opposite side of the street. Corner parcels may be required to have all

access from a side street as determined by the City/Town Engineer. A non-vehicular access easement (NVAE) may be required to restrict curb cuts to approved locations. Residential lots with more than one driveway shall have a twenty-five (25') foot minimum separation.

TABLE 6-1312

COMMERICAL DRIVEWAY SPACING

Street Classification	Minimum Distance Driveway Spacing (Feet)
Controlled Access Facility	None
Limited Access Facility	As determinedTBD by TIATraffic Impact Analysis
State Highway & Major Arterial	300
Minor Arterial	200
Collectors & Local Streets	As determined by TIA or the City/Town Engineer

2. Driveway Number

Table 6-14Table 6-13 and the following shall serve as a guide for allowable number of driveways on a site unless justified by a TIA.Traffic Impact Analysis. Safe driveway requirements per the above section shall be provided at a minimum.

a. At least one (1) driveway per abutting street shall be allowed unless physical constraints or otherwise directed by the City/Town Engineer.

b. One (1) additional driveway may be allowed for a site with continuous frontage of three-hundred (300') feet or more on a roadway classified as Minor Arterialminor arterial or lower and four-hundred (400') feet or more on a Major Arterialmajor arterial or higher.

c. Two (2) additional driveways (three (3) total) may be allowed for a site with continuous frontage of more than six-hundred (600') feet or more on a roadway classified as Minor Arterialminor arterial or lower and eight-hundred (800') feet or more on a Major Arterialmajor arterial or higher.

d. An additional service type driveway may be allowed for a site under the following conditions:

i. Continuous frontage of six-hundred (600') feet or more on a roadway classified as Minor Arterialminor arterial or lower.

~~ii.~~ Continuous frontage of eight-hundred (800') feet or more on a Major Arterial~~major arterial~~ or higher.

~~iii.~~ The site layout is such that the service driveway is unlikely to be used by customers of the businesses on the site~~,~~ and designed as such.

~~e.~~ Shared access~~, and~~ internal connectivity and shared curb cuts between adjacent parcels ~~shall be encouraged. Adjoining parcels under common ownership~~ may be required. ~~to share a curb cut.~~

~~f.~~ Driveway location must be evaluated with respect to the particular site layout and location. Variations may be permitted where a TIA,~~Traffic Impact Analysis~~ approved by the Agency,~~City Engineer~~ justifies a departure from these guidelines ~~or an exception is granted through the GES, Article 9, process~~.

TABLE 6-14~~13~~

NUMBER OF DRIVEWAYS

Street Classification	Street Frontage (feet)	Number of Driveways
Controlled Access Facility	–	None
Limited Access Facility	>1 Mile	As determined ~~TBD~~ by TIA~~Traffic Impact Analysis~~
State Highway & Major Arterial	> 800	3*
State Highway & Major Arterial	≥ 400 to 800	2
State Highway & Major Arterial	< 400	1
Minor Arterial & Comm/~~.~~/Ind~~.~~ Collector	>600	3*
Minor Arterial & Comm/~~.~~/Ind~~.~~ Collector	≥300 to 600	2

Street Classification	Street Frontage (feet)	Number of Driveways
Minor Arterial & Comm/ /Ind. Collector	< 300	1
Residential Collector & Local Streets	Any	1*

* Actual number to be determined through a TIA Traffic Impact Analysis or by approval of the City/Town Engineer.

3. Driveway Location Limitations

A new driveway shall not be allowed within twenty (20') feet of any commercial property line except when it is a joint use driveway, serving two (2) abutting commercial properties. Commercial driveways shall not be allowed within fifty (50' seventy-five (75') feet of the curb face extension right of an intersecting local street, one-hundred and fifty (150') feet way line of an intersecting collector street, two-hundred (200') feet of an intersecting Minor Arterial, and three-hundred (300') feet of an intersecting Major Arterial or as determined by a TIA with approval by the City/Town Engineer. . Exceptions may be granted through the GES, Article 9, process.

1. Residential driveways shall not be allowed within fifty (50') feet of the curb face extension of an intersecting street. Driveway extensions in the ROW shall not cross the projection of the property line.

2. Opposing commercial/industrial driveways shall be aligned. Offset shall be within six (6') feet centerline to centerline. On streets with no median where access points cannot be aligned, the minimum offset shall be one hundred, seventy-five (175') feet centerline to centerline.

4. Right-In -Right-Out -Design

When a right-in-right-out design is required by the Agency City of Prescott, the design engineer shall refer to QCSD COP Standard Detail 650Q-1 and 650Q-2 for specific design requirements.

6.4.8 MEDIAN DESIGN

A. In the interest of public safety, traffic management and street aesthetics, medians are used to separate traffic flow, channelize left turns, control access and reduce conflicts.

1. Raised Median

Raised median islands shall be installed in accordance with MAG standards.

a. Storage Lane Lengths and Tapers: Refer to GES, Section 6.4.6 Section 6.4.6 "Auxiliary Traffic Lanes" for minimum specific dimensions, unless the TIA Traffic Impact Analysis results or the City/Town Engineer demonstrates longer lengths are required.

b. Median curb type: Refer to GES, Section 6.6.3Section 6.6.3 "Median Curb" for requirements.

c. Termination: Medians shall terminate in a bull nose per MAG Standard Detail 223. Other types may be considered based on the application through the GES, Article 9, process.

d. Full access median openings consist of right-in and /right-out and left-in and /left-out turning movements. Full access median openings may be required to be signalized.

e. Partial access median openings consist of right-in/right-out and left ingress only while prohibiting left egress. Partial openings allow fewer traffic conflicts and create a lower potential for collisions.

f. Spacing for median openings is measured from the center of the median opening to the center of the adjacent median opening or intersection.

g. All medians shall be signed per the MUTCD guidelines. The beginning of each median where none exists prior, are to be signed. Median breaks in a continuous median are required to have object markers.

2. Median Openings

Raised medians on Arterialarterial streets are provided to reduce conflicts, channelize movements for safety, and improve traffic flow. It is not possible to provide an opening in the median for every driveway. Careful consideration shall be given to each request for a median opening to ensure that the safety and the intent of the median is not compromised by a proliferation of median cuts. The preference for access along arterial streets is to have full access median openings that align at not less than one-quarter (1/4) mile intervals. The design engineer shall line up full access openings in compliance with the street system planned for the arterial corridor. Full access openings shall occur at the mile, one-half (1/2) mile, and one-quarter (1/4) mile interval. The preference for access at less than one-quarter (1/4) mile spacing is to have a partial access median opening; however, these openings are subject to such parameters as safety of operation, flow of traffic requirements for storage, and feasibility of geometrics. These parameters shall be addressed in a TIATraffic Impact Analysis when requesting a partial access opening. All median openings shall be prohibited within six-hundred sixty (660') feet of an arterial-to-arterial intersection. Full access median openings at less than one-quarter (1/4) mile intervals or within six-hundred sixty (660') feet of an arterial-to-arterial, intersection must go through the GES, Article 9, process. The applicant shall be required to submit a TIAstandard Traffic Impact Analysis that also demonstrates the following:

a. The full access opening is spaced safely and shall not be in conflict with the planned grid system for the corridor.

b. The full access opening shall allow for safe operation.

c. The full access opening shall not compromise storage requirements.

d. The full access opening shall not compromise safety for all other turning movements.

e. The full access opening shall not significantly affect the flow of traffic on the arterial.

f. The full access opening shallwill not negatively affect accessaccesses to future property development.

SECTIONSection 6.5 EASEMENTS AND DEDICATIONS

6.5.1 PUBLIC UTILITY EASEMENT (PUE)

A minimum of ten (10') feeteight (8') foot wide, Public Utility Easement (PUE) shall be located adjacent to each side of the dedicated street ROW. PUEright-of-way. Public Utility Easements may not be located within the side or back property lines without the approval of the City/Town Engineer. Landscaping installed in a PUE shall be of the shallow root, and non-intrusive variety, and shall be maintained by the property owner.

6.5.2 NON-VEHICULAR ACCESS EASEMENT (NVAE)

A. An Non-Vehicular Access Easement (NVAE) limits vehicular access to a parcelsite from the ROW.

B. For private lots located on local streets which are also contiguous with arterial, and/or collector streets. On local streets, a one (1') foot NVAE shall be required on the lot line(s) contiguous or adjacent with the arterial and/or collector streets.

C. A one (1') foot NVAE on private lots is required on parcels adjacent to all greenbelts and open space parcels, except for private roadway parcels.

A one (1') foot NVAE may be required on private lots to restrictareas. Vehicular access to a ROW in order to satisfy access restrictions stipulated in Section 6.4.7. shall be restricted by use of a one (1') foot NVAE, at locations other than street intersections and approved driveways. The ownership and maintenance of the NVAE remains with the property owner of the parcel from which the NVAE is granted. NVAE shall be shown on the final plat and dedicated as non-exclusive easement to the Agency.

6.5.3 TEMPORARY CONSTRUCTION EASEMENT (TCE)

An easement placed on a parcel of land temporarily for the use of construction personnel and equipment. The TCEs shall be determined by the EOR and shall be of sufficient width to accommodate the construction type, spoils piles and vehicles necessary to complete the work. The easement shall be extinguished upon the completion of the construction project.

SECTIONSection 6.6 CURB AND GUTTER

6.6.1 VERTICAL CURBS

A. Vertical curbs are required on all streets classified as Minor Arterial and higher, Residential Collectors and higher, Local Residential streets at curb returns, adjacent to common areas, and other areas to restrict vehicle access. Vertical curbs may be installed on Local Residential.

B. The height of all vertical curb shall be six (6") inch unless otherwise approved by the City/Town Engineer. Installation shall be per QCSDCOP Standard Detail 220Q-1, Type "A.""., Vertical curbs shall be six (6") inch at all medians, and curbs adjacent to landscaping tracts or vertical structures (e.g. cluster mailboxes, utility cabinets, signal equipment, monument signing, etc.).

6.6.2 ROLL CURB

Roll curb per QCSDsCOP Standard Detail 220Q-1, Type "C" and 220Q-2 may be installed on Local Residential., Residential Collector streets, and Commercial/Industrial Collector streets may use roll curb as approved by the City/Town Engineer. Driveways shall use the commercial driveway per QCSD 250Q-1 or 250Q-2 on Commercial/Industrial Collectors.

6.6.3 MEDIAN CURB

In locations where raised medians are constructed, vertical curb or vertical curb and gutter is required. Median curb shall be installed per QCSDCOP Standard Detail 220Q-1, Type "A" with depressed lip and 222Q, Type "A.". With the City/Town Engineer approval, roll curb may be used around medians installed in low speed, low volume streets, to facilitate truck turning movements with traffic calming projects, or where needed to maintain adequate width for emergency vehicles.

6.6.4 CURB RETURNS

A. Vertical curb shall be used through the curb return from point of curvature (PC) to point of tangent (PT) regardless of whether the tangent curb sections are vertical or roll curb.

B. Curb Return Radii on Streets

The radii for curb returns shall be in accordance with Table 6-15: Table 6-14: All dimensions are to back of curb.

TABLE 6-1514

CURB RETURN RADII

	Intersecting Street Classification					
Street Classification	**Major Arterial**	**Minor Arterial**	**Comm/Com./Ind. Collector**	**Residential Collector**	**Local Residential**	**Rural Local Residential**
Major Arterial	35'TBD*	35'TBD*	35'	35'	35'	-
Minor Arterial	35'TBD*	35'TBD*	35'	35'	35'	-
Comm/Ind Collector	35'	35'	30'	30'	30'	-
Residential Collector	35'	35'	30'	30'	30'	25'
Local Residential	35'	35'	30'	30'	25'	25'
Rural Local Residential	-	-	-	30'	25'	25'

*Curb radii for Arterial streets *may require larger radius based on* shall be determined by speed and *largest design vehicle determined in* a TIA. In all cases, they shall be a minimum thirty-five (35') feet.

C. Sidewalk Ramp

Sidewalk ramps shall be constructed at all curbed street intersections, at medians with pedestrian refuges, and wherever a pedestrian access route crosses a street. Sidewalk ramps shall align with the sidewalk ramps on the opposite side of the street. If a traffic signal exists or is planned, the sidewalk ramp and apron shall provide access to the pedestrian push button, per the Americans with Disabilities Act (ADA) requirements.

1. Detectable Warning Panels of truncated domes shall be provided at all sidewalk ramps. The minimum area provided shall be two feet by 4 feet (2' x 4') on standard ramp types. The COP requires a cast (ductile) iron panel with an uncoated natural patina finish. The TOPV may approve other materials.

1. Directional or double sidewalk ramps per QCSDCOP Standard Detail 232Q shall be installed at all arterial and collector street intersections. Where directional sidewalk ramps are required, the minimum curb return radius shall be thirty (30') feet.

2. Single sidewalk ramps per QCSDCOP Standard Detail 231Q-1 shall be installed at all Local Residentiallocal residential street intersections.

3. At T-intersections one sidewalk ramp shall be installed per QCSDsCOP Standard Detail 233Q-1 or 233Q-2. The ramp shall normally be placed on the right-hand side of the TEE and align with ramps on the opposite side of the street.

4. Along safe routes to schoolsschool, any crosswalk location or trail connections, additional sidewalk ramps may be required.

5. Projects that include construction improvements at existing street intersections where sidewalk ramps are located shall note whether the ramps comply with current GES and QCSDs.City of Prescott standards. If the sidewalk ramps are not in compliance, they shall be removed and replaced with sidewalk ramps that meet GES and QCSDsCity of Prescott standards.

SECTIONSection 6.7 SIDEWALKS

Installation of sidewalks shall promote and enhance pedestrian safety and the aesthetic quality of the roadway. Streets constructed to AgencyCity of Prescott standards shall have sidewalks installed on both sides of the street per QCSDCOP Standard Detail 230Q with the exception of Rural Local Residential X-Section QCSD 601Q.. Sidewalks shall remain within the ROW or established easements designated for pedestrian use. right-of-way.

6.7.1 SIDEWALK WIDTHS

A. Arterial Street:

1. Detached Sidewalk = Five (5') feet with a nine (9') foot separation (parkway) from back of curb per QCSD 605Q-1, 605Q-.

1. 2 and 606Q.

. Paved Multi-use pathUse Path = Twelve (12'12') feet wide if on one side of the street or can be reduced to ten (10') feet wide if on both sides of the street with a four (4') foot separation (parkway) from back of curb per QCSD 605Q-1, 605Q-2 and 606Q. .

B. Commercial/Industrial Collector Street:

1. Detached Sidewalk = Five (5') feet wide with a four (4') foot separation (parkway) from back of curb.

C. Residential Collector and Local Residential Street:

1. Detached Sidewalk with two (2') foot gutter = Five (5'Four (4') feet wide with a three (3'four (4') foot separation (parkway) from back of curb.

2. Detached Sidewalk with three (3') foot gutter = Five (5'Four (4') feet wide with a two (2'three (3') foot separation (parkway) from back of curb.

NOTE: Detached sidewalks and multi-use paths shall connect to the attached sidewalk at each curb return. Detached sidewalksThey shall also use a curved design with a minimum radius of three (3') feet for the connection at curb return sidewalk. Sidewalk dimensions shall not include the curb width. Multi-use paths shall typically connect at the back of a curb ramp per QCSD 231Q-2.

6.7.2 PEDESTRIAN WAYS

Pedestrian ways shall be constructed to connect sidewalks with public and private facilities not located in the public street ROWright-of-way. Public pedestrian ways shall be within a tract or easement for the purpose of defining the access and maintenance responsibility. The minimum width of the easement shall be seven (7'six (6') feet, or a width consistent with adjacent trails, and may be used for additional purposes as approved by the City/Town Engineer. If additional uses are approved, the minimum required width may be increased depending on the specific use.

6.7.3 MULTI-USE PATHS/TRAIL FACILITIES

Developments which impact existing or planned trails as detailed in the Prescott Bicycle and Pedestrian Master Plan, are required to provide ROWright-of-way or other accommodation to extend the trail system through or adjacent to the development, as directed by the City/Town Engineer. The development shall design and build appropriate and safe crossings, which shall include consideration of street classification, speed, traffic volume, trail volume, proximity to signalized intersections, and cost; and link new local pedestrian facilities to the regional system.

A. Multi-use path and trail surfaces

Multi-use path and trail surfaces should be firm, stable, and slip resistant material. Minimum design criteria for multi-use paths and trail surfacespath are as follows:

1. 1. Multi-use paths, where required, shall have a minimum of fifteen (15') foot public ROWright-of-way or easement dedicated to the public when not included as part of the roadway ROW.

Multi-use paths shall be constructed of a firm, stable, and slip resistance material. Concrete shall be used when a multi-use trail is within the roadway ROW and serves as the sidewalk facility on one-side right of the roadway as required by the roadway standard detail. Asphalt, six (6") inch compacted ABC or Agency approved material may be used for multi-use paths that are supplementary and adjacent to the required concrete sidewalk within a roadway ROW. way

2. Two-way travel standard width isshall be twelve (12') feet to accommodate the use of bicycles, pedestrians and maintenance vehicles. In no case shall the travel width be less than ten (10') feet

3. One-way travel shall be a minimum six (6') feet in width

4. Maximum longitudinal grade shall match that of the roadway it parallels.

5. Minimum one (1') foot graded area adjacent to both sides of the path.

6. Minimum separation of four (4') feet from multi-use path to back of curb. a roadway

7. Maintain a minimum vertical clearance of eight (8') feet, and keep free of protruding objects.

8. Paths designated for equestrian use shall have a minimum vertical clearance of fourteen (14' ten (10') feet and be constructed with trail surfaces suitable for that use.

9. Fall protection, if required, shall be a minimum height of forty-two (42") inches for pedestrian facilities and fifty-four (54") inches for facilities with bicyclebike and equestrian uses.

10. Lighting shall be required for all underground pedestrian crossings.

2. When a multi-use path connects to a sidewalk section at an intersection it shall intersect perpendicular to the back of the ADA curb ramp and not require users to make sudden swerves, or to be directed towards oncoming traffic. The path tie-in to the curb ramp shall be at the same grade as the back of the ramp landing. The curb ramp shall be as wide as the path.

3. When a multi-use path passes through a drainage structure, an elevated pathway shall be provided to keep nuisance water off the path and allow the water to rapidly drain or be removed. Additional measures may be needed in areas prone to flooding.

B. Trail Crossing Type and Design

Several federal resources address trail and shared use path design, which can be used, by the design engineerEngineer as references. These include the AASHTOAmerican Association of State Highway and Transportation Officials (ASSHTO) "Guide for the Development of Bicycle Facilities"; and the Federal Highway Administration (FHWA) "Equestrian Design Guidebook for Trails, Trailheads and Campgrounds."." Whenever practical, a grade-separated crossing is preferred operationally over an at-grade crossing;, however, the City/Town Engineer may consider at--grade crossings based on a technical submittal from the design engineerEngineer. This submittal shall either show that the grade separated crossing is unfeasible because of topography or that an at-grade crossing is operationally safe and the added expense and maintenance of the grade-separated crossing is not justified. The following summarizes the requirements of any trail crossings:

1. Trails, which consider equestrian at-grade crossings, shall use an alignment that is perpendicular to the street. The crossing shall be on a straight segment of the street, and optimally in a location where motorists might expect an intersection. Consistency in the placement and design of intersections allows all users to identify them more readily.

2. Appropriate tread surfaces at crossings are critical to equestrian safety and the use of rough textured concrete, washed concrete or rubberized railroad type inserts is preferred.

3. Provision of waiting areas is required where trails cross at-grade. These are created by expanding the width of the trail surface as it approaches the street, or forming a rectangular or fan-shaped waiting area using fencing.

4. At midblock crossing locations where were the street exceeds eighty (80') feet curb to curb a median refuge is required to break the crossing into two (2) legs. The refuge shall be designed to allow storage of tandem bicycles bikes or equestrians without encroachment into travel lanes.

5. Traffic signals or pedestrian hybrid beacons (PHB Beacons (HAWKs) can enhance at-grade trail crossings when warranted. Deployment of such devices must not be taken lightly. They shall only be installed at locations with significant trail user volumes as approved by the City/Town Engineer. Signalized crossings serving equestrian users shall consider appropriate push button height.

SECTION Section 6.8 PAVEMENT

6.8.1 CROSS SECTIONS

A. Undivided Streets

6.8.1 UNDIVIDED STREETS

Undivided streets should have a normal crown, that is a two-way cross-slope with the cross section high point on the street centerline. A raised crown with a constant cross slope of two (2%) percent is required on all public streets. Inverted crown sections are not allowed, except when approved by the City/Town Engineer as required at arterial or collector street intersections and alleyways. Within an arterial or collector street intersection, the cross-slope shall comply with QCSD COP Standard Detail 600Q to accommodate rideability ride ability through the intersection.

B. Divided Streets

6.8.2 DIVIDED STREETS

Divided streets should have cross-slope on each pavement section. The high point of each slope on each pavement section must occur on the edge of the pavement nearest to the median. Unusual conditions may cause cross-slope requirements to vary (e.g. superelevated sections), but normally, the desirable cross-slope is two (2%) percent. The desirable slope from top of median curb to top of median curb shall not exceed fifteen (15%) percent.

6.8.2 PAVEMENT CUTS

A. All pavement cuts shall be in accordance with Agency Code.

PCC, Chapter 8-2, City Right-of-Way

B. There shall be no open trenching (pavement cut) on public streets with paved surfaces less than five (5) years old.

A. Open trenching (pavement cut) may be permitted on streets with paved surfaces that are a minimum of five (5) years old. Backfill and pavement replacement shall conform to QCSD 200Q-1.

B. Pavement replacement for street cuts shall be made within seventy-two (72) hours of completion of work as specified on QCSD 200Q.

C. When the trench of any lineal utility project is within three (3') feet or less from lip of gutter, the pavement area between the trench and lip of curb will also require full removal and replacement. Pavement replacement shall be the minimum structural section for said street classification. In no case shall the replacement of existing asphalt be less than four (4") inches asphaltic concrete (AC) over six (6") inches aggregate base course (ABC) (the minimum residential section). In addition, should any raveling or damage occur to the existing pavement within the construction area, the damaged areas shall be saw cut, removed, and replaced. Damage to curb, gutter and sidewalk shall require full panel removal with saw cuts made at each joint. Removal and replacement of any and all existing infrastructure, damaged pavement, concrete, landscaping and irrigation, etc. shall be at the contractor's or private utility's expense.

6.8.3 TRENCHLESS CROSSINGS

In lieu of pavement cuts, developers and contractors may use trenchless technologies. Designs with pavement boring shall include a boring profile to ensure proper separation is maintained from all existing utilities. Profiles of existing utilities shall be potholed prior to start of work and included on the boring profile.

~~SECTION~~Section 6.9 CUL-DE-SACS AND KNUCKLES

6.9.1 ~~———~~CUL-DE-SAC STREET

~~A.~~ A cul-de-sac street is a street that serves more than one (1) parcel~~property owner~~ and has only one (1) direct access to the public street system.

~~B.~~ Cul-de-sac streets shall be a maximum of one-thousand three-hundred (1,300') feet in length and terminate in a circular turnaround. Refer to QCSDs 620Q~~COP Standard Detail 620P~~-1 and 620Q~~620P~~-2 for ROW~~right-of-way~~, street improvement requirements and dimensions and Section 7.4.3.D of the LDC~~Land Development Code~~.

6.9.2 ~~———~~KNUCKLES

Knuckles are areas on the roadway expanded to provide a turn-around and additional access or lot frontage on local streets. Knuckles are required at intersections where changes in alignment are present but a centerline curve is not

provided. Knuckles are permitted to improve accessibility to odd-shaped sites. The use of knuckles (except on a cul-de-sac) on streets other than local streets must be approved by the City/Town Engineer. Refer to QCSDs 622Q~~COP Standard Detail 622P~~-1 and 622Q~~622P~~-2 for ROW~~right-of-way~~, street improvements and dimensions.

SECTION~~Section~~ 6.10 DEAD-~~-~~END STREETS

Permanent dead-end streets that do not provide future connection shall include a cul-de-sac turn around. A hammerhead turn around, as approved by Emergency Services, may be used where topography and lot layout are such that one or two lots need to be accessed. Private driveways shall not be used for hammerhead or turn around requirements. Where~~Dead end streets shall be prohibited except short stubs where~~ a street connection is necessary to serve adjacent un-platted land that will develop at a future date a stub may be constructed without a cul-de-sac or hammerhead when the length is one-hundred (100') feet or less. A temporary turn around ~~. Temporary turnarounds~~ shall be required where the street stub exceeds two (2) lots~~one (1) lot~~ or one-hundred (100') feet in length. The developer shall provide a sign at the stub declaring that the particular street shall connect with ~~any~~ future development.

SECTION~~Section~~ 6.11 MAILBOXES~~MAIL BOXES~~

~~A.~~ Curb Side Mailboxes

~~1.~~ Curb side mailbox within parkway strip~~with Parkway~~: When an open space exists between the back of curb and the sidewalk of three (3') feet or more (parkway), the mailbox shall be installed so that the front is flush with the back of curb. The mailbox shall be a minimum of forty-two (42") inches above ground, and on a two (2") inch diameter steel or four by four (4"x4") inch wood breakaway post. Refer to QCSDs~~COP Standard Detail~~ 134Q-1 and 134Q-2.

~~2.~~ Curb side mailbox behind sidewalk: When the sidewalk starts at the back of curb, the mailbox shall be installed so that the front is a minimum of twelve (12") inches behind the back of the sidewalk, forty-two (42") inches above ground and on a two (2") inch diameter steel or four by four (4"x4") inch wood breakaway post. Refer to QCSDs~~COP Standard Detail~~ 134Q-1 and 134Q-2.

1. Mailbox behind ditch: Where a roadway has no curb but there exists a roadside ditch, the mailbox shall be installed on an elbowed structure of two (2") inch diameter steel such that the mailbox extends over the ditch with its front flush with the edge of the roadway shoulder, if paved, or edge of the roadway, if unpaved. The front of the mailbox shall be between thirty-six (36") and forty-two (42") inches above ground. Refer to QCSDs 134Q-1 and 134Q-2.

2. Mailbox beside shoulder: Where a roadway has no curb and no roadside ditch, the mailbox shall be installed between thirty-six (36") and forty-two (42") inches above ground on a two (2") inch diameter steel post two (2') feet from the edge of the edge of the shoulder. Refer to QCSDs 134Q-1 and 134Q-2.

3. Masonry mailboxes will not be permitted within the street ROW. right-of-way.

B. Cluster Mailboxes

Cluster style mailboxes: a style whereby mailboxes, meeting the specifications of the United States Postal Service (USPS),, are assembled and grouped together in a single area of land so that they are regarded as one unit. Requirements:

1. The location of a cluster mailboxbox shall be approved by the City/Town Engineer and the local USPS, United States Postal Service. For cluster boxes in new subdivisions, the location of the unit shall be shown on the preliminary plat.

2. No driveway access shall be constructed within ten (10') feet of the cluster mailbox.

3. Units shall not be installed within one-hundred (100') feet of a street intersection. Units shall not be installed in locations where, because of the position of, shape or color it may interfere with, obstruct the view of or be confused with any traffic sign, signal or device.

4. Cluster mailboxes shall be located on property lines or on a dedicated open tract on the same side of the street designated as a "no parking" zone and in a manner as to provide sufficient sight distance for pedestrian access.

5. A sidewalk shall be constructed perpendicular to the curb adjacent to the unit providing a pedestrian connection from the unit to the curb.

6. The cluster box unit shall be located on a concrete pad and the unit shall be set backsetback a minimum of one (1') foot from the back edge of the sidewalk to the nearest edge of the unit.

7. Cluster mailboxmailboxes units shall not be located to conflict with any public utilities, including but not limited to manholes, fire hydrants, meters, vaults and cabinets.

8. When in the opinion of the City/Town Engineer it is necessary for pedestrian and vehicular safety, an access driveway turnout shall be required at the developer's expense, built three (3') feet outside of the face of the curb.

SECTIONSection 6.12 TRAFFIC CONTROL DEVICE SELECTION

A. Traffic control device selection is critical to the successful operation of the transportation network. Several options exist for controlling traffic at intersections but this section shall focus on the two highest levels of control, which include traffic signals and roundabouts. These are often interchangeable and the use of one over the other is not always evident. The following information provides guidance for the design Engineer on choosing one over the other. This justification procedure shall be documented in the Traffic Impact Analysis for each intersection requiring all way stop control or traffic signalization.

1. Installation Warrants

The studies required to justify the installation of a traffic signal are based on the warrants and requirements set forth in the Manual of Uniform Traffic Control Devices (MUTCD). No such warrants or requirements exist for roundabouts however, roundabouts shall be considered as an alternative to traffic signals and all way stop control whenever they are warranted.

2. Roundabout Criteria

Roundabouts shall be considered the most appropriate form of control at any intersection if three general questions can be answered positively.

a. Will a roundabout be expected to perform better than other alternative control modes? In other words, will it reduce delay, increase capacity, reduce queue lengths or solve some other operational problem?

b. Will a roundabout provide improved safety over other alternative control devices?

c. Will a roundabout be expected to provide improved operational characteristics over other alternative control devices? This includes adjacent access operations and emergency vehicle operations.

3. Comparative Performance

Once it is determined a roundabout is the most appropriate form of control based on the operational criteria; the final stage is to compare the construction cost, life cycle cost, right of way considerations, "reserve capacity" (the ability to accommodate traffic growth), and constructability. If no clear disadvantage is evident with the roundabout then it shall be moved forward as the preferred traffic control device.

4. Roundabout and Traffic Signal Design

a. Roundabout design can be performed by either a general civil engineering firm or a specialized roundabout designer, however if a general civil is used the plans shall require a final design review by a recognized roundabout expert as agreed upon by the City and paid for by the developer/engineer.

b. Traffic signal design shall be conducted by a registered Civil or Traffic Engineer with particular expertise in traffic signal control systems.

5. Roundabout Plan Checklist

The Round About Plan Checklist shall be used as a guide to ensure that all of the basic elements are included in the roundabout plans. Any roundabout plan that does not include each of the basic elements included on the checklist shall be returned for revision and re-submittal.

Section 6.13 ON-STREET PARKING

A. Sign Spacing

Signs restricting on street parking shall normally be placed in accordance with the distances shown in Table 6-16.Table 6-15. These may be adjusted as required by the City/Town Engineer when:

1. An assessment of the anticipated parking demand indicates a change is needed.

2. The roadway vertical or horizontal alignment reduces the visibility of the signs.

3. Parking is allowed in some areas and not in others to indicate the beginning and ending of no parking zones. This can be accomplished using "Begin" and "End" plaquesplacards, arrows or specific wording on the signs. This also applies when parking time limits are used, or handicap spaces are designated, in which case individual stalls shall be signed.

4. For special conditions such as hydrants, fire lanes, sight visibility requirements, special restrictions needed for traffic control devices,. etc.

TABLE 6-1615

PARKING RESTRICTION SIGN SPACING

Street Classification	Min. Sign Spacing (Feet)	Max. Sign Spacing (Feet)
Major Arterial	400	600
Minor Arterial	400	500
Residential Collector	200	300
Comm/Com./Ind. Collector	200	300
Local Residential	150	250
Rural Local Residential	150	250

B. Parking Restriction Guidelines

On street parking shall be restricted on those roadways with insufficient width to allow both parked vehicles and the safe, efficient movement of through traffic as shown in Table 6-17. These parking guidelines assume bike lanes are not usedTable 6-16.

TABLE 6-1716

PARKING RESTRICTION GUIDELINES – STREET WIDTH

Roadway Pavement Width (Feet)	No Parking On One Side Allowed	Parking On one Side Two Sides	No Parking Allowed on Two Sides
≤ 28	X	–	X
>28 to ≤32	X	X	–
>32	–	X	X

These parking guidelines assume bike lanes are not used.

C. Sign Type

Signs restricting on street parking shall be of the type and size in accordance with those shown in Table 6-18. Table 6-17. Alternative types and sizes shall only be approved for special circumstances as approved by the City/Town Engineer.

TABLE 6-18 17

PARKING RESTRICTIONS SIGN TYPE & SIZE

Street Classification	Approved Sign	Size	Plaque Placard or Arrow	Orientation to Travel Way (Degrees)
Major Arterial	R8-3	30" x 30 x30"	N/A	90
Minor Arterial	R8-3	30" x 30 x30"	N/A	90
Comm/Com./Ind. Collector	R8-3	24" x 24 x24"	N/A	90
Comm/Com./Ind. Collector	R7-9	12" x 18 x18"	N/A	90
Residential Collector	R7-1	12" x 18 x18"	Begin & End Here to corner	90 30 to 45
Local Residential	R7-1	12" x 18 x18"	Begin & End Here to corner	90 30 to 45
Rural Local Residential	R7-1	12" x 18 x18"	Begin & End Here to corner	90 30 to 45

SECTION Section 6.13 14 BUS BENCH LOCATIONS

A. When properly located, adequately designed, and effectively enforced, bus stops can improve service and expedite general traffic flow. Decisions regarding bus stop spacing and location call for a careful analysis of passenger service requirements (e.g. demand, convenience, and safety), the type of bus service provided and the interaction of stopped buses with general traffic flow. The following guidelines provide direction to for the design

engineerEngineer for the installation of bus stops in accordance with the City of Prescott. Refer to Prescott City Code (PCC,): Title 8-2-17 and TOPV 14-03-100..

1. Stop Spacing

Bus stops are locations where passengers access the transit system, and . Bus stops must therefore must be convenient to the places where passengers desirewish to travel togo. Convenience and speed must be balanced in determining appropriate bus stop placement, as too many bus stops can slow down travel times and impede traffic movements. The following guidelines on bus stop spacing shall apply:

a. In the downtown area, bus stops shall have a spacing of eight-hundred (800') feet to one-thousand three-hundred (1,300') feet.

b. Outside the downtown area, bus stops shall be spaced no less than one-thousand five-hundred (1,500') feet apart.

2. Bus Stop Locations

Bus stops shall be placed along the street curb for direct safe passenger access to and from the sidewalk, waiting and walking areas. Bus stops are placed in one of three locations: far side (located immediately after an intersection); nearside (located immediately before an intersection); and mid-block (located between intersections). Each of these locations offers advantages to vehicle drivers and pedestrians. However, in general the following guidelines apply to their use:

a. Far-side stops are the preferable choice for service because they reduce conflicts between right-turning vehicles and stopped buses, eliminate sight-distance deficiencies on approaches to an intersection, and encourage pedestrian crossing at the rear of the bus.

b. Nearside stops shall be avoided whenever possible. However, they may be considered on an individual project basis if in the opinion of the City/Town Engineer a far-side stop is deemed unsafe or impractical.

c. Mid-block stops are considered special case stops and are to be used only in special circumstances when determined byin the opinion of the City/Town Engineer that there is a special need based on trip attractors, transfer points or other special demands that cannot be accommodated at an intersection nearby. Bus turnouts shall be used for mid-block stops.

3. Bus Stop Benches

~~a.~~ Each bus stop location shall consist of only one bench or shelter unit unless otherwise approved. Multiple benches at one stop location may only be considered when ridership records indicate a clear need for their installation.

~~b.~~ Bus benches shall be placed in a manner that sidewalk passage is not narrowed to less than the minimum widths set forth by ADA. ~~the Americans with Disabilities Act.~~

~~c.~~ Bus bench placement, which would result in sidewalk widths less than thirty-six (36") inches, shall require the transit provider to install additional sidewalk width and acquire additional ROW~~right-of-way~~ at their expense, as needed to maintain ADA required sidewalk widths.

SECTION 6.14 TRAFFIC CONTROL DEVICE SELECTION

Traffic control device selection is critical to the successful operation of the transportation network. Several options exist for controlling traffic at intersections. This section shall focus on the two highest levels of control, which include traffic signals and roundabouts. These are often interchangeable and the use of one over the other is not always evident. The following information provides guidance for the design engineer on choosing one over the other. This justification procedure shall be documented in the TIA for each intersection requiring all-way stop control or traffic signalization.

Installation Warrants

The studies required to justify the installation of a traffic signal are based on the warrants and requirements set forth in the MUTCD. The satisfaction of a traffic signal warrant shall not in itself require the installation of an enhanced control option. No such warrants or requirements exist for roundabouts, however, roundabouts shall be considered as an alternative to traffic signals and all way stop control whenever they are warranted.

Roundabout Criteria

Roundabouts shall be considered the most appropriate form of control at any intersection if three (3) general questions can be answered positively.

1. Will a roundabout be expected to perform better than other alternative control modes; will it reduce delay, increase capacity, reduce queue lengths or solve some other operational problem?

2. Will a roundabout be shown to address collision types or trends over other alternative control devices?

3. Will a roundabout be expected to provide improved operational characteristics over other alternative control devices? This includes adjacent access operations and emergency vehicle operations.

Comparative Performance

If it is determined a roundabout is the most appropriate form of control based on the operational criteria, the final stage is to compare the construction cost, life-cycle cost, ROW considerations, "reserve

capacity" (the ability to accommodate traffic growth), and constructability. If no clear disadvantage is evident with the roundabout then it shall be moved forward as the preferred traffic control device.

Roundabout and Traffic Signal Design

1. Roundabout design can be performed by either a general civil engineering firm or a specialized roundabout designer, however, if a general civil is used the plans shall require a final design review by a recognized roundabout expert as agreed upon by the City/Town Engineer and paid for by the developer/engineer.

2. Traffic signal design shall be conducted by a registered Civil or Traffic Engineer with particular expertise in traffic signal control systems.

Roundabout Plan Checklist

The Roundabout Plan Checklist shall be used as a guide to ensure that all of the basic elements are included in the roundabout plans. Any roundabout plan that does not include each of the basic elements included on the checklist shall be returned for revision and re-submittal.

SECTIONSection 6.15 TRAFFIC SIGNALS & LIGHTING

6.15.1 ——PUBLIC STREET LIGHTING

Developers of all residential, commercial, industrial or other types of properties are responsible for the design and installation of street lighting on all streets within and adjacent to their sites when required by the Agency.Prescott City Code (PCC). Street light plans shall be prepared and sealed by a licensed Electrical Engineer or Civil Engineerelectrical engineer registered in the State of Arizona with particular expertise in roadway lighting design.. The street lighting design shall be reviewed and approved by the AgencyCity and shall take into account any policy promoting "dark sky initiatives" in recommendations on the number, spacing, and shielding of new street lighting. The street light design shall include numbering of the street light poles as directed by the City/Town Engineer and/or Arizona Public Service (APS). .

6.15.2 ——STREET LIGHT SELECTION

These street lighting criteria and guidelines apply for all standard installations. Alternative street light designs using decorative/architectural old style posts and lamps, for example, may also be acceptable by the AgencyCity for public street light systems when consistent with the Historic Globe Street Light Overlay District Map and requested by developersDevelopers and/or property owners. These alternative designs may be granted through the GES, Article 9, process.

6.15.3 ——STREET LIGHT DESIGN

The developer shall retain a licensedProfessional Electrical Engineer or Civil Engineer, registered in the State of Arizona with particular expertise in roadway lighting design, to prepare the lighting system design and appropriate calculations relative to illumination levels. Illumination design shall follow the recommendations of the

American National Standard Practice for Roadway Lighting, Illuminating Engineering Society of North America, IES RP-8. The Luminance criteria, with light loss factors of point eight (0.80), shall be used to determine the compliance with the IES RP-8 and AgencyCity street lighting design guidelines. Light Emitting Diode (LEDHigh Pressure Sodium (HPS) fixtures are the standard for all installations.

6.15.4 GENERAL STREET LIGHT NOTES

A. Street lights shall normally be located on property lines whenever possible, at least five (5') feet from driveways or any above ground facility, and at such locations to maximize their separation from trees.

B. Streetlights shall be located on the outside edge of the curve for horizontal curvilinear street alignments.

C. The minimum curb overhang by street light luminaries (excluding decorativehistoric globe style) shall be no less than two (2') feet.

D. Where the sidewalk is separated from the curb (parkway exists), the street light pole shall be centered two (2') feet from the gutter flow line.

E. Where the sidewalk is contiguous to the curb and the sidewalk, the street light pole shall be placed one and one-half (1 ½') feet behind the sidewalk.

F. Street trees can significantly interfere with the efficient lighting of streets, and shall not be permitted within thirty (30') feet of any street light standard.

G. All electrical connections and suppliessupply shall be placed underground.

6.15.5 ROADWAY SAFETY COBRA HEAD STREET LIGHT LUMINAIRES (COBRA HEAD & ARCHITECTURAL STYLE)

A. Standard Details

For the purpose of simplifying street light inventories, street light maintenance and consistency with APS requirements, the AgencyCity of Prescott has adopted a pre-approved roadway safety (cobra head and architectural) street light standardsstandard for use inon all AgencyCity of Prescott owned street light systems (except areas where decorativehistoric globe lighting is used).

1. Cobra head streetlights shall be per QCSD 170Q, and shall be gray in color. COP Standard Detail 170P.

1. Architectural style streetlights shall be per QCSD 171Q and shall be bronze in color.

2. All luminaries shall be multi"Cobra" head style, grey in color.

3. Multi tapped 120-240-277 voltage ready.

4. All lamps for Cobra head street light systems shall be LEDhigh-pressure sodium (HPS) lamps with a correlated color temperature of 3000K to 4000K.. These LEDHPS lamps shall meet one of the following criteria based on the classification of the roadway and the use specified in Table 6-19. Forty-one (41Table 6-18. One-Hundred (100) watt or four thousand eightninety-five hundred (4,8009500) minimum initial lumens, eighty-eight (88one-hundred fifty (150) watt or eightsixteen thousand two hundred (8,200(16,000) initial lumens, or onetwo-hundred eight (108fifty (250) watt or eleventhirty-thousand one-hundred (11,100(30,000) minimum initial lumens.

2. Special lighting conditions based on roadway character or conditions, as determined by the City/Town Engineer, may result in directed deviation from these lighting standards.

TABLE 6-1918

STREET LIGHT LUMINAIRE WATTAGE

Street Classification	Head Type (LEDHPS)	Location (Use)	Wattage
Major Arterial	Cobra Head	Roadway & Intersection	108250
Minor Arterial	Cobra Head & Architectural	Roadway & Intersection	108250 to 88150*
Comm/Com./Ind. Collector	Cobra Head & Architectural	Intersection	108250 to 88150*
Comm/Com./Ind. Collector	Cobra Head & Architectural	Roadway	108250 to 88150*
Residential Collector	Cobra Head & Architectural	Intersection	88150 or 41100*
Residential Collector	Cobra Head & Architectural	Roadway	88150 or 41100
Local Residential	Cobra Head & Architectural	Roadway & Intersection	41100
Local Residential	Historic Globe	Roadway	3270
Rural Local Residential	Cobra Head & Architectural	Roadway & Intersection	41100

* Specific use shall be directed by the City/Town Engineer based on local conditions.

Typical locationB. Location and spacing

Lighting Layout: The street lighting layout required is dictated by the street classification and shall be continuous. The design engineer shall consult the City/Town Engineer to assist in determining the appropriate street classification. The spacing distances listed belowof streetlights shall be used as general guidance, however final spacing shall ensure that appropriate lighting levels are provided as determined throughconform to the lighting system design. criteria below.

1. Arterial Streets: AverageLights shall be required at an average spacing of one-hundred fifty (150') feet (staggered) with spacing of three-hundred (300') feet on each side.

2. Commercial/Industrial and Residential Collector Streets: AverageLights shall be required at an average spacing of two-hundred (200') feet. Light may be placed on one side of the street or staggered.

3. Local Streets: AtLights shall be required at or near the end of cul-de-sacs longer than one-hundred forty (140') feet measured from a typical Stop sign location, at changes of horizontal street alignment of forty-five (45°) degrees or more that are two-hundred (200') feet or more from a street intersection. If optional mid-block locations are used then the spacing of lights is about two-hundred seventy-five (275') feet, but never less than two-hundred feet (200') feet or more than three-hundred fifty (350') feet.

4. Intersection Lighting: All arterial-to-arterial and signalized intersections shall have four (4) streetlights. All other intersections require at least two (2) streetlights except local-Local to-local. Local and in some cases, as determined by the City, Residential collector-Collector to-local may Local, which shall have one (1) streetlight as determined by the City/Town Engineer.. Knuckles shall require at least one (1) streetlight.

6.15.6 CITY OF PRESCOTT HISTORIC GLOBE STREET LIGHT LUMINARIES

C. Historic Globe Street Light Luminaries

1. Standard Details

a. Historic streetlights shall be Sternberg 4200 Augusta Series – 4208 TFP4 (Ten (10') feet tall, four (4") inch tapered Fluted cast aluminum-extruded poles) or approved equivalent.

b. Multi tapped 120-240 voltage ready.

c. All lamps for historic globe street light systems shall be thirty-two (32) seventy (70) watt LEDHPS incandescent lamps.

d. Eight (8') foot poles are 4208 TFP5 – Verde Green; Globe – A840, seventy (70) watt HPS.

e. Ten (10') foot poles are 5210 TFP – RE5Q and Alzak FH/DBA/Black; Globe – B750., seventy (70) watt HPS MT.

2. Location and Spacing

a. Lights shall be placed on alternating sides of the roadway at approximately seventy-five (75') foot intervals.

b. Lights shall be used in designated historic districts only as defined by the Historic Globe Street Light Overlay District Map.

c. Light spacing shall be such that at least one (1) streetlight is placed in close proximity of any roadway intersection (within five (5') feet of the back of curb return or edge of curb return). At larger intersections with collector-to-collector or arterial to collector street classifications, two (2) lights shall be placed diagonally opposite to one another (within five (5') feet of the back of curb return or edge of curb return).

d. In some cases, cobra head streetlights may be required at intersections requiring higher levels of safety lighting.

6.15.7 6 TRAFFIC SIGNALS

This section shall present the criteria and procedures to be utilized by consultants when performing traffic signal work in and for the Agency. City of Prescott.

A. Traffic Signal Spacing

Street Intersection Spacing on State Highways and Major Arterials:

1. Minimum one-half (1/2) mile spacing shall be required for all warranted traffic signal intersections on all state highways, parkways and Major Arterialmajor arterial in all cases, except where subject to a highway access management plan or as otherwise approved by ADOT. Consideration for intersection spacing as close as one-quarter (1/4) mile may be considered through the GES, Article 9, process. Recorded easements for shared access, provision of acceleration/deceleration lanes, traffic signals and other ROWright-of-way improvements, for these cuts may be required prior to approval.

2. Minimum one-quarter (1/4) mile spacing shall be required for all warranted traffic signal intersections on Minor Arterials, Major Collectors, and Minor Collectors in all cases. Consideration for intersection spacing as close as one-quarter (1/4) mile to six hundred sixty (660') feet may be considered to provide required access through the GES, Article 9, process. Recorded easements for shared access may be required prior to approval. Adjoining parcels under common ownership may be required to share a curb cut.

B. Traffic Signal Design Guidelines

The following publication most recent editions and approved supplements by the stateState and AgencyCity of Prescott are to be used in conjunction with the design criteria when designing traffic signals for the AgencyCity of Prescott.

1. Manual on Uniform Traffic Control Devices for Street and Highways; USDOT/FHWA.

2. Traffic Signals and Lighting (Standard Drawings); ADOT.

3. ADOT Standard Specifications for Road and Bridge Construction.

4. International Signal Association Specifications.

5. Equipment and Materials Standards of the Institute of Transportation Engineers.

1. General accessibility guidelines as adopted by Agency.

C. Controllers and Cabinets

1. Control cabinet shall be type IV Econolite TS2, Type 1 with elevator base.

2. Meter Pedestal Cabinet shall be Myers PBM 2000 or 1250 UPS with w/foundation or approved equal.

3. Provision for battery backup shall be provided in all traffic signal cabinets.

D. Emergency Vehicle Preemption

Emergency vehicle preemption shall be installed at all traffic signal intersections. A complete installation to include Opticom 700 series system, sensors, processors and confirmation hardware or approved equal shall be used.

E. Loop Detectors

All signalized intersection shall be fully actuated. Actuation shall be achieved through the use of video detection. Radar vehicle detection may be used when approved. When designing a traffic signal (new installation or modification), the type of vehicle detection to be used shall be discussed with the City/Town Traffic Engineer.

1. Video Detection Equipment.

Video detection systems used on Agency signals shall be the model listed below. The model number for both presence and advance vehicle detection is listed.

Manufacturer	Radar Detection Model Number
Cubic Transportation Systems	Gridsmart GS-3 (Advance & Presence Video)

2. Radar Detection Equipment

Radar detection systems used on Agency signals shall be the models listed below. These systems shall be considered for special circumstances or when requested by Yavapai County for their traffic signals. The model number for both presence and advance vehicle detection is listed.

Manufacturer	Radar Detection Model Number
Wavetronix	Advance WX-SS-200 (Advance Radar)
	Matrix WX-SS-225 (Presence Detection)

~~Loop detector shall be six (6') feet by fifty (50') feet quadrupole unless otherwise specified by the City Engineer and shall conform to the current ADOT Traffic Signals and Lighting Standard Drawings.~~

~~F.~~ Pedestrian Signal Indications

Provide pedestrian signals at vehicular signal locations. Install crosswalks at intersections, when sidewalk connections exist, or are installed. Pedestrian indications shall be LED countdown style with accessible pedestrian push buttons provided.

A. Pedestrian Push Buttons

Provide audible pedestrian push buttons at each crossing location. The button shall emit an audible locator tone (beep) and where directed include a vibrotactile directional crossing arrow. The button when pushed shall provide a pedestrian call and other messages to indicate when to walk. The locator tone (beep) and audible message volume shall have the ability to automatically adjust to ambient noise and be quieted by time of day.

~~G.~~ Pole and Head Location

Traffic signal pole and head locations shall conform to the MUTCD and direction of the City/Town Engineer.

~~H.~~ Street Light Luminaries

All traffic signal installations shall include streetlights on all mast arm equipped poles consistent with the requirements of GES, Section 6.15.5Section 6.13.4 "Cobra Head Street Light Luminaries.""

I. Pull Boxes

Traffic signal pull boxes shall be No. 7, signal interconnect pull boxes shall be No 5, with locking lid and labeled "TRAFFIC SIGNAL" and shall conform to T.S. 1-4, 1-5, and 1-6 of the ADOT Traffic Signals and Lighting Standard Drawings.

J. Traffic Signal Conduit

Traffic signal conduit shall be three (3") inch Schedule 40 PVC.

K. Traffic Signal Interconnect

Traffic signal interconnect conduit shall be installed along all arterial roadways and at other locations as directed by the City/Town Engineer per QCSDCOP Standard Detail 640Q to extend the existing interconnect systems. In locations where challenges with infrastructure or topography make in ground conduit unfeasible, traffic signal radio communication systems may be provided as directed by the Agency.

1. Conduit shall be two (2") inch Schedule 40 PVC.

2. Interconnect cable shall be 6-pair, filled 19-gauge solid, run un-spliced.

L. Traffic Signal Plan Checklist

The Traffic Signal Plan Checklist shall be used as a guide to ensure that all of the basic elements are included in the traffic signal plans. Any signal plan that does not include each of the basic elements included on the checklist shall be returned for revision and re-submittal.

SECTIONSection 6.16 SIGNING

6.16.1 SIGNING

In new development, the applicant shall install all required regulatory traffic control signs, which shall include but not be limited to street name, parking, stop, warning, dead end and guide signspedestrian signing. The applicant shall be responsible for supplying and installing the required signs, posts and hardware in accordance with the required standard plans and specifications.

6.16.2 GENERAL SIGNING STANDARDS SIGN DESIGN GUIDELINES

The following publications most recent editions and approved supplements by the stateState and AgencyCity are to be used in conjunction with the design criteria when designing traffic signing for the Agency with regard to size, color, shape and placementCity of Prescott.

A. Manual on Uniform Traffic Control Devices for Street and Highways (MUTCD); USDOT/FHWA.

B. City of Prescott Standard Specification

C. City of Prescott Standard Details

D. Manual of Approved Signs (ADOT).)

E. American Association of State Highway Transportation Officials (AASHTO)

6.16.3 GENERAL SIGNING GUIDELINES

A. All signing shall conform to the most recent editions of the publications shown above with regard to size, color, shape and placement.

B. All signs shall be new other than those shown on the plan to be relocated. All new and relocated signs shall be mounted on new posts with new hardware. Signs designed for installation on existing street light poles shall be mounted with new hardware.

C. Traffic sign dimensions, colors and lettering shall conform to the latest MUTCD specifications. Traffic sign size shall be standard unless otherwise specified here or on the plans.

D. All signs shall be located at least one (1') foot from the curb face to the nearest edge of the sign. All other roadways signs shall be mounted from six (6') feet to twelve (12') feet from the edge of the pavement to the nearest edge of the sign.

E. Roadways with guardrail signs shall be located at least six (6') feet from the face of the guardrail to the nearest edge of the sign.

F. Sign location shall be coordinated with landscaping plans to ensure sign visibility per AASHTO standards.

G. Signs shall be mounted on street light poles wherewhenever feasible.

H. All signs installed in areas where parking or pedestrian movements occur shall be erected at a height of seven (7') feet above the pavement or sidewalk to the bottom of the sign or to the lowest sign in a multiple sign installation assembly with the following exceptions:

1. The height to the bottom of a secondary sign mounted below another sign may be up to one (1') foot less than the height specified above in rural areas where pedestrians are not expected.

2. Object markers shall be installed at least four (4') feet above the pavement.

I. All R1-1 "STOP" signs and pedestrian warning signs shall be retro-reflective with all sheeting material to be diamond VIP grade, meeting or exceeding ASTM 4956-04.

J. All other signs are to be retro-reflective with all sheeting material to be high intensity prismatic meeting or exceeding ASTM 4956-04.

K. Sign blanks shall be 5052-H38 alloy treated aluminum with Alodine 1200 conversion coating, eight-hundredths (0.080") inch thick with rounded corners.

L. Stop signs are to be shown at all local street intersections within a subdivision unless an engineering study shows that no control or yield control is warranted. Stop signs shall be designed and shown on the minor leg of all collector and non-signalized arterial street intersections.

M. "STOP" signs and "YIELD" signs shall be a minimum of thirty (30") inches and thirty-six (36") inches in width, respectively. When specified by the requirements of the MUTCD, thirty-six (36") inch and/or forty-eight (48") inch signs may be required on major collectors and arterial streets.

N. At intersections where all approaches are stop controlled, "All Way" plaquesplacards shall be placed below the R1-1 stop signs.

6.16.3 4 SIGN POSTS

A. Sign posts shall conform to QCSDCOP Standard Detail 131Q.

B. For new construction the Telspar, Uni-strut or approved equal twelve--gauge, galvanized steel, four (4) sided perforated square tubing is required. Two (2") inch tubing shall be used for smaller signs while two and one-half (2½") inch tubing shall be used for the larger signs.

C. The post shall be tall enough to provide the minimum clearances specified in the GES, Section 6.16.3.Section 6.16.3 H.

D. The base and sleeve system for the sign shall be anchored in a minimum of a twenty-four (24") inch deep, twelve (12") inch diameter foundation of concrete. The base shall have a breakaway slip base system. The exposed post from the base shall be four (4") inches to six (6") inches high.

E. Signs over forty-eight (48") inches wide shall be mounted on two (2), two and one-half (2½") inch posts with a horizontal support frame.

6.16.4 5 STREET NAME SIGNS

A. Street name signs shall conform to QCSD COP Standard Detail 132P in the COP and 132PV in the TOPV.

B. All reflective sheeting material shall be high intensity prismatic, meeting or exceeding ASTM 4956-04.

C. All transparent acrylic, pressure-sensitive film shall be 3M#177 blue/green electro cut film or approved equal, color determined per Agency.

D. Letter font shall be uppercase four (4") inch minimum with the block numbers in the 100's with a directional arrow.

E. These signs are constructed by applying white sheeting to the entire blank. On top of this sheeting, a blue/green translucent pressure-sensitive film from which the legend has been cut and removed is applied. Thus, the green background is applied on top of the white sheeting resulting in a sign with a white legend and a blue/green background, color determined per Agency.

In the COP signsF. Signs that are located in the center of the block shall have " ← →."" ".

In the COP signsG. Signs that are at the beginning and end of the block shall have " → "" pointing up the block.

6.16.5 6 LOW WATER CROSSING GATES

A. Gates shall be required on all new low water crossings.

B. Two-hundred (200') feet prior to the low water crossing gate a thirty- six (36") inch by thirty- six (36" x 36") inch black on yellow warning sign shall be posted on each approach that reads "Flood Area Do Not Enter When Flooded."".

C. Black and yellow object marker (OM-3R(L)) shall be mounted on all four (4) corners of the gate facing traffic.

D. When the gates are closed, a black on white "Road Closed" (R11-2) shall be affixed to the gate facing oncoming traffic. To the left of the R11-2 sign, in the left most lane shall be affixed to the gate a red on black nine ball (OM4-2).

E. Knox padlocks will be required on all low water crossing gates.

6.16.6 7 END OF ROAD BARRICADESDELINEATORS

End of road barricades shall conform to QCSD 130Q-1 and 130Q-2. ThreeA. Two types of end of road barricadesbarriers can be used. These are a modified MAG Standard Detail 130.

1. Type A is constructed of two (2) redwood or treated four by four (4" x 4") inch woodredwood posts sunk in the ground thirty-six (36") inches and four (4') feet apart, extending to a height of five (5') feet. Three (3), eight (8") inch minimum, twelve (12") inch maximum by six (6') foot boards shall be mounted horizontally twenty (20") inches on center between the posts. The boards shall be painted in a chevron design using white and orange for barricades to indicate temporary status., black and yellow. Starting in the middle of the board the chevrons shall slope to both sides. Attached to the center board shall be a thirty-six by thirty-six (36" x 36") inch black on yellow warning sign with the words "Road Closed." The boards shall be painted in a chevron design using white and red to indicate permanent status. Starting in the middle of the board the chevrons shall slope to both sides. Attached to the center board shall be a forty-eight by thirty (48" x 30") inch black on white warning sign with the words "Road Closed." Short-term or rolling full closures may utilize a Type A barricade mounted on a base instead of posts set into the ground. six (36") inch by thirty six (36") inch black on yellow warning sign with the words "Road Closed".

A. Type B is constructed of two (2) redwood or treated four by four (4" x 4") inch wood posts sunk in the ground thirty-six (36") inches and four (4') feet apart, extending to a height of five (5') feet. Three (3), eight (8") inch minimum, twelve (12") inch maximum by six (6') foot boards shall be mounted horizontally twenty (20") inches on center between the posts. The boards shall be painted in a chevron design using white and orange for barricades to indicate temporary status. Starting in the middle of the board the chevrons shall slope to both sides. Attached to the center board shall be a thirty-six by thirty-six (36" x 36") inch black on yellow warning sign with the words "Road Closed." The boards shall be painted in a chevron design using white and red to indicate permanent status. Starting in the middle of the board the chevrons shall slope to both sides. Attached to the center board shall be a forty-eight by thirty (48" x 30") inch black on white warning sign with the words "Road Closed."

B. Type C consists of an array (minimum two (2) signs) of thirty-six by thirty-six (36" x 36") inch red on black OM4-2 type object markers mounted at a minimum of four (4') feet on twelve (12) gauge two (2") inch square steel tubing.

2. Type B is a smaller version of Type A. The two (2) treated four by four (4" x 4") inch posts shall be five (5') feet apart and extend three (3') feet above ground. One horizontal board shall be attached at the three (3') foot level. On the board will be the same color scheme, chevrons and sign as Type A.

3. In all cases in which a road closure is greater than one-hundred fifty (150') feet from the nearest street intersection or the roadway alignment obscures the closure, pre-warning signs shall be required and placed as directed by the City/Town Engineer.

6.16.7 8 SIGNING PLAN CHECKLIST

The Signing Plan Checklist shall be used as a guide to ensure that all of the basic elements of a project signing and striping plan elements of a project are included in the signing plans. Any signing plan that does not include each of the basic elements included on the checklist shall be returned for revision and re-submittal.

SECTIONSection 6.17 STRIPING

6.17.1 STRIPING

New plats and developments shall be responsible for the installation ofinstall all striping and pavement legends as determined by the City/Town Engineer, which shall include but not be limited to lane lines, crosswalks, stop bars, legends, and arrows. The applicant shall be responsible for supplying and installing the required striping in accordance with standard plans and specifications.

6.17.2 STRIPING DESIGN GUIDELINES

A. The corresponding publications referenced in Article 1 and Section 6.1.3, in theirfollowing publications' most recently adoptedrecent editions and approved supplements by the stateState and Agency,City are to be used in conjunction with approved design criteria when designing striping for the AgencyCity of Prescott.

1. Manual on Uniform Traffic Control Devices for Street and Highways (MUTCD); USDOT/FHWA

2. City of Prescott (COP) Standard Details

3. American Association of State Highway Transportation Officials (ASSHTO)

B. General Striping Guidelines

1. Striping shall conform to the most recent editions of the MUTCD specifications with regard to size, color, reflectivity and placement unless otherwise specified here.

2. All roadways classified as Commercial/Industrial Collector or higher shall require centerline striping, lane lines, stop bars, crosswalks (where applicable) and other appropriate legends and arrows.

Residential CollectorLocal residential streets or lower may be required to have additional pavement markingsare normally exempt.

3. All thermoplastic applications shall conform to ADOT specification 704. Transverse markings, symbols and legends shall be 90 mil (0.090 inch) thick preformed thermoplastic, longitudinal markings shall be 60 mil (0.060 inch) thick alkyd extruded thermoplastic.

4. All paint application shall conform to ADOT specification 708 or High Build Waterborne Traffic Paint. High Build Paint shall be applied to all Arterial and Collector streets and shall be 24 – 28 (0.024 – 0.028 inch) mils thick. .

1. All epoxy applications shall be hot applied by spray methods at a thickness of 15 – 20 mils (0.015 - 0.020 inch) and consist of epoxy resin compositions specifically formulated for use as a pavement marking material and for hot-spray application at elevated temperatures.

5. All conflicting striping, pavement markings, and curb paint shall be removed by wet sandblasting or other approved method prior to the installation of new striping. Slurry or paint shall not be used to cover existing paint. Pavement that is damaged due to the removal of markers or striping shall be repaired to the satisfaction of the City/Town Engineer.

All6. Through lanes shall be a minimum of twelve (12') feet in width, with the exception that lane(s) of eleven (11') feet minimum are used on the center lane of a Major Arterial street, per QCSD 606QCOP Standard Detail 606P.

7. Turn lane widthslanes shall be equal to that of the through lanes but mayshall be reduced to a minimum ofat least ten (10') feet wide per the City/Town Engineer. .

8. Parallel parking lanes adjacent to the curb with a gutter pan shall be a minimum of seven (7'five (5') feet in width from the edge of gutter.

Lane9. A maximum of two (2') foot offset in the lane striping through an intersection shall be aligned. When approved by the City/Town Engineer a maximum of two (2') foot offset may be permitted. is acceptable.

On streets that do not have curb and gutter, 10. All skip lane lines and edge of road markings shall be four (4") inches in width unless otherwise specified.

11. Four (4") inch solid white edge lines shall be used for posted speed limits of 25 MPH and under and six (6") inch solid white edge lines for streets with posted speed limits over 25 MPH. on streets that do not have curb and gutter.

12. All skip white or yellow road markings shall be a ten (10') foot long, four (4") inch wide stripe with a thirty (30') foot gap (forty (40') foot repeated interval).

13. Crosswalks shall normally be twelve (12") inches in width and shall be installed as shown in COP Standard Detail 630P and 631Q.

14. Stop bars shall be eighteen (18") inches wide and set back four (4'two (2') feet from the crosswalk, or in the absence of a crosswalk placed at the desired stopping point. They are required at all intersection locations where crosswalks are used and at all stop controlled intersections on streets classified a Residential Collector and higher. Additionally stop bars are required at all Local Residential and Rural Local Residential street intersections that intersect streets classified a Residential Collector and higher.

15. Dual turn lanes shall require the installation of lane delineation markings (guide lines) through the intersection, which shall consist of white six (6") inch wide thermoplastic skips placed in a two (2') foot stripe with a four (4') foot gap pattern.

C. Crosswalks

Crosswalks shall be required at all legs of signalized intersections and roundabouts and may be required at other locations in white or yellow or white, standard or high visibility types as determined by the City/Town Engineer. Refer to QCSDs 630QCOP Standard Detail 630P and 631Q.

Standard crosswalk marking - a1. A white twelve (12") inch transverse crosswalk markings shall be used. at all designated pedestrian crossings that require the minimum visual treatment.

High visibility crosswalk where specified – a 2. A white crosswalk marking ofwith twelve (12") inch transverse and diagonal and longitudinal marking shall be used on collector streets with higher volumes to provide increased visibility to drivers. This will result in a more noticeable pavement marking than the standard white crosswalk.

3. A white crosswalk with twenty-four (24") inch longitudinal markings twenty-four (24") inches on center. transverse and twelve (12") inch longitudinal markings provides the highest visibility to drivers and shall be used on arterial streets with the greatest volumes, requiring a more noticeable pavement marking than the diagonal white crosswalk.

Standard school crosswalk - a4. A yellow crosswalk with twelve (12") inch transverse and optional diagonal markings shall be used at designated school crossings. Its twelve (12") inch wide diagonal markings help to provide increases visibility to drivers and is the standard school crossing on streets with lower volumes.

High visibility school crosswalk - a5. A yellow crosswalk with twelve (12twenty-four (24") inch transverse and twenty-four (24twelve (12") inch longitudinal markings shall be used at designated school crossings on streets classified as Major Collector and higher. , requiring a more noticeable pavement marking than the diagonal yellow crosswalk.

D. Speed Hump Markings

Speed humps shall be striped in accordance with the QCSDCOP Standard Detail 210Q. The markings shall be white extruded or preformedprecut thermoplastic (90-mil thickness).

E. Bike Lane Marking

1. Bike lane markingslanes shall be installed in accordance with the most recent version of the Bicycle and Pedestrian Plan as adopted by the City Council and marked per QCSDCOP Street Typical Sections and the MUTCD. Part 9.

2. Bike lane symbols shall be installed as part of on-street bike lane striping at the beginning of each block and at a spacing of six-hundred (600') feet thereafter in the absence of intersecting streets.

3. Bike lane striping lines shall be six (6") inches in width, solid white unless otherwise specified.

4. Bike lanes shall be a minimum of four (4') feet in width when placed adjacent to the lip of gutter and five (5') feet in width when placed between a travel lane and a parking aisle.

SECTIONSection 6.18 GUARDRAIL

All new developments shall provide for the design and construction of guardrail as determined by the warrants, procedures and policies in the AASHTO Roadside Design Guide. Additional length may be requiredIn areas where short sections of guardrail are warranted the developer shall design and construct additional length sufficient to ensure that the guardrail system has collective post strength to resist failure or total displacement of the system .