CITY OF PHOENIX
WATER MASTER PLAN UPDATE




PREPARED BY RH2 ENGINEERING, INC.

WITH ASSISTANCE FROM

HANSFORD ECONOMIC CONSULTING

RH2

CITY OF PHOENIX
O•R•E•G•O•N

SUMMER 2020

City of Phoenix Water Master Plan

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INTRODUCTION

The City of Phoenix, Oregon (City) engaged the services of RH2 Engineering, Inc., (RH2), to prepare a Water Master Plan (WMP) for the City's water distribution system. The WMP includes a study of the entire Phoenix system from supply to storage and distribution. To aid in the master planning effort, a hydraulic computer model was created of the distribution system. The model was used to evaluate the system to determine recommendations for capital improvements. A Capital Improvement Plan (CIP) was created which provides recommendations for improvements to meet existing and future demands. This executive summary provides a brief overview of the WMP findings and results.

The City owns and operates a potable water system (Public Water System Identification Number 00625) and complies with all regulatory standards for managing a public water system in the state of Oregon. In 2017 the City served a population of approximately 4,605 through approximately 1,400 connections. Water to the City is supplied from the Medford Water Commission (MWC) through a regional transmission system called the "TAP" supply system (Talent, Ashland, and Phoenix). As a result, the City does not operate or maintain its own source of water, rather its operations are solely those of local storage and distribution.

PLANNING PERIODS AND STUDY AREA

Four planning periods were included in this study; existing conditions (year 2017), short-term operating conditions (year 2025), mid-term operating conditions (year 2040) and long-term operating conditions (buildout - year 2070). The study area for this report includes the City's current service area, its current urban growth boundary, and future growth areas as determined by the City in coordination with regional planning efforts under Jackson County. The City's existing and predicted future service areas for this report are shown in **Figure 1-1** and **Figure 1-2**. Future water master plan updates will be able to capture changes in planning assumptions that occur after the completion of this master plan.

EXISTING WATER SYSTEM

The City of Phoenix owns and operates the water system which services the majority of the residential, commercial and industrial customers within the City of Phoenix. The City purchases all of its water from Medford Water Commission (MWC). The City obtains all of its water through two pumping and metering facilities, the Experiment Station Road Pump Station (Experiment BPS) and the regional Talent/Ashland/Phoenix (TAP) Pump Station (RBPS). The majority of the customers within the Phoenix system are supplied by a single pressure zone with the exception of a few high-level customers located on a small hill in the south end of town near Amerman Road which receive service from a continually running pump station. **Figure 1-4** of the report is a hydraulic profile of the water system.

PLANNING AND ANALYSIS CRITERIA

The existing water system and proposed improvements are evaluated against the planning and analysis criteria summarized in **Chapter 2** of the report. City staff was consulted to establish the criteria. They are based on industry standards and criteria followed by similar communities.

DEMANDS

Existing trends in water demands were calculated from the City's customer billing and water production records. Future demand projections, presented in **Chapter 3,** were developed based on historic trends and using growth assumptions shown in **Table 1-1**. A range of demand projections were developed which capture growth assumptions from the City's Comprehensive Plan and reflect the City's assumptions on the range of growth. The Low, Average, and High-water demand projections for average day demand (ADD) and maximum day demand (MDD) are presented in **Table ES-1**.

Table ES-1
Future Water Demand Projections

	2018	2025	2040	Build-Out 2070
ADD Low (mgd)	0.73	0.77	0.85	1.03
ADD Average (mgd)	0.77	0.84	1.10	1.48
ADD High (mgd)	0.81	0.92	1.35	1.92
MDD Low (mgd)	1.90	2.01	2.21	2.68
MDD Average (mgd)	2.17	2.38	3.13	4.22
MDD High (mgd)	2.43	2.75	4.06	5.76

MODEL DEVELOPMENT

The City's existing water system hydraulic model was updated for use in evaluating system capacity to handle anticipated growth. The model was built primarily from the City's GIS data using WaterGEMS® developed by Bentley Systems, Inc and updated to reflect the best-known information about the existing distribution system. The model was calibrated to match field measurements of system pressures while operating hydrants. The model calibrated well, meaning that model results matched field measurements to an acceptable degree of accuracy (within 10 percent).

WATER SYSTEM ANALYSIS

All components of the water distribution system were evaluated against the established planning and analysis criteria, which are largely focused on supply, system, capacity, and redundancy. This water master plan does not review maintenance of the water system infrastructure, which is managed and funded separately from capital projects. The following summarizes the system analysis as further detailed in **Chapter 4**.

Supply Evaluation

The City has three potential limitations governing its water supply: water rights, the MWC purchase agreement, and the TAP supply system capacity. The results of the supply analyses indicate that the City has sufficient water rights and pumping capacity through buildout. The following supply improvements are recommended:

- Confirm perfection of water rights as part of a regional water rights strategy with MWC.
- Expand the RBPS to meet the City's 3.0 million gallons per day (mgd) allotment of the TAP capacity. Timing and costs will be determined as part of the TAP Water Master Plan.
- Renegotiate the MWC purchase agreement to allow for meeting the City's projected summer demands and for avoiding the peak hour limitation.
- Coordinate with the City of Ashland to develop a new emergency supply from Ashland through the TAP system.
- Plan for a new MWC supply connection in North Phoenix Road and/or the Charlotte Ann Water District.
- Plan for eventually abandoning the Experiment BPS supply, unless development in NE Phoenix does not occur.

System Capacity Evaluation

Overall, the water system analysis shows few capacity issues within the City; however, some improvements are recommended for simplifying operation, reducing anticipated maintenance, and meeting updated fire flow requirements for all customers.

Storage

Using typical storage requirement methods, the City may be looking at a storage deficit as soon as the year 2025. However, assuming a less conservative approach that is widely accepted among water utilities (particularly in Washington State), the City's existing storage volume will be adequate until the year 2040. RH2 recommends the following storage improvements:

- Perform a seismic analysis of the Shop Reservoirs.
- Perform a Cost-Benefit Analysis of improving the Shop Reservoirs or constructing a new reservoir.
- Construct a 1.16 to 3.0 MG Reservoir by 2040. For budgeting purposes in this master plan, a new 3.0 MG Reservoir is assumed to meet buildout conditions. This assumes 1.85 MG of replaced volume from the Shop Reservoirs and 1.15 MG of storage for new growth. Future water master plan updates will likely revise this recommendation as development occurs and demands adjust.
    - Location to be determined. City staff prefer a location in NE Phoenix concurrent with development in the area. If development does not occur, the City will revisit other options as identified in **Chapter 4**.

- Eventually abandon the Shop Reservoirs to simplify operations concurrent with construction of a new reservoir and abandoning the Experiment Station Road supply system.

Pumping

RH2 recommends the following pump station improvements:

- Eventually abandoning the Shop Pump Station when the City is able to secure a new MWC supply source or modify the Experiment BPS supply system.
- When Skyline BPS requires major rehabilitation, replace the fire pump with two 70-hp pumps to meet the updated fire flow guidelines for single-family residential areas and firm capacity criterion.
- Plan for a new Upper Zone BPS to serve development near the East Side Reservoir above the 1681 pressure zone.
- Plan for a new NE BPS to serve development in PH-5 that is above the 1681 pressure zone.

Distribution System Capacity

The hydraulic model was used to evaluate the capacity of the distribution pipe network to meet pressure requirements throughout the system under the most critical demand conditions. These include peak hour demand (PHD) and the highest fire flow during MDD for the future planning periods. Results indicate no significant capacity issues with the existing system piping, with the exception of a few locations where existing pipes cannot meet the new higher fire flow criteria. In these locations, improvements were identified to install larger pipes when pipe replacement is required for maintenance purposes.

RECOMMENDATIONS AND CAPITAL IMPROVEMENT PLAN

The water system analysis indicates that some fire flow, transmission main, storage, pump station, and supply improvements will be needed. The recommended capital improvements are explained in detail in **Chapter 5** and provided in **Table ES-2**. The CIP identifies approximately $22.3 million in necessary water infrastructure improvements, of which approximately $15.3 million will be needed to serve existing customers and accommodate new growth over the next twenty years. The remaining costs are recommended for the long-term and will likely be re-evaluated as part of future water master plans. Several of these improvements are for serving future growth in the City and are assumed to be partially or fully eligible for system development charge (SDC) funding. Other infrastructure improvements are only required as part of development and are not assumed to be funded by the City as shown in **Table ES-2**. **Chapter 5** also includes recommendations beyond the capital improvement recommendations, such as developing an emergency supply connection to the City of Ashland. Additional recommendations beyond this master plan are anticipated to come from a joint TAP Water Master Plan (assumed to begin in 2019).

FINANCIAL ANALYSIS

Hansford Economic Consulting (HEC) performed a financial analysis to assess the ability of the City to finance the recommendations in this WMP. The analysis reviewed water rates, system

development charges (SDCs), and operating forecasts to identify funding gaps and make recommendations to fully fund the CIP. The study indicates that the City has not generated enough SDC revenue in the past to support infrastructure costs of new development and recommends increasing the City's water SDC base charge for a ¾ by $^{5}/_{8}$-inch meter to $5,724. The new recommendation is a significant increase over the existing SDC charge of $3,602 but is necessary to improve the City's financial position and reduce the burden of growth on existing customers. An additional recommendation is to update the SDC ratios that apply to larger meter sizes to minimize the fee increase impact on larger customers.

While not performing a full rate study, the financial analysis identified the City's water system projected operating costs, capital improvements, and debt servicing. To meet the revenue requirements for the recommended CIP, the City's water rates would need to increase 5.25 percent each year for ten years beginning in fiscal year 2019/2020. Beyond the first five-year period, annual rate increases of 3.5 percent are recommended to cover the anticipated inflationary costs of operating expenses (personnel and materials). By increasing water rates and SDCs as recommended, the City will be able to fund all CIP projects with the exception of three projects (T-1, ST-1, and S-3), which are recommended for low-cost financing. **Chapter 6** also presents a review of potential funding mechanisms, including loan and grant programs, optional rate structure modifications, and other recommendations.

Table ES-2
Summary of Proposed CIP Projects

CATEGORY	PROJECT NO.	DESCRIPTION	TOTAL PROJECT COST	DEVELOPMENT COST SHARE ($)	CITY COST SHARE ($)	SCHEDULE FOR WATER SYSTEM IMPROVEMENTS							SDC ELIGIBILITY (%)	NOTES
						PLANNING PERIOD (YEARS)								
						SHORT-TERM					MID-TERM	LONG-TERM		
						2019	2020	2021	2022	2023	2024-2040	2040-2070		
Pipelines	P-1 through P-6	Fire Flow Improvements: Various low priority pipe improvements for increased fire flow criteria or future fire flow deficiencies. To be addressed as development occurs or as pipe needs replacement.	$2,101,000	$0	$2,101,000	$0	$0	$0	$0	$220,000	$0	$1,881,000	42%	SDC eligiibility assumes P-5 is 100% eligible. Assumes P-1 through P-4 and P-6 are 0% eligible.
	P-7	Annual AC Pipe Replacement: annual budget for pipe replacement and repair.	$7,650,000	$0	$7,650,000	$150,000	$150,000	$150,000	$150,000	$150,000	$2,400,000	$4,500,000	0%	$150,000/yr. Coordinate replacement projects with road construction or other projects in the area.
	T-1	Camp Baker Rd (from Tracy to Colver) Install 12-in DI pipe	$738,000	$0	$738,000				$738,000				0%	Provides system looping.
	T-2	Transmission Main Looping to PH-5 Install 12-in DI pipe	$3,346,000	$0	$3,346,000						$3,346,000		100%	Provides new piping to serve future growth areas both within City Limits and in URA. Piping near Home Depot on the northeast side of town. City to determine developer cost-share.
Storage	ST-1	New 3 MG Reservoir/Tank	$5,000,000	$0	$5,000,000						$5,000,000		38%	Provide new 3-MG storage tank (or alternatively, two 1.5-MG tanks). Assumes abandonment of Shop Tanks. Does not include property acquisition costs. City to determine developer cost-share.
Pump Stations	PS-1	Add larger fire pump to Skyline BPS to provide 1500 GPM fire flow	$125,000	$0	$125,000							$125,000	0%	Provide new fire pump when pump replacement is required on existing Skyline fire pump. Existing non-conforming.
	PS-2	New Upper Zone BPS	$699,000	$699,000	$0				$0				0%	For future growth. Projected higher elevation new customers on the east side of the city will need boosted water.
Supply	S-1	SCADA system mapping	$10,000	$0	$10,000	$10,000							47%	Assumed City cost.
	S-2	Update SCADA system	$100,000	$0	$100,000						$100,000		47%	Cost to be confirmed and shared with TAP.
	S-3	New Supply Connection from MWC in North Phoenix Rd	$2,000,000	$0	$2,000,000						$2,000,000		47%	To be further defined based on developer needs and discussions with MWC.
	S-4	Increase RBPS capacity	$200,000	$0	$200,000						$200,000		100%	Expansion of RBPS to meet City's 3.0 mgd allotment of TAP capacity. Cost to be shared with TAP and timing and costs to be determined as part of TAP Water Master Plan.
	S-5	Relocate TAP pipeline for ODOT bridge project in Phoenix	$100,000	$0	$100,000		$100,000						0%	Shared cost with TAP, TAP line must be relocated to accommodate ODOT bridge project (Coleman Creek Crossing) in Phoenix.
Recommended Studies	RS-1	City Water Master Plan Update (every 10 years)	$500,000	$0	$500,000						$200,000	$300,000	100%	$100,000 for each study
	RS-2	Water Management and Conservation Plan (every 5 years)	$100,000	$0	$100,000					$10,000	$30,000	$60,000	100%	$10,000 for each study (assumed WMCP is concurrent with WMP updates or is just a progress report)
	RS-3	TAP Water Master Plan Update (every 10 years)	$300,000	$0	$300,000	$50,000					$100,000	$150,000	47%	$50,000 for each study
	RS-4	System-Wide Seismic Resilience Assessment	$20,000	$0	$20,000	$20,000							47%	One-time study.
	RS-5	Seismic and Structural Analysis of Shop Reservoirs	$30,000	$0	$30,000			$30,000					0%	
	RS-6	Cost-Benefit Analysis comparing improvement of Shop Reservoirs to construction of a new reservoir	$15,000	$0	$15,000			$15,000					0%	
		CIP Total[1]	**$23,034,000**	**$699,000**	**$22,335,000**	**$230,000**	**$250,000**	**$195,000**	**$888,000**	**$380,000**	**$13,376,000**	**$7,016,000**		

1. Future costs are in 2018 dollars, no adjustment made for inflation.

1 INTRODUCTION AND EXISTING SYSTEM

1 INTRODUCTION AND EXISTING SYSTEM

INTRODUCTION

The City of Phoenix (City) is a small community located in the Rogue Valley in Jackson County, Oregon. The City owns and operates the water system which serves the majority of the residential, commercial, and industrial customers within the City limits. In 2017, the City served a population of approximately 4,605 through approximately 1,400 connections. The City's Water System ID is 00625.

Water to the City is supplied from the Medford Water Commission (MWC). As a result, the City does not operate or maintain its own source of water, rather its operations are solely those of local storage and distribution. The City is responsible for providing quality water of sufficient quantities to its current and future customers.

PURPOSE

The purpose of this water master plan (WMP) update is to support the City's service goals for current and future customers and comply with the regulatory agencies which oversee the water system. This 2018 WMP update has been prepared in accordance with state requirements for maintaining and operating a public water system. Principle objectives of the plan include:

- Establishing Level of Service Goals
- Forecasting Demands
- Hydraulic Model Calibration and System Analysis
- Updating the Capital Improvement Plan
- Submitting the WMP Update to the Oregon Health Authority (OHA) for approval

PLANNING PERIODS

The WMP is designed to provide the City with a planning document to meet its water system needs through the year 2070 (50-year planning horizon) and to meet the basic requirements of master plans outlined under Oregon Administrative Rules 331-060-0060.

WATER SYSTEM SERVICE AREA

EXISTING SERVICE AREA AND LAND USE

The City's current water service area coincides with the City limits. **Figure 1-1** presents the existing service area boundary as of 2017. Residents and businesses along Highway 99 to the north of the City are served by the Charlotte Ann Water District. The City does not serve customers outside of the City limits, nor any wholesale purchasers of water. The City recently acquired the services of several customers that were previously customers of the Charlotte Ann Water District whose parcels were located completely within the City limits. Within the City limits, the customer base is made up of residential connections with limited commercial and industrial users.

Existing land use and service area boundaries for the City are shown in **Figure 1-1**. Land use information attained from the City's current zoning, with specific updates to known developments that differ from the City of Phoenix Zoning Map updated March 8, 2018. Current zoning shows 42 percent of land use is devoted to single-family residential, 7 percent multi-family residential, 25 percent commercial, and 3 percent industrial.

FUTURE SERVICE AREA AND LAND USE

City planning is coordinated with regional planning efforts under Jackson County. The City is an important partner of the County's Greater Bear Creek Valley Regional Problem Solving (RPS) Plan. The goal is to establish a long-term land use plan that will coordinate the use of development lands among the partnering communities while preserving sufficient inventories of agricultural lands, open spaces, and shared community interests. In addition, the RPS plan recognizes the need for developing adequate infrastructure to support the noted growth and meeting the overall objectives of preserving a high standard of living throughout the Greater Bear Creek Valley.

Growth of the City's water system is comprised of infill within the existing City limits, expansion to the Urban Growth Boundary (UGB), and expansion to Urban Reserve Areas. **Figure 1-2** presents the Comprehensive Plan Land Use and currently anticipated areas of expansion.

Under the RPS, the City is assigned a number of important growth areas (PH-1, PH-1a, PH-3, PH-5, and PH-10) that represent possible future service areas for the City. In addition, the City also has a few potential tracts of land identified within its present Urban Growth Boundary that may extend its municipal boundaries over the next 20 to 40 years. The City is considering amendments to its Comprehensive Plan to reflect that several previously identified areas of development are not buildable due to access and slope limitations.

The City's agreement with MWC restricts the addition of any new customers unless they reside within the City's municipal boundary. Hence, water service into any areas beyond the City's current municipal boundary requires annexation.

From discussions with City staff, the PH-1, PH-1a, and PH-3 are not anticipated to be served by the City's water system as they are served by the Charlotte Ann Water District. Residents and businesses in these areas are outside the City limits but already have urban services, and thus have little incentive to annex to the City. Thus, it is assumed for this WMP that these areas will not be served by the City in the future.

Table 1-1 presents the assumptions for when areas of infill and expansion are anticipated to develop and/or annex to the City to become part of the future water system. Two scenarios were developed to capture slower and more aggressive growth scenarios. Detailed assumptions used for planning purposes are reviewed in detail in Chapter 3 – Demand Projections.

Table 1-1
Growth Scenarios

Growth Scenario	Area	5-Year (2025)	20-Year (2040)	Build-Out (Year Unknown)
Low	Current City Limits	Partial Infill Based on Current Comp Plan; Rate According to PSU Projections	Partial Infill Based on Current Comp Plan; Rate According to PSU Projections	Full Infill Based on Current Comp Plan
	Urban Growth Boundary	None	Full UGB Development	Full UGB Development
	Urban Reserve Areas	None	Partial PH-10	Full URA Development
High	Current City Limits	Partial Infill Based on Higher Density	Full Infill Based on Higher Density; Rate base on PSU Projections	Full Infill Based on Higher Density
	Urban Growth Boundary	None	Full UGB Development	Full UGB Development
	Urban Reserve Areas	Partial PH-10	Partial PH-10, Partial PH-5	Full URA Development

POPULATION

The population within the City limits is 4,605 in 2017, as estimated from the Portland State University (PSU) College of Urban & Public Affairs Population Research Center (PRC). According to the PRC, the City should anticipate a 2040 population of 5,923 people. This represents a 29 percent growth over the 2017 population and equates to an average of 1.1 percent growth per year.

SOURCE OF SUPPLY AND WATER RIGHTS

Historically, the City supplied its customers through local wells, but as of the 1980s, all of the City's water supply is purchased through a wholesale agreement with the MWC. MWC is a regional water provider that supplies water to the City of Medford and six neighboring communities including the City of Phoenix. The MWC has two sources of supply. Its primary source of water is Big Butte Springs which supplies approximately 25.4 million gallons per day (mgd) of water year-round to the system. When demands exceed this source of supply, the Duff Water Treatment Plant on the Rogue River is operated. The treatment plant normally operates from May through October and is currently being expanded to a capacity of 65 mgd.

MWC SUPPLY AGREEMENT

The current 5-year supply agreement with MWC, approved in 2016 and expiring in 2021, is included as **Appendix 1A** of this report. This agreement contains a number of critical issues which impact the City. A summary of the current MWC Purchase Agreement is presented in **Table 1-2**. These agreements are renewed every 5 years to address demand forecast updates. MWC is restricted from entering into agreements for periods exceeding 20 years, but fully intends on supplying water to the City for the foreseeable future as demands continue.

Table 1-2
Current MWC Purchase Agreement Pumping Rates

Season/Time of Day	Maximum Pumping Rate	
	mgd	gpm
October – April, 5am – 11am	0.63	440
October – April, 12pm – 4am	1.87	1,300
May – September, 5am – 11am	1.71	1,190
May – September, 12pm – 4am	2.30	1,600

WATER RIGHTS

In addition, the MWC supply agreement requires the City obtain its own water rights for the months of May through October. These water rights are outlined in **Table 1-3** below. Water Right S-47672 allows Phoenix to withdraw up to 5.0 cfs from the Rogue River in addition to the 400 acre-feet (AF) of stored water from Lost Creek Reservoir. Water right S-52650 allows Phoenix to withdraw 600 AF of water out of Lost Creek Reservoir at a maximum rate of 3.1 cfs.

Table 1-3
Phoenix Water Rights

Water Right	Permit Number	Priority Date	Rogue Maximum Flow	Lost Creek Reservoir Storage
			cfs	Acre-ft
Rogue River	S-47672	10/9/1980	5.0[1]	400
Rogue River	S-52650	11/15/1991	3.1	600

[1] Additive to 400 acre-feet.

Permit S-47672 was fully developed in 1991. It would normally be appropriate for the City of Phoenix to seek a water right certificate for this permit. However, as the City obtains treated water from the MWC and works in cooperation with all of the cities that obtain water from the MWC, Phoenix must wait to perfect this water right until MWC can demonstrate that it has the capacity to deliver water under this permit, plus all of the other water that has been previously certificated. MWC is in the process of preparing a water rights strategy for access to water between MWC and the wholesale city customers to assure that all partner cities, including Phoenix, have a time schedule for obtaining water rights certificates. Accordingly, the Oregon Water Resources Department

(OWRD) has advised Phoenix to withdraw a previously submitted time extension for this permit and instead submit a Claim of Beneficial Use (COBU) with the caveat that OWRD be requested to place a hold on the COBU and not issue a certificate until MWC can deliver the necessary amount of water. The City submitted the COBU for S-47672 on November 14, 2018 but agreed processing would be delayed by OWRD per this guidance.

On March 20, 2003, the City submitted an Extension of Time for Permit S-52650 (Application S-71996) for development of 600 AF. The City has already demonstrated the use of 516.27 AF of this permit. The Extension of Time was approved on February 8, 2019 and extends the deadline for full development of the 600 AF until October 1, 2030. The resulting Final Order includes a development limitation of the remaining 83.73 AF requiring approval of a Water Management and Conservation Plan. No limitations were established regarding fish persistence.

Further development of the water rights is planned in collaboration with MWC and other regional water providers as part of a regional water rights strategy to begin in 2019.

TAP SUPPLY

In 1997, the City entered into a three-party agreement with the cities of Talent and Ashland to develop the TAP supply system. A copy of the TAP agreement is included in **Appendix 1B**. The agreement calls for a percentage share of the construction, operations, and maintenance cost and capacity of the system to be allocated to the three parties. **Table 1-4** below depicts that allocation.

Table 1-4
TAP Cost and Capacity Allocation

City	Percentage Allocation of Project Cost	2050 Capacity Allocation (mgd)	
		ADD*	PDD**
Talent	58.83%	1.858	3.972
Ashland	19.78%	1.600	1.600
Phoenix	21.78%	1.406	3.012

*Average Daily Demand (mgd)
** Peak Daily Demand (mgd)

WATER QUALITY

As a wholesale customer of MWC, the City relies on MWC for quality supply water that meets drinking water regulations. The City's water distribution system is relatively small and is operated to minimize water detention time after it is received from MWC. The system met 40/30 certification requirements to comply with the Initial Distribution System Evaluation (IDSE) requirements of the EPA's Stage 2 Disinfectants and Disinfection Bi-Products Rule (Stage 2 DBPR). The City regularly monitors for coliforms, disinfection byproducts, lead, and copper and meets all water quality

monitoring requirements set by the Oregon Health Authority (OHA). The City was listed as an outstanding performer in 2015 according to the OHA.

EXISTING WATER SYSTEM

GENERAL

As discussed earlier, the City has two separate supply connections to MWC; the Experiment BPS and Regional BPS and their associated transmission piping. The supply system is illustrated in **Figure 1-3**.

Other than the two supply pump stations, the City's water system includes two distribution pump stations, three storage reservoirs, and approximately 25 miles of distribution piping. The majority of the City's customers are supplied by a single pressure zone with the exception of a few high-level customers located on a small hill in the south end of town near Amerman Road, which receive service from a continual running pump station. These facilities are described in further detail below. A hydraulic profile and figure of the existing system are depicted in **Figure 1-4** and **Figure 1-5**, respectively.

SUPPLY FACILITIES

The City has two separate supply connections to MWC: The Experiment Station Road Booster Pump Station (Experiment BPS) and the TAP (Talent-Ashland-Phoenix) Regional Booster Pump Station (Regional BPS). These are further described below.

The Experiment BPS is located near the intersection of Kings Highway and Experiment Station Road. Water from the MWC system is pumped from this station through approximately 6.5 miles of 10-inch and 12-inch polyvinyl chloride (PVC) transmission mains. The PVC pipe is class 160 on the suction side of the pump station (between meter and station) and on the south end of the transmission system where pressures are the lowest. Everywhere else, the PVC is class 200 pipe.

Water is boosted to supply the City's two Shop Reservoirs located in the south part of the system at the City's operations center. The water is then pumped again utilizing the Shop Booster Pump Station (Shop BPS) to the main distribution system. These facilities were installed in 1982, when the City started obtaining water from MWC.

The TAP facilities consist of the TAP Regional BPS located on Samike Drive and a 24-inch transmission main that extends from the Regional BPS along Highway 99 to the City of Talent. Water is pumped from the MWC by one or more of the four pumps located in this facility to City's Eastside Reservoir. The reservoir provides the head to deliver flow to the Talent Booster Pump Station as shown in **Figure 1-4**. Talent subsequently pumps water to supply its customers and boosts water towards the City of Ashland, when required.

Table 1-5 outlines the pump capacity of the supply system. The Regional BPS has a firm capacity of 4,800 gpm. In the summer, the City operates the Regional BPS to avoid using water during the hours of 6 AM to 9 AM to avoid MWC peak demand periods. The rest of the day, the pumps cycle on and off as controlled by the Eastside Reservoir water level. During the peak demand week of 2017, the

pump station flows vary from 1,000 to 3,700 gpm. In the low demand season, the pumps cycle from 0 to approximately 1,800 gpm.

The City only operates one pump at a time at the Experiment BPS, and usually only turns on a pump one time per day. Staff indicate that a valve on the discharge pipe slowly opens when a pump is activated to avoid a water hammer. The City has had issues with this valve in the past not opening quickly enough and water will blow out of the pressure relief valve. Staff have considered adding a variable frequency drive (VFD) to reduce the potential water hammer and allow the supply to vary with demand.

Table 1-5
City of Phoenix Supply Pump Stations

	No. of Pumps	Horsepower (HP)	Rated Pumping Rate (GPM)	Normal Pump Rate (GPM)	Motor Type	Year Built	Backup Power
Regional BPS	2	125	3000	2000	VFD	2000	Onsite Generator & Fuel Tank
	2	50	1380	1000	Standard		
Experiment BPS	2	60	1200	1000	Standard	1982	Onsite Generator & Fuel Tank

Both supply pump stations are equipped with auxiliary power supplies. All water entering the City's system is metered at one of the two main pump stations and a master meter is located on the south end of the City's system on the 24-inch transmission line to record all water supplied to Talent and/or Ashland.

DISTRIBUTION SYSTEM PUMP STATIONS

The City has two distribution booster pump stations: one at the City Shops (Shop BPS) and the other on a small hill (Skyline Booster Pump Station; Skyline BPS) located near the City Shops in the south part of the City. The Shop BPS boosts supply from the Shop Reservoirs to meet the pressure of the City's main pressure zone, as set by the Eastside Reservoir, as seen in **Figure 1-4**. The Shop BPS was originally constructed in 1982 but was updated with new pumps in the year 2000. Operation of this pump station is controlled by both the Eastside Reservoir and Shop Reservoir water levels.

The Skyline BPS serves approximately 42 homes located above the normal service elevation of the main water system (1550′ asl). There is no active storage serving the Skyline system, although there are two abandoned reservoirs at this location, thus, the pumps run continuously to meet demands. The pump station also houses a fire pump and an auxiliary power supply. City staff have indicated issues with the fire pump activating to meet peak demands, indicating that the two 3-HP pumps are inadequate to meet peak hour demands for the zone. **Table 1-6** summarizes the distribution pump stations.

Table 1-6
City of Phoenix Distribution Pump Stations

	# of Pumps	Horsepower (HP)	Rated Pumping Rate (gpm)	Normal Pump Rate (gpm)	Motor Type	Year Built	Backup Power
Shop Pump Station*	3	40	720	500	VFD	1973	Onsite Generator & Fuel Tank
Skyline Pump Station	2	3	50	Varies	VFD	2002	Onsite Generator & Fuel Tank
	1	50**	1000	Varies	Standard		

* Pump station rebuilt and pumps replaced in 2000
**The 50 HP pump is a Fire Pump

STORAGE

The City has three active storage facilities. The two Shop Storage Reservoirs are located at the City operations center and receive the supply from the Experiment BPS. They have a combined capacity of 1.85 MG. The Eastside Reservoir with a capacity of 1.0 MG is located east of Interstate 5 directly above 3730 Fern Valley Road, the Pear Tree Truck Stop. This reservoir sets the hydraulic grade for the majority of the City's customers as well as the TAP transmission system between Phoenix and Talent.

The City owns two additional reservoirs on Skyline Hill that are currently abandoned. The reservoir elevations are insufficient to provide adequate pressure to City customers without additional pumping. The City has considered abandoning them due to their small size, poor condition, and low elevation; however, they continue to be maintained (though unused) until an official decision is made. The City reservoirs are summarized in **Table 1-7**.

Table 1-7
Phoenix Storage Reservoirs

	Location	Material	Year Built	Base Elevation (ft)	Overflow Elevation (ft)	Diameter (ft)	Volume (MG)
Shop 1 Reservoir	1000 South B St	Concrete	1973	1545.5	1565	55	0.35
Shop 2 Reservoir		Steel	1982	1545.5	1565	116	1.50
Eastside Reservoir	Phoenix East Side	Concrete	2000	1657.5	1681	80	1.00
*Skyline 1 Reservoir**	*Rose St and Alder St*	*Steel*	*1967*	*1608*	*1636*	*38*	*0.25*
*Skyline 2 Reservoir**		*Steel*	*1977*	*1608*	*1636*	*38*	*0.25*

**Not in service*

WATER DISTRIBUTION SYSTEM PIPING

The water distribution system consists of pipes ranging in size from 2 inches to 16 inches in diameter and are constructed from a variety of different materials. The total length of piping is approximately 131,000 feet. The system is in relatively good condition, is well looped, and has relatively low maintenance. **Figure 1-5** shows the water mains in the system color coded by pipe material. Outlined below in **Table 1-8** are the pipe material footage and diameters for the entire water distribution system (not including the 24-inch TAP piping).

Table 1-8
Phoenix Water Distribution System Piping

Material	Total Length of Distribution System Piping (ft)	Minimum Diameter (in)	Maximum Diameter (in)
Asbestos Cement	35,368	4	12
Ductile Iron	36,998	6	16
Galvanized	275	2	2
PVC C900	14,792	4	12
PVC PR200	36,405	6	12
Steel	1,874	2	6
Unknown	5,323	6	16
Total Length All Materials	**131,034**		

Note: Table does not include the 24-inch TAP piping.

Legend

City Limits

TaxLotsZones

Zoning

- Farm Residential (County)
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial Highway
- General Industrial
- Light Industrial
- CITY Center
- Schools
- Bear Creek Greenway

PHOENIX
KIRK
OAK CREST
PACIFIC
EXIT 24 OFF
EXIT 24 ON
INTERSTATE 5
FERN VALLEY
LUMAN
FURRY
MOUNTAIN VIEW
FRESHWATER
ABBEY
VAIL
GROVE
PHOENIX HILLS
MEADOW VIEW
PEAR TREE
BEAR CREEK
QUAIL
BARNUM
ORCHARD
ARANA
BRANDON
EMILY
DANO
CHERYL
BOLZ
TWIN
6TH
MAIN
CHURCH
5TH
4TH
3RD
2ND
PINE
B
C
HOUSTON
LOCKE
CORAL
COLVER
RHONDA
CALHOUN
1ST
HILSINGER
HUNTLEY
BENJAMIN
REBECCA
WALNUT
COREY
MEGAN
SKYLER
CAMP BAKER
JARED
SAMUEL
ASH
OAK
ROSE
ELM
ALDER
RAY
AMERMAN
SHARON
OAK CHURCH
CABBAGE

C:\USERS\HFARRIS\DESKTOP\PHOENIX_EXISTINGLANDUSEMAP.MXD BY: HFARRIS PLOT DATE: JUL 1, 2020 COORDINATE SYSTEM: NAD 1983 HARN STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

RH2

NORTH

1 inch = 800 feet

0 205 410 820 Feet

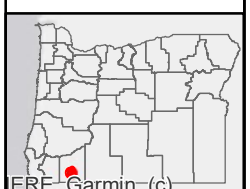
DRAWING IS FULL SCALE WHEN BAR MEASURES 1”

CITY OF PHOENIX OREGON

Figure 1-1
Existing Land Use

City of Phoenix Water Master Plan

Vicinity Map



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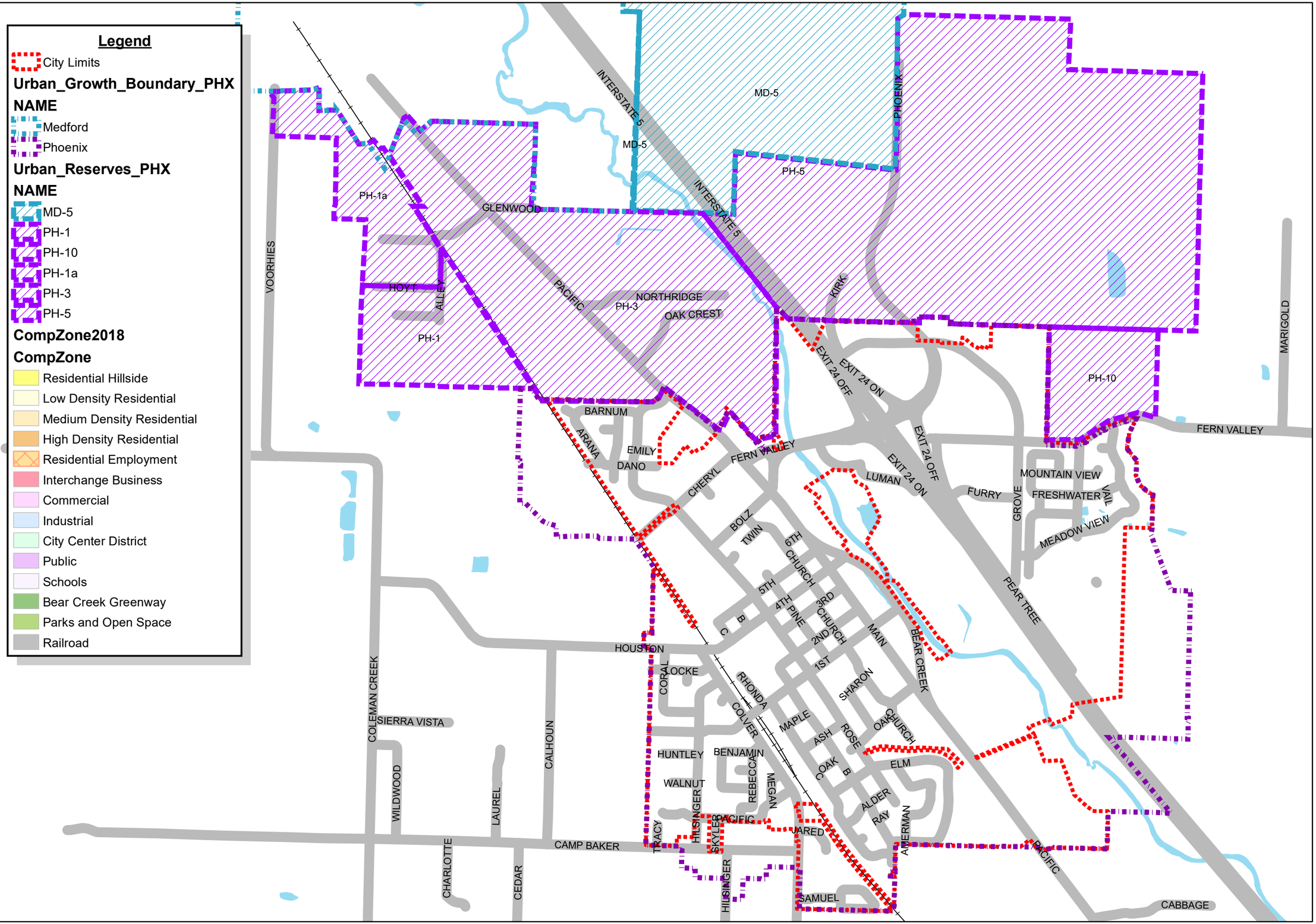

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Vicinity Map

Figure 1-2
Future Land Use

City of Phoenix
Water Master Plan

CITY OF PHOENIX
O • R • E • G • O • N

1 inch = 1,200 feet

0 310 620 1,240 Feet

DRAWING IS FULL SCALE
WHEN BAR MEASURES 1"

RH2

NORTH

C:\USERS\HFARRIS\DESKTOP\PHOENIX_FUTURELANDUSEMAP_LANDSCAPE.MXD BY: HFARRIS PLOT DATE: JUL 1, 2020 COORDINATE SYSTEM: NAD 1983 HARN STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

Connection to Medford Water System; Backflow Preventer

Connection to MWC

Experiment BPS

RBPS

TAP Supply to Talent

Legend

City Limits

Inactive

Active Reservoir

DESCRIPT

RBPS

Experiment BPS

Pipes2018

Mat_Label

PVC

TAP

C:\USERS\HFARRIS\DESKTOP\PHOENIX_EXISTINGSUPPLYSYSTEM.MXD BY: HFARRIS PLOT DATE: JUL 1, 2020 COORDINATE SYSTEM: NAD 1983 HARN STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

RH2 NORTH

1 inch = 2,500 feet

0 650 1,300 2,600 Feet

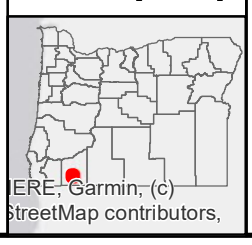
DRAWING IS FULL SCALE WHEN BAR MEASURES 1”

CITY OF PHOENIX OREGON

Figure 1-3
Existing Supply System

City of Phoenix Water Master Plan

Vicinity Map



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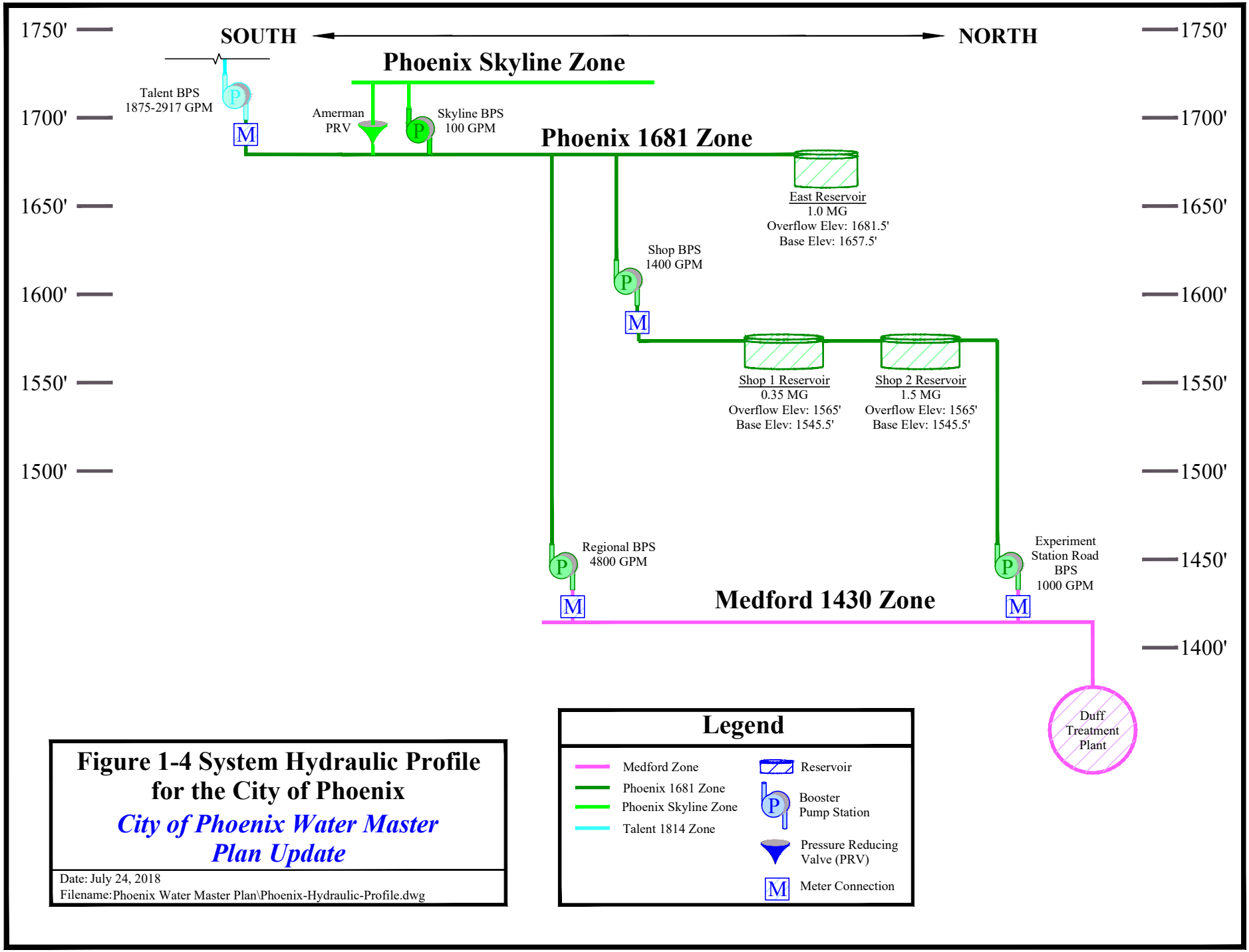


Figure 1-4 System Hydraulic Profile for the City of Phoenix

City of Phoenix Water Master Plan Update

Date: July 24, 2018
Filename: Phoenix Water Master Plan\Phoenix-Hydraulic-Profile.dwg

Legend

Pipes2018

Mat_Label

- AC
- DI
- PVC
- PVC C900
- PVC PR200
- STEEL
- TAP
- Unknown

INTERSTATE 5
PHOENIX
KIRK
NORTHRIDGE
OAK CREST
PACIFIC
EXIT 24 ON
EXIT 24 OFF
QUAIL
BARNUM
BRANDON
ARANA
EMILY
DANO
CHERYL
FERN VALLEY
LUMAN
FURRY
COUNTRY HILL
MOUNTAIN VIEW
FRESHWATER
ABBEY
VAIL
GROVE
PHOENIX HILLS
MEADOW VIEW
BOLZ
TWIN
6TH
MAIN
5TH
CHURCH
4TH
PINE
3RD
2ND
B
C
BEAR CREEK
REAR TREE
HOUSTON
CORAL
LOCKE
RHONDA
COLVER
1ST
HUNTLEY
BENJAMIN
REBECCA
MEGAN
WALNUT
HILSINGER
SKYLER
PACIFIC
CAMP BAKER
JARED
SAMUEL
MAPLE
ASH
OAK
ELM
ROSE
SHARON
CHURCH
CAMERMAN
ALDER
RAY
CABBAGE

C:\USERS\HFARRIS\DESKTOP\PHOENIX_EXISTINGSYSTEMMAP_2018PIPES.MXD BY: HFARRIS PLOT DATE: JUL 1, 2020 COORDINATE SYSTEM: NAD 1983 HARN STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

RH2

NORTH

1 inch = 800 feet

0 205 410 820 Feet

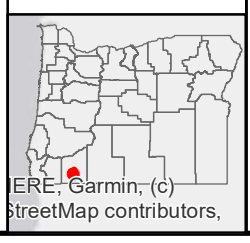
DRAWING IS FULL SCALE WHEN BAR MEASURES 1"

CITY OF PHOENIX OREGON

Figure 1-5
Existing System Map

City of Phoenix Water Master Plan

Vicinity Map



HERE, Garmin, (c) StreetMap contributors,

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2 POLICIES AND REGULATIONS

2 POLICIES AND REGULATIONS

INTRODUCTION

The City operates and plans water service for City water system customers according to the design criteria, laws, and policies that originate from the sources listed in **Table 2-1** in descending order from those with the broadest to narrowest authority.

Table 2-1
Regulatory Agencies and Reference Documents

Agency Design Criteria/Laws/ Policies	Related Documents	Reference Name Used Herein	Location
United States Environmental Protection Agency			
Federal Regulations	The Safe Drinking Water Act of 1974 (Amended in 1996)	SDWA	https://www.epa.gov/sdwa
State of Oregon – Oregon Health Authority			
State Regulations	Oregon Public Water Systems (OAR 333-061)	OAR 333-061	https://secure.sos.state.or.us/oard
State of Oregon – Department of Land Conservation and Development			
State Goals and Guidelines; State Regulations	Oregon's Statewide Planning Goals and Guidelines (OAR 660-015-0000 and OAR-660-011)	OAR 660-015	
State of Oregon – Oregon Water Resources Department			
State Regulations	Water Management and Conservation Plans (OAR 690-086-0150)	OAR 690-086	https://secure.sos.state.or.us/oard
State Regulations	Water Rights Certificate (OAR 690)	OAR 690	
State of Oregon			
State Regulations	2014 Oregon Fire Code (2012 Version International Fire Code with Amendments)	OFC	http://www.oregon.gov/osp/SFMPages/2014ORFireCode.aspx
Jackson County			
Comprehensive Land Use Planning Coordination	The Greater Bear Creek Valley Regional Problem-Solving Plan ORS 197.656 (compliant with OAR 660-025)	RPS	
Jackson County - Fire District No. 5			
County Regulations	Uniform Fire Code	UFC	

Phoenix City Council			
Comprehensive Plan	Public Facilities Element (Updated in 1998)	1998 Comp Plan	Appendix 2A
City Ordinances	ORD 568, 600, 610, 612, 639, 697, 713, 708, 783, 784, 819, 834, 898, 900, 909, 936, 937, 959, 969		Available upon request
Water System Planning	2007 Water Master Plan	2007 WMP	Hardcopy available upon request
Water Conservation	Water Management and Conservation Plan	Phoenix 2009 WMCP	Appendix 2B
Design Standards	Standards for Water Facilities, February 2007	Phoenix Water Design Standards	http://www.phoenixoregon.gov/sites/default/files/fileattachments/public_works/page/5361/phx_cty_pw_standards_for_water_facilities_2007_collated.pdf
Medford Water Commission			
Water Conservation	2013 Southern Oregon Municipal Water Conservation Strategies Plan	2013 Conservation Plan	http://www.oregon.gov/owrd/LAW/docs/GrantApp/2011_2013/SOMWCWG_Conservation_Plan_FINAL_Report_2013.pdf

These laws, design criteria, and policies guide the City's operation and maintenance of the water system on a daily basis, and planning for growth and improvements. The overall objective of the agencies is to ensure that the City provides high-quality water service at a minimum cost to its customers. The design criteria, laws, and policies also set the standards the City must meet to ensure that its water supply is adequate to meet existing and future water demands. The system's ability to meet these demands is detailed in Chapter 4, and the recommended improvements are identified in Chapter 5.

The highest three governmental entities establishing policies and laws – the U.S. Government, Oregon State (State) through the Oregon Health Authority (OHA), and Jackson County – establish requirements in statutes, regulations, or ordinances. The Phoenix City Council and Mayor adopt policies that cannot be less stringent or in conflict with those established by the higher governing agencies. The City's policies take the form of ordinances, memoranda, and operational procedures, which are included as appendices to this Plan where available.

The following sections summarize the level of service goals, policies, and design criteria related to the water system, sources for the policies, and any recommendations to policies and criteria in the following categories:

- Supply
- Facilities
- Seismic Resilience

SUPPLY POLICIES

Reliability

Reference Documents:

- Phoenix Comprehensive Plan Public Facilities Element, page 26 (**Appendix 2A**)
    - Goal 1: To ensure that the City's public facilities are designed, developed, and maintained to ensure their reliability, safety, and cost effectiveness.

Recommendations:

- Revisit and possibly update the Comprehensive Plan Public Facilities Element to reflect current supplies, pump stations, and storage, and update water system goals.

Water Quality

See regulatory requirements below.

Cross-Connection Control

Reference Documents:

- OAR 333-061, Section 0070 - 0074
- Phoenix ORD-708

Recommendations:

- Continue implementation of the existing program to verify that the City maintains a legally defensible cross-connection control and backflow prevention program that takes reasonable care according to industry standards to protect the drinking water system.

Supply Capacity

Reference Documents:

- OAR 333-061, Sections 0061-0062
- 2007 WMP Section 3, page 10
    - The City should have sufficient water rights to meet demands from May through October 10 years in advance of anticipated demands.
    - The water system must have redundant sources of supply.
    - There shall be adequate supply to meet total system maximum day demand with the largest source out of service.
    - There must be adequate transmission capacity to convey maximum day demand from the sources to the distribution system.

Recommendations:

- Develop statement that the City will ensure that the capacity of the system, including supplies, pump stations, storage, and transmission mains are sufficient to meet the Peak Hour Demands (PHD) of the system.

Fire Flow

Reference Documents:

- OFC, Section 507 and OFC **Appendix B**
- 2007 WMP Section 3, page 11

Zone	Fire Flow (gpm)	Duration (hr)
Bear Creek Greenway	1,500	2
City Center	3,000	3
Commercial Highway	3,000	3
General Commercial	3,000	3
Home Depot	4,000	3
Industrial	3,000	3
Low Density Residential	1,500	2
Medium Density Residential	1,500	2
High Density Residential	2,000	3
Hilsinger PUD	2,000	3

Recommendations:

- Continue to use the existing fire flow requirements identified in the 2007 Water Master Plan.

Water Use Efficiency

The City has actively promoted water use efficiency as summarized in its 2009 Water Management and Conservation Plan. Additionally, the City participated in a regional water conservation analysis in 2013 to develop a strategic water conservation plan for Medford Water Commission water users. This plan establishes conservation strategies to reduce peak demands and delay or offset capital projects.

Reference Documents:

- OAR 690-086-0150
- Phoenix 2009 WMCP (see **Appendix 2B**)
- 2013 Southern Oregon Municipal Water Conservation Strategies Plan

Recommendations:

- Update the City's Water Management and Conservation Plan to reflect findings of the 2013 Conservation Plan (to be updated in conjunction with this Plan).
- Develop implementation plan to follow recommendations in the 2013 Conservation Plan.

SEISMIC RESILIENCE

In 2013, the State Legislature adopted the Oregon Resilience Plan, a document prepared by the Oregon Seismic Safety Policy Advisory Commission that recognizes the threat of the Cascadia Subduction Zone earthquake to the State and develops resilience planning guidelines for the State's infrastructure systems. As of 2017, OHA now requires water master plans to include a seismic risk assessment and mitigation plan.

Reference Documents:

- OAR 333-061-0060(5)(a)

Recommendations:

- Adopt the Oregon Resilience Plan guidelines for water system seismic resilience.
- Prepare a risk assessment and mitigation plan as part of this Water Master Plan or a TAP System Water Master Plan.

FACILITY POLICIES

This section describes the planning criteria and policies used to establish an acceptable level of service for water pressure, reliability, and redundancy.

Minimum Standards

Reference Documents:

- OAR 333-061-0050
- Phoenix Water Design Standards

Recommendations:

- Revise City ordinances to officially adopt design criteria established as part of this Water Master Plan update.

Pressure

Reference Documents and Policies:

- 2007 WMP, Page 10
    - The minimum allowable service pressure in the system is 35 psi.
    - The minimum allowable pressure in transmission piping is 20 psi.
    - 100 psi is the maximum allowable static pressure in the system.
- OAR 333-061-0050

- Distribution piping shall be designed and installed so that the pressure measured at the property line of any user shall not be reduced below 20 psi (OAR 333-061-0058 (9)(e).

Recommendations:

- Suggest adopting maximum pressure criteria as follows:
  - Maximum System Pressure of 100 psi at Average Day Demand (ADD). Individual residences are responsible for reducing pressures over 80 psi.

Pipe Velocity

Maximum pipe velocities protect the City's infrastructure from excessive forces that can damage or weaken City assets.

Reference Documents:

- 2007 WMP, Page 10
  - Velocities during peak hour demand conditions should be maintained less than 10 feet per second (ft/s).
  - Future pipes are designed to maintain velocities below 5 ft/s.

Recommendations:

- Use 2007 WMP maximum velocity recommendation.

Storage

Storage within the distribution system must be of sufficient capacity to supplement supply when system demands are greater than the supply capacity (equalizing storage), fire suppression (fire flow storage), and other emergency conditions (emergency storage).

Reference Documents:

- 2007 WMP, page 10
  - Equalization storage volume is the storage needed to handle periods when demand exceeds supply.
  - Fire flow storage must be equal to the maximum flow rate in the tank service areas for the fire flow duration.
  - Emergency storage volume is up to each utility to determine but is assumed to be 30-percent of maximum daily demand (MDD), and total system storage be no less than one full MDD.

Recommendations:

- Operational Storage: Volume used to supply the water system under peak hour demand conditions when the system demand exceeds the total rate of supply of the sources. Operational storage is calculated as 25 percent of MDD. Operational storage must be available at 30 psi to all service connections.
- Emergency Storage: Volume used to supply the water system under emergency conditions when supply facilities are out of service due to equipment failures, power outages, loss of supply, transmission main breaks, and any other situation

that disrupts the supply source. The City's previous criteria assumed 30 percent of MDD for emergency storage. Common emergency criteria in the state of Oregon is to assume emergency storage as two times ADD. Emergency storage of two times ADD is recommended. Emergency storage must be located above the elevation that yields a 20-psi service pressure to all services in the zone under PHD conditions with the largest source out of service.

- Fire Suppression Storage: Volume used to supply water to the system at the maximum rate and duration required to extinguish a fire at the building with the highest fire flow requirement. The magnitude of the fire flow storage is the product of the fire flow rate and duration of the operating area's highest fire flow needs. Fire suppression storage must be located above an elevation that yields a 20-psi service pressure to all services in the zone under MDD conditions.
- Nesting of Storage. Some water systems allow for "nesting" of fire flow and emergency storage, meaning that it is assumed that a fire and a supply disruption would not happen at the same time and therefore only the greater of the two storage volumes is used to calculate required storage. It is recommended that the City consider nesting of storage volume as needed during evaluation of long-term storage needs.

Transmission and Distribution

Reference Documents and Policies:

- OAR 333-061-0050
    - Wherever possible, distribution pipelines shall be located on public property. Where pipelines are required to pass through private property, easements shall be obtained from the property owner and shall be recorded with the county clerk (OAR 333-061-0050 (9)(a)).
    - Wherever possible, dead ends shall be minimized by looping. Where dead ends are installed, or low points exist, blow offs of adequate size shall be provided for flushing (OAR 333-061-0050(9)(h)).

Recommendations:

- Suggest updating City Design Standards to reflect more current standards of practice, provide guidance on the City's preferred pipe material, and include seismic resilience design standards.
- Consider allowing other pipe materials such as High-Density Polyethylene (HDPE) pipe.

Booster Pump Stations

Criteria for booster pump stations should address reliability, pump redundancy, and adequate capacity to supply peak demands to all customers in combination with storage volume.

Reference Documents and Policies:

- 2007 WMP, Section 3, Page 11
    - Pump stations serving areas with storage facilities must have sufficient capacity to supply MDD.
    - Pump station capacity for areas without storage facilities must be equal to peak hour demands (PHD) and have fire pump capacity to supply the maximum fire flow of the area.
    - Pump stations should have at least two pumps.
    - Pump stations must meet the required capacity with the largest pump out of service.
    - All pump stations must have back-up power supply.

Recommendations:

- None: pumping criteria from previous WMP is acceptable.

REGULATORY REVIEW

Water Quality

As a wholesale water purchaser from the MWC, water treatment of the supply sources and water quality compliance is entirely managed by MWC. MWC's *Big Butte Springs and Duff Water Treatment Plan Facility Plan* summarizes the MWC water quality compliance. This review of regulatory compliance pertains to the City's distribution system water quality.

Reference Documents:

- EPA SDWA
- OAR 333-061, Sections 0025 - 0043
- Phoenix 2017 Annual Water Quality Report (see **Appendix 2C**)

The following regulations govern water quality in the distribution system and are discussed below:

- Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR)
- Stage 2 Disinfection By-Products Rule (S2DBPR)
- Revised Total Coliform Rule (RTCR)
- Lead and Copper Rule (LCR)

Long-Term 2 Enhanced Surface Water Treatment Rule and Stage 2 Disinfection By-Products Rule

The LT2ESWTR was established in 2006 at the same time as the S2DBPR to balance the requirements for residual disinfectants in the distribution system (to manage coliform levels) and the potentially harmful byproducts of those disinfectants. The 2017 MWC Water Master Plan says the following regarding these two rules (page 5-1):

> *Secondary disinfection requirements are the one aspect of the LT2ESWTR that relate to distribution water quality. This rule requires that the residual disinfectant concentration in the water entering the distribution system is equal to or greater than 0.2 mg/L and that the residual disinfectant concentration in the distribution system cannot be undetectable in more than 5 percent of the samples each month for two consecutive months. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500 cfu/mL is deemed to have a detectable disinfectant residual.*

The City is required to sample disinfection byproducts (DBPs) at two locations every year in July. Records show that the City was out of reporting compliance for one month in 2015 and 2017, but quickly returned to compliance. No other monitoring violations have been reported to OHA, and the City was considered an outstanding performer for its last survey by the OHA in 2015.

Revised Total Coliform Rule

The Revised Total Coliform Rule (RTCR) was established by the Environmental Protection Agency (EPA) in 2013 and revises the 1989 Total Coliform Rule. Total coliforms are a group of related bacteria that are (with few exceptions) not harmful to humans. EPA considers total coliforms a useful indicator of pathogens for drinking water. Total coliforms are used to determine the adequacy of water treatment and the integrity of the distribution system.

Per the EPA website, key provisions of the RTCR include:

- Setting a maximum contaminant level goal (MCLG) and maximum contaminant level (MCL) for E. coli for protection against potential fecal contamination. E. coli are better indicators of pathogens than total coliforms.
- Setting a total coliform treatment technique requirement.
- Requirements for monitoring total coliforms and E. coli per a sample siting plan and schedule specific to the PWS.
- Requirements for assessments and corrective action when monitoring results show that a system may be vulnerable to contamination.
- Public notification requirements for violations.
- Specific language for systems to use in their Consumer Confidence Reports when they must conduct an assessment or if they incur an E. coli MCL violation.

The City tests for total coliforms at five sample sites every month. The City has had a few occasional positive test results and follows all procedures to bring the system into compliance with the RTCR.

Lead and Copper Rule

The Lead and Copper Rule, though not new, warrants specific mention because of the heightened concerns about high lead levels in drinking water in U.S. water utilities that

occurred in 2016. In 2007, the EPA revised the Lead and Copper Rule to enhance implementation in the areas of monitoring, treatment, customer awareness, and lead service line replacement. The update also enhanced public education requirements and ensured drinking water consumers receive is: meaningful, timely and useful information. These changes are also known as the "Short-Term Revisions to the Lead and Copper Rule." The EPA is also considering long-term revisions to substantially change the rule and improve public health protection. Details on what this update may entail are not known at this time.

The City is required to test for lead and copper every three years, at 20 sites. The City has not exceeded the required action levels. According to the 2017 MWC Water Master Plan, the MWC plans to conduct a detailed corrosion evaluation of its system, with possible outcomes including treatment adjustments, and more intensive management of water age and flushing within the distribution system.

3 DEMAND PROJECTIONS

3 DEMAND PROJECTIONS

INTRODUCTION

A detailed analysis of system demands is crucial to the planning efforts of a water supplier. A demand analysis first identifies current demands to determine if the existing system can effectively provide an adequate quantity of water to its customers under the most crucial conditions. A future demand analysis identifies projected demands to determine how much water will be needed to satisfy the water system's future growth and for properly sizing infrastructure to deliver water.

Demands are typically based on three main factors: 1) population; 2) weather; and 3) water use classification. Population and weather have the two largest impacts on water system demands. Population growth increases the overall annual demand, whereas high temperatures increase demands in the summer. Population does not solely determine demand because different user types use varying amounts of water. The use varies based on the number of users in each customer class, land use density, and irrigation practices. Water use efficiency efforts also impact demands and can be used to accommodate a portion of the system's growth without increasing a system's supply capacity.

The following sections summarize the components of existing water demands, develop unit demand factors, and project future demands. Due to varying planning conditions, a range of demands has been developed to capture the low and high growth assumptions and other variables that influence demands. These demand projections are used in Chapter 4 – System Analysis to confirm supplies and infrastructure sizing.

EXISTING WATER DEMANDS

HISTORICAL WATER PRODUCTION

A city's water supply, or production, is the total amount of water supplied to the system. For the City of Phoenix (City), total production is the water purchased from the Medford Water Commission (MWC). **Table 3-1** summarizes the total amount of water supplied to the system from 2008 through 2017. A metering error was discovered and rectified in 2014, thus data from calendar year 2015 and forward is considered the most reliable supply data for the City.

Table 3-1
Historical Water Production/Purchase

Year	Annual MWC Purchase (mg)	ADD (mgd)	MDD (mgd)	Peaking Factor (MDD/ADD)
2008[1]	296	0.81	1.45	1.79
2009[1]	335	0.92	2.84	3.10
2010[1]	301	0.83	2.06	2.50
2011[1]	296	0.81	N/A[2]	N/A[2]
2012[1]	327	0.89	1.87	2.09

2013[1]	353	0.97	2.26	2.34
2014[1]	310	0.85	1.90	2.24
2015	276	0.76	1.95	2.58
2016	272	0.75	2.17	2.91
2017	275	0.75	2.29	3.04
Average	**304**	**0.83**	**2.09**	**2.51**
Average 2015 – 2017[1]	**274**	**0.75**	**2.14**	**2.84**

Note: [1]Accuracy of data not verified 2008 – 2014.
[2]MDD data not available for 2011.

Average Day Demand

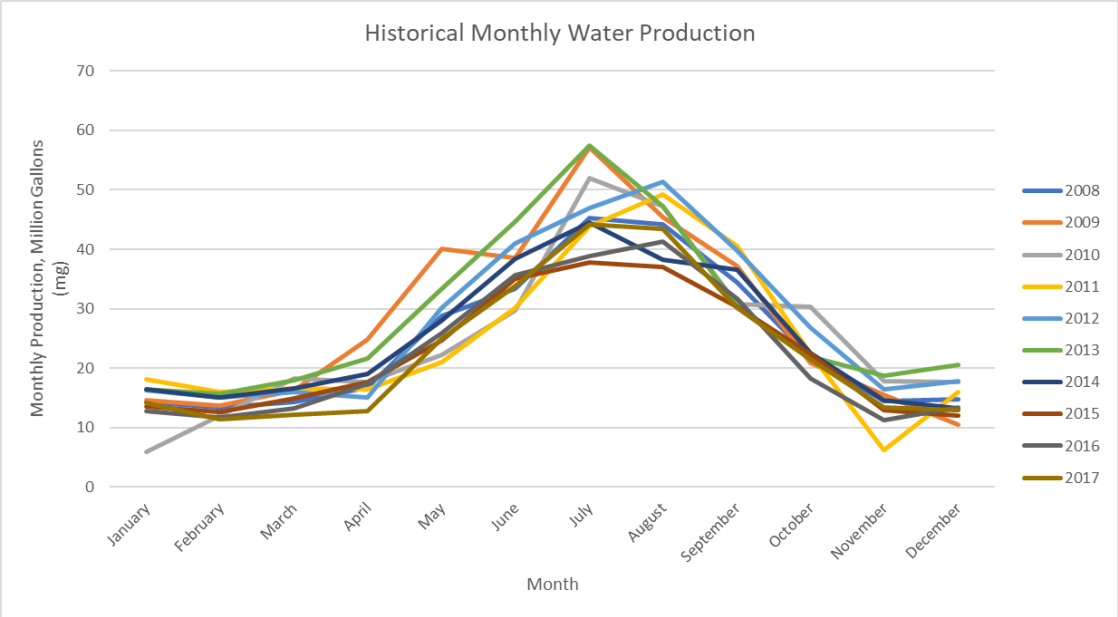
Table 3-1 also presents the Average Day Demand (ADD) for the City. ADD is the total amount of water delivered to the system in a year divided by the number of days in the year. The ADD is determined from the historical water use patterns of the system and can be used to project future demands within the system. As seen in the table, ADD from 2008 through 2017 ranges from 0.75 million gallons per day (mgd) to 0.97 mgd; and the average ADD from 2015 to 2017, which has more accurate metering data, is 0.75 mgd.

Seasonal Variation and Maximum Day Demand

Similar to other water systems in the northwest, the City's water use varies seasonally, typically peaking in the hot summer months due to high irrigation demands. **Chart 3-1** shows the historical amount of water supplied to the City's system for each month from 2008 to 2017. As seen in the chart, the City's highest water use typically occurs in July and August. Monthly water production increases from around 14 million gallons (mg) per month during winter months to approximately 46 mg per month during the summer months. Non-residential customers often peak at different times than residential customers throughout the year due to non-irrigation needs. However, it is common for communities with a higher number of residential customers, like the City, to observe peak demands driven by the residential irrigation water use.

Maximum Day Demand (MDD) is the maximum amount of water used throughout the system during a 24-hour period of a given year. MDD typically occurs on a hot summer day when lawn watering is occurring throughout much of the system. **Table 3-1** presents the MDD from 2008 to 2017 based on MWC purchase data. The highest MDD occurred in 2009 with a peak of 2.84 mgd; however, metering data may have been inaccurate during 2009. The average MDD from 2015 to 2017, which has more accurate metering data, is 2.14 mgd. Projected MDD is often estimated as a factor of projected ADD, using what is called the MDD/ADD Peaking Factor. Using 2015 to 2017 data, the average MDD to ADD Peaking Factor is 2.84.

Chart 3-1
Historical Monthly Water Production



HISTORICAL WATER CONSUMPTION

Water consumption is the amount of water used by all customers of the system, as measured by the customer's meters. The City categorizes water customers into 20 different customer types for billing purposes. For planning purposes, the customers have been grouped into nine customer types according to similar demands per account as shown in **Appendix 3A**. **Table 3-2** shows the number of connections, annual consumption, and average daily consumption per connection of each customer class for the City from 2012 to 2017.

Table 3-2
Metered Consumption and Service Connections

	Number of Connections					
Customer Type	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Single-family Residential	1,139	1,134	1,137	1,141	1,145	1,151
Multi-family Residential / Senior Housing	94	94	93	94	95	97
Mobile Home / RV Park	18	18	18	18	18	18
Commercial – Low	79	77	78	77	78	81
Commercial – Medium	25	24	26	25	25	26
Commercial – High	3	3	3	3	3	3
Industrial	4	4	4	4	4	4
Institutional	18	18	18	18	19	19
School	10	10	10	10	9	9
Total	**1,390**	**1,382**	**1,387**	**1,390**	**1,396**	**1,408**

Annual Consumption (mg)

Customer Type	2012	2013	2014	2015	2016	2017
Single-family Residential	111	110	113	116	116	115
Multi-family Residential / Senior Housing	26	29	27	27	28	28
Mobile Home / RV Park	43	42	44	43	53	52
Commercial – Low	12	14	15	13	13	14
Commercial – Medium	15	14	14	19	18	16
Commercial – High	5	5	5	5	5	4
Industrial	4	2	1	1	1	1
Institutional	2	3	3	3	2	3
School	9	15	10	10	10	9
Total	**226**	**233**	**231**	**236**	**244**	**242**

Average Daily Water Use Per Account (gpd/account)

Customer Type	2012	2013	2014	2015	2016	2017	Average
Single-family Residential	266	266	273	278	278	274	**274**
Multi-family Residential / Senior Housing	765	831	784	796	801	795	**795**
Mobile Home / RV Park	6,499	6,326	6,760	6,555	8,032	7,879	**7,008**
Commercial – Low	427	511	513	460	450	474	**472**
Commercial – Medium	1,615	1,616	1,485	2,098	1,926	1,679	**1,736**
Commercial – High	4,467	4,588	4,157	4,157	4,259	3,888	**4,252**
Industrial	2,740	1,370	685	685	685	685	**1,142**
Institutional	267	396	401	410	349	368	**365**
School	2,338	4,132	2,781	2,749	2,911	2,863	**2,962**

Large Water Users

Table 3-3 shows the largest water users of the system from 2015 to 2017, and their total amount of metered consumption for the year. The total water consumption of these water accounts represented approximately 20 percent of the system's total metered consumption on average from 2015 to 2017.

Table 3-3
Largest Water Users

Name	Address	Total Annual Consumption (gal)			
		2015	2016	2017	Average
Bear Lake MHC	300 Luman Rd	6,696,844	22,277,684	21,481,064	**16,88,531**
Phoenix-Talent School District	745 N Rose St	8,133,004	5,483,588	5,251,708	**6,289,433**
Holiday RV Park	201 N Phoenix Rd	4,138,684	4,234,428	3,728,780	**4,033,964**
Pear Tree Motel	3730 Fern Valley Rd	3,555,244	3,438,556	3,542,528	**3,512,109**
Pear Tree RV	3730 Fern Valley Rd	-	3,917,276	3,092,980	**3,505,128**
PSC-Restaurant	3730 Fern Valley Rd	3,105,696	2,564,144	2,894,012	**2,854,617**
PSC #24 Fuel Center	3730 Fern Valley Rd	2,440,724	-	-	**2,440,724**
Rogue Valley	4624 S Pacific Hwy	2,798,268	6,375,952	6,428,312	**5,200,844**
Bear Creek	610 N Main St	2,819,960	2,641,936	3,268,012	**2,909,969**
Home Depot	3345 Grove Rd	-	2,970,308	2,923,184	**2,946,746**
Greenway Village	4729 Pacific Hwy	2,280,652	-	-	**2,280,652**
Largest Water Users Total Consumption		35,969,076	53,903,872	52,610,580	**47,494,509**
Water System Total Metered Consumption		235,833,456	243,388,036	241,781,276	**240,334,256**
Percent of Total		15%	22%	22%	**20%**

Bulk Water Sales

The City allows bulk purchases of water to authorized account holders. Commonly, these are water trucks filling up using one of the City's two water fill-up stations. Purchased water is metered at the fill-up stations and the accounts are tracked and billed according to use. Water used by Rogue Valley Sewer Services (RVSS) for flushing sewer mains is also tracked and for planning purposes is included in bulk water sales. Bulk water meters consume only 0.04 percent of the City's total metered consumption. In 2016 and 2017 total bulk purchases averaged 87,959 gallons annually.

Water Loss

The difference between the amount of water supply and the amount of authorized water consumption is considered unaccounted for water or water loss. Many issues contribute to water loss in a typical water system, including water system leaks, inaccurate supply metering, inaccurate customer metering, illegal water system connections or water use, hydrant flushing, water main flushing, and malfunctioning telemetry and control equipment resulting in reservoir overflows.

The City's water loss was calculated using data from 2015 to 2017 since those three years had the most reliable production data. **Table 3-4** shows the calculation of water loss as a percentage of total production. From 2015 to 2017 the average water loss was 12 percent. Future improvements to the water distribution system by the City should aim to reduce water loss to bring the water loss percentage down to or below 10 percent, a more acceptable level.

Table 3-4
Water Loss

Year	Total Annual Production (mg)	Total Annual Consumption (mg)	Water Loss (% of Production)
2015	276.30	235.83	15%
2016	272.30	243.39	11%
2017	274.60	241.78	12%
		Average	**12%**

UNIT DEMANDS FOR PLANNING PURPOSES

Equivalent Residential Units

It is helpful to normalize water use from all customer types to a single unit demand for demand forecasting and planning purposes. An equivalent residential unit (ERU) is the amount of water used by a single-family residence. Water use from all other customer types can be expressed as a ratio to this value. **Table 3-5** presents the 2017 water use per account type. A single-family residence in the City uses an average of 274 gallons per day per account (gpd/account), thus the ERU value is 274 gpd/ERU. The typical multi-family residential customer, which represents numerous individual residential units, used 2.9 times more water than the typical single-family residential customer on average, thus one multi-family residential customer represents 2.9 ERUs. As seen in **Table 3-5**, the total ERUs for the system is estimated to be 2,419 in 2017.

Table 3-5
Equivalent Residential Units

Customer Type	2017 Number of Connections	2017 Annual Consumption (mg)	Average Daily Water Use Per Account (gpd/account)	ERUs per Account	Total ERUs
Single-family Residential (ERU Basis)	1,151	115	274	1.0	1,151
Multi-family Residential/Senior Housing	97	28	795	2.9	281
Mobile Home/RV Park	18	52	7,879	28.7	517
Commercial – Low	81	14	474	1.7	140
Commercial – Medium	26	16	1,679	6.1	159
Commercial – High	3	4	3,888	14.2	42
Industrial	4	1	685	2.5	10
Institutional	19	3	368	1.3	25
School	9	9	2,863	10.4	94
Totals	**1,408**	**242**	**-**	**-**	**2,419**

Residential Population Served

The population within the City limits was 4,605 in 2017, based on estimates from the Portland State University College of Urban & Public Affairs Population Research Center (PRC). **Table 3-6** presents the computation of the existing system per capita demand based on 2017 data. This population served, and the City's total water consumption in 2017, were used to arrive at the existing per capita demand of 163 gpd.

Table 3-6
Existing Per Capita Demand

2017 Population	2017 Total Annual MWC Purchases (gal)	Existing Per Capita Demand (gpd/capita)
4,605	274,648,000	163

Note 1: Population according to Portland State University College of Urban & Public Affairs Population Research Center (Certified Estimate as of July 1, 2017).

Peak Hour Demand

Peak Hour Demand (PHD) is the maximum amount of water used throughout the system, excluding fire flow, during a one-hour time period of a given year. It is commonly equivalent to 1.3 to 2.0 times the MDD. The City's historical production data show several peaking periods throughout the day, with a peak hour approximately 1.8 times the MDD. This value will be used for estimating projected peak demands.

FUTURE WATER DEMANDS

Demand projections are based on several assumptions including anticipated growth of the City and estimated water use of existing and future customers. Because these factors vary, both a low and a high demand scenario were developed to bracket the potential range of demands the City could experience in the future. Demand projections are provided for 5-year, 20-year, and 50-year/Build-Out scenarios. For simplification, these are translated to the years 2025, 2040, and 2070 (Build-Out). The following sections summarize the assumptions used for the City's demand projections.

PLANNING ASSUMPTIONS

The City is actively planning to accommodate the anticipated growth of the City through infill and expansion (see Chapter 1 for Existing Service Area & Land Use). The City's planned growth has been categorized into three categories for this Plan:

1. **Infill in the existing City limits**. Infill is the transition of existing land use into future planned land use as governed by the City's Comprehensive Plan.
2. **Development up to the Urban Growth Boundary (UGB)**. Development in the UGB is also determined by the City's Comprehensive Plan.
3. **Development of Urban Reserve Areas**. Estimates for growth in these areas were provided by the City.

Chapter 1 summarizes the assumptions for timing and degree of development for both a low and high growth scenario in each of the three areas. The total growth of all new accounts was adjusted in the planning years to match the PRC population projections. To estimate the water use from new development, it is necessary to convert land use acreage to customer accounts using density assumptions. **Table 3-7** presents the density assumptions used for the different customer classifications for the low and high demand scenarios.

Table 3-7
Housing Density Assumptions

	Low Projections	High Projections
Customer Type	**Accounts/Acre**	**Accounts/Acre**
Single Family Residential	5.00	8.00
Multi-Family Residential/Senior Housing	1.00	3.75
Mobile Home/RV Park	0.75	1.25
Commercial – Low	1.00	1.10
Commercial – Medium	2.38	2.62
Commercial – High	3.00	3.30
Industrial	0.40	0.44
Institutional	0.45	0.50
School	0.45	0.50

The next step after converting the acreage of infill and growth to new accounts is to convert new accounts to equivalent residential units (ERUs). **Table 3-8** presents the assumptions used for ERUs for existing and new customers. New residential customers use less water per account than existing customers due to higher efficiency appliances, plumbing, and irrigation, and are thus assumed to be 80-percent of an ERU. These assumptions are the same for the low and high demand scenarios.

Table 3-8
ERU Assumptions

	Existing Customers	New Customers
Customer Type	**ERUs/Account**	**ERUs/Account**
Single Family Residential	1.0	0.8
Multi-Family Residential/Senior Housing	2.9	2.3
Mobile Home/RV Park	28.7	28.7
Commercial – Low	1.7	1.7
Commercial – Medium	6.1	6.1
Commercial – High	14.2	14.2
Industrial	2.5	2.5
Institutional	1.3	1.3
School	10.4	10.4

Table 3-9 presents the remaining demand projection assumptions used for projecting the low and high demand scenarios. The low demand scenario assumes an ERU value of 270 gpd/ERU, bulk sales matching current demands, a water loss value of 10 percent of total production, and a MDD to ADD peaking factor of 2.6. The high demand scenario assumes a slightly higher ERU value of 280 gpd/ERU, bulk sales increasing by 10 percent, a water loss value of 15 percent of total production (slightly more than the current 12 percent average), and an MDD to ADD peaking factor of 3.0.

Table 3-9
Additional Demand Projection Assumptions

Demand Category	Units	Demand Scenario	
		Low	High
ERU Value	gpd/ERU	270	280
Bulk Sales	gpd	241	265
Water Loss	% of Production	10%	15%
MDD/ADD Peaking Factor	unitless	2.60	3.00

DEMAND FORECASTS

The City's projected ERUs, average day demand, and maximum day demand for the planning periods used in this Plan are summarized in **Table 3-10** and shown graphically in **Chart 3-2** and **Chart 3-3**. In addition to the low and high demand scenarios, the table

presents the calculated average of the low and high demands as well. The average projection shows that ERUs are projected to increase from 2,449 in 2018 to 4,632 when the City is fully built-out including all Urban Growth and Urban Reserve Areas. ADD is anticipated to range from 0.77 mgd to 1.48 mgd at build-out. This large range is due to the large variability in growth assumptions. The low projections remove several undeveloped lands that are currently included in the City's Comprehensive Plan but are considered unbuildable by City planners, while the high projections still include those lands. MDD is anticipated to range from 2.17 to 4.22 mgd by build-out. MDD is a multiplier of ADD so it also has a large range.

It is important to note that in **Chart 3-2** and **Chart 3-3**, the historical ADD and MDD prior to 2014 may be low due to metering errors.

The average demand projections will be used to evaluate the City's water system capacity; high demand projections will be used to compare to supply requirements.

Table 3-10
Future Water Demand Projections

	2018	2025	2040	2070 (Build-Out)
ERUs Low	2,439	2,574	2,829	3,436
ERUs Average	2,449	2,677	3,468	4,632
ERUs High	2,459	2,780	4,106	5,828
ADD Low (mgd)	0.73	0.77	0.85	1.03
ADD Average (mgd)	0.77	0.84	1.10	1.48
ADD High (mgd)	0.81	0.92	1.35	1.92
MDD Low (mgd)	1.90	2.01	2.21	2.68
MDD Average (mgd)	2.17	2.38	3.13	4.22
MDD High (mgd)	2.43	2.75	4.06	5.76

Chart 3-2
Average Day Demand Projections

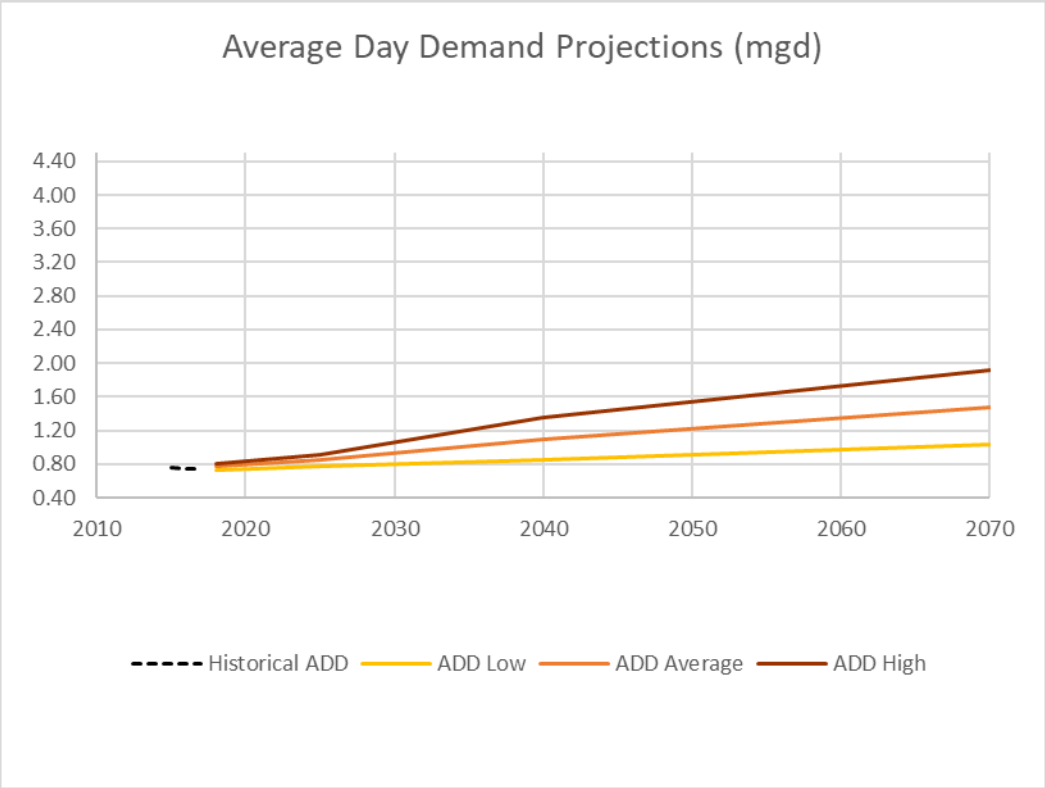
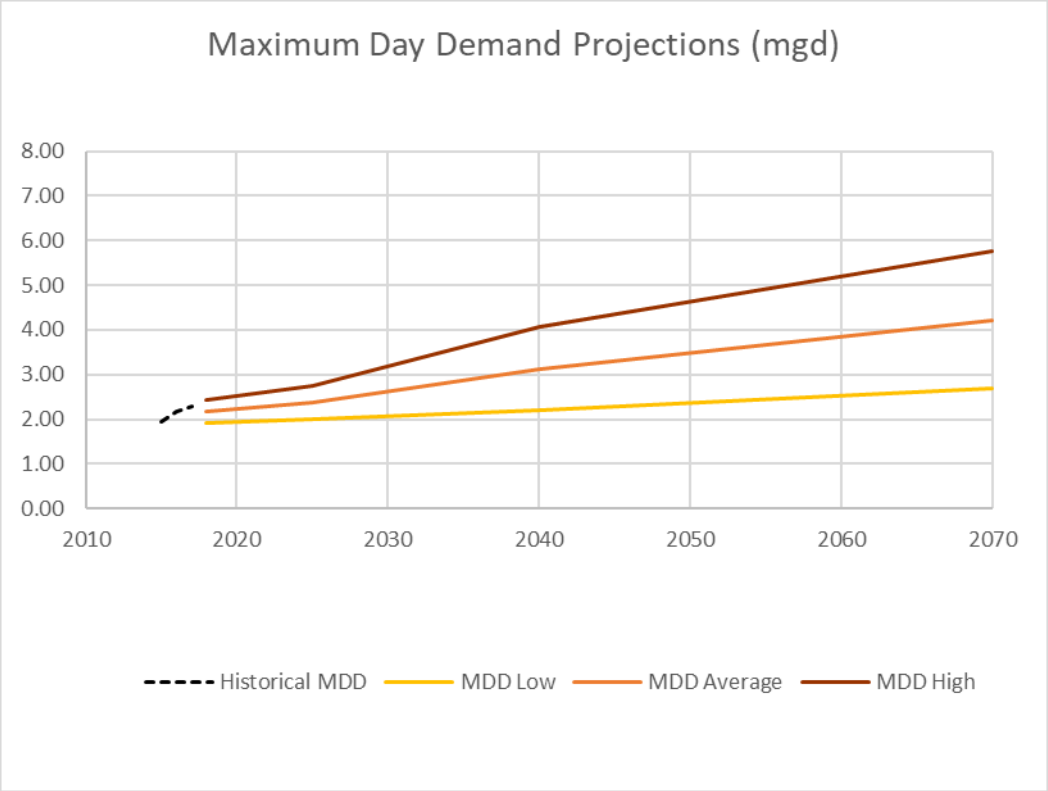


Chart 3-3
Maximum Day Demand Projections



CHARLOTTE ANN WATER DISTRICT

The Charlotte Ann Water District is located to the north of the City of Phoenix. Charlotte Ann is a private water district which receives water from the MWC independently from the City of Phoenix. Current Charlotte Ann Water District customers are outside the City limits, but inside designated Urban Reserves for the City (PH-1 and PH-1a). Because these customers have full urban services through varying utilities, they have little incentive to annex to the City and become City water customers. However, it is important to consider the potential for the City to eventually take over this water district and predict its impact on the City's water demands. Developing demands for this area is outside of the scope of this Plan, however, the 2017 MWC Water Management and Conservation Plan predicts that the City's population would increase by 50 percent if the current portion of Charlotte Ann located within the Urban Reserve Areas of Phoenix were annexed entirely to the City. If the Charlotte Ann Water District was annexed, the change would most likely happen gradually. Another indication of the demands that may be expected is the current supply pump station capacity. The Charlotte Ann Water District has its own pump station which can supply up to 4 mgd to the Charlotte Ann system (Brown and Caldwell, Phoenix WMP 2007).

Table 3-11
Land Use/Customer Type Conversion

Grouped Customer Types for Planning Purposes	Existing Meter Customer Types from City	Future Customer Types from City Comprehensive Plan
Single-Family Residential	Single-Family Residential	Residential Hillside, Low Density Residential
Multi-Family Residential/Senior Housing	Multi-Family Residential, Senior Housing	Medium Density Residential
Mobile Home/RV Park	Mobile Home Park, RV Parks	High Density Residential, Residential Employment
Commercial – Low	Offices, Low Volume Commercial 1, Warehouse/Furniture, Business Park, Mini Warehouse, Low Volume Commercial 3	Residential Employment, Interchange Business
Commercial – Medium	Low Volume Commercial 2, High Volume Commercial	Commercial
Commercial – High	Lodging	Commercial
Industrial	Industrial	Industrial
Institutional	Church/Institution, City	City Center District, Public
School	School 1, School 2, School 3	Schools

4 WATER SYSTEM ANALYSIS

4 WATER SYSTEM ANALYSIS

INTRODUCTION

This chapter presents the capacity analysis of the City of Phoenix (City) water system. Individual water system components were analyzed to determine the ability to meet policies and design criteria (presented in **Chapter 2**) under existing and future water demand conditions (presented in **Chapter 3**). The following sections summarize the results of assessing the City's supply, storage and pumping, pipe capacity, and Supervisory Control and Data Acquisition (SCADA) system.

SUPPLY EVALUATION

This section evaluates the City's water supplies for meeting existing and future demands of the water service area. Three limitations govern the City's water supplies: Oregon Water Resources Department issued water rights, Medford Water Commission (MWC) purchase agreement flow rates, and pumping capacity of the TAP Supply System. The following sections compare these three supply limitations to the City's current and projected demands and provide recommendations where needed.

WATER RIGHTS EVALUATION

As described in Chapter 1, the City holds an annual water right volume of 1,000-acre feet (AF) (0.89 million gallons a day (mgd)) in addition to a 5 cfs flow rate. Together this equates to an annual flow rate of 4.12 mgd. As seen in **Chart 4-1**, compared to the City's projected low, average, and high average day demands (ADD) estimated in Chapter 3, the City has ample water rights far beyond the planning horizon.

The City's rights together have a peak flow rate of 8.1 cfs (5.23 mgd). Compared to the MDD projections in **Chart 4-2**, the City may exceed the annual volumetric right as soon as 2040 under the high demand projections and 2070 under the average demand projections. Demands may reach the water rights peak rate of 8.1 cfs (5.23 mgd) by 2060 under the high demand projections.

Certification of these rights and the schedule to exercise the permits is currently being developed as part of a regional water rights strategy led by MWC. The study will consider regional demands and infrastructure capacity and will develop a strategy for MWC and wholesale customers for further developing the existing rights. No other actions for water rights are recommended at this time.

MWC PURCHASE AGREEMENT

As described in Chapter 1, the City's 2016 agreement with MWC allows a maximum purchase of 1,600 gallons per minute (gpm) (2.3 mgd) during summer months, and a maximum of 1,300 gpm (1.87 mgd) during the rest of the year. The MWC purchase agreement further restricts summer and non-summer usage between the hours of 5 AM and 11 AM to 1,190 gpm (1.71 mgd) and 440 gpm (0.63 mgd), respectively.

In **Chart 4-1** and **Chart 4-2**, these values are graphed against the projected low, average, and high demand projections. **Chart 4-1** shows the City's projected ADD compared to maximum allowable annually purchased flows for October through April. The ADD graphed in **Chart 4-1** is for the

entire calendar year. In the winter months, defined as October through April, the City's demands are typically 64 percent of the ADD for the entire year, which is shown in a dashed orange line. According to the demand projections, the City's ADD for October through April will likely begin to exceed the MWC Purchase Agreement limitation of 0.63 mgd from 5 AM to 11 AM by the year 2034. However, the Purchase Agreement will be renegotiated before this time.

Chart 4-1 shows MDD compared to maximum allowable purchased flows for the summer months, May through September. The comparison indicates that the City currently exceeds the summer maximum purchase agreement of 1.71 mgd between the hours of 5 AM to 11 AM. Outside of these peak hours, the City is just barely able to stay within the purchase agreement limitation.

It is possible that the 2016 MWC purchase agreement, that is updated every five years, was based on inaccurate demand assumptions for the City due to supply metering issues prior to 2014. Additionally, the agreement says that MWC will compare the total purchase agreement amounts for Phoenix, Talent, and Ashland against the combined meter reading of the TAP regional meter and Phoenix's second MWC meter. Though not evaluated for this Plan, the City may comply with the total purchase agreement given the measurement method that includes all TAP wholesale users. It is recommended that the City review the purchase agreement with MWC to confirm the maximum purchase amounts and make sure future agreements meet the actual and projected City demands. These negotiations should also address the rate limitations during peak flow periods to reduce or remove the limited hours. This is recommended as part of a future TAP Water Master Plan.

Chart 4-1
Water Rights Annual Capacity Evaluation

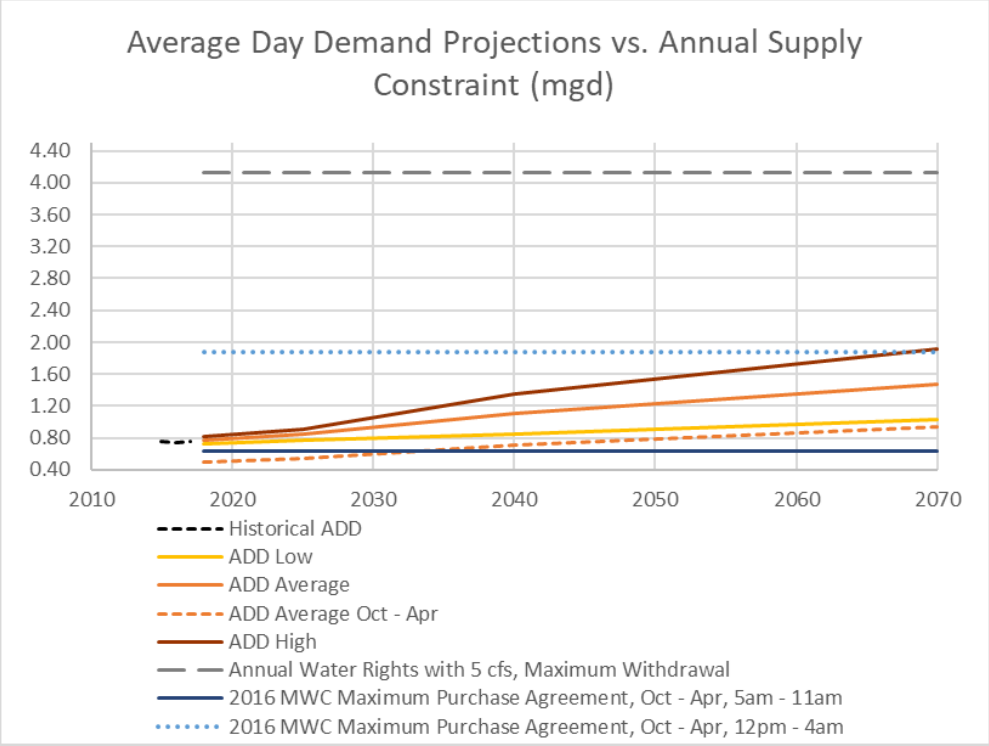
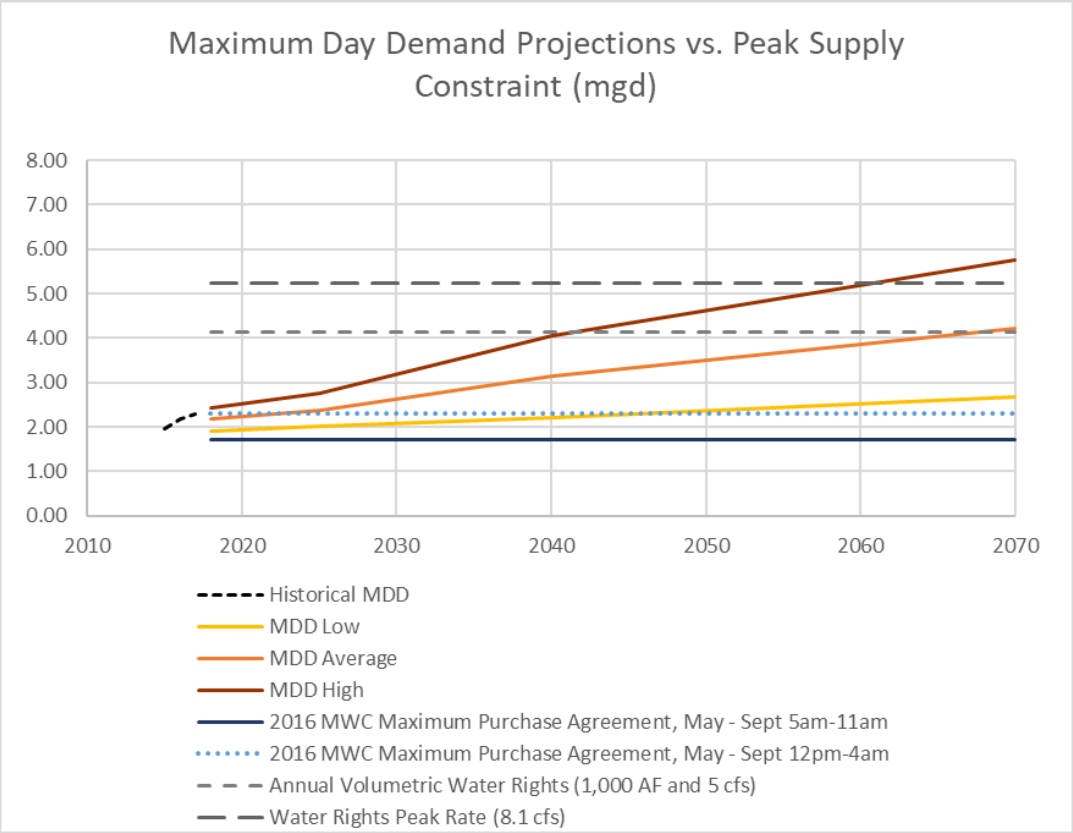


Chart 4-2
Water Rights Peak Capacity Evaluation



SUPPLY PUMPING CAPACITY

This section evaluates the capacity of Regional Booster Pump Station (RBPS) and Experiment Station Road Booster Pump Station (Experiment BPS) to meet current and future demands. Supply facilities must be capable of adequately and reliably supplying high-quality water to the system. In addition, supply facilities must provide a sufficient quantity of water at pressures that meet the requirements of OAR 333-061, Sections 0061-0062. The evaluation of the combined capacity of the sources in this section is based on the criteria that the booster pump stations provide supply to the system at a rate equal to or greater than the MDD of the system. This is consistent with the City's policies established in Chapter 2.

Table 4-1 compares the projected City demands to the combined firm and total pumping capacity of RBPS and Experiment BPS. Firm capacity is the capacity of a pump station when the single largest pump is offline. Though not an official criterion of the City, using firm capacity criteria provides redundancy so that the pump station can still meet system needs on the day of the highest water demands even when a pump is not functioning. The Experiment BPS firm and total capacity (1,000 gpm) are the same because the pump station has two identical pumps but is limited to 1,000 gpm by the transmission system capacity.

This Plan does not consider the full RBPS capacity for the City; the supply pumping capacity comparison in **Table 4-1** assumes 3 mgd of the RBPS pumping capacity for the City's use, which is the maximum amount allotted to the City by the TAP Agreement. Thus, firm and total supply capacity for the City is 3,083 gpm, or 4.44 mgd. As seen in **Table 4-1**, these supplies have adequate capacity to meet the City's demands through buildout. However, the City will need to participate in expansion of the RBPS to achieve its full 3.0 mgd allotment of the TAP system.

Table 4-1
Phoenix Pumping Capacity Evaluation

Year	Phoenix MDD Average Projections	Supply Capacity (Firm and Total)	Surplus/Deficit (mgd)
2018	2.17	4.44	2.27
2025	2.38	4.44	2.06
2040	3.13	4.44	1.31
Buildout 2070	4.22	4.44	0.22

SUPPLY CRITERIA

Additionally, the City's supplies were compared to the existing supply criteria presented in Chapter 2. These include the following:

1. Criterion: The City should have sufficient water rights to meet demands from May through October 10 years in advance of anticipated demands. Confirming perfection of its water rights as part of the regional water rights strategy is recommended.
2. Criterion: The water system must have redundant sources of supply. Developing a new emergency source of supply through the City of Ashland is recommended to meet this criterion.
3. Criterion: There shall be adequate supply to meet total system maximum day demand with the largest source out of service. This criterion used in the City's previous water master plan would require significant costs to develop a new supply source. The criterion has been adjusted to meet ADD with firm supply capacity. The Experiment BPS could meet the average ADD projection with the RBPS offline beyond the year 2060, thus this criterion is assumed to be met.
4. Criterion: There must be adequate transmission capacity to convey maximum day demand from the sources to the distribution system. This criterion is evaluated in the system analysis presented later in this chapter.

NEW SUPPLIES

Due to the large anticipated growth northeast of the City (Growth Areas PH-5 and PH-10), an opportunity exists for the City to develop either a normal or emergency supply connection to the MWC system. A new supply connection would both serve the new growth areas and allow the City to eventually abandon the Experiment BPS supply system. Abandoning the Experiment BPS supply system is appealing because the pipeline is all located in non-City right-of-way, it requires boosting

twice to meet system pressures, and the system is aging. The Experiment BPS supply relies on the Shop BPS, which has limited capacity, to deliver the supply to the system.

A new supply in North Phoenix Road would require negotiating with MWC on purchasing capacity in their facilities to accommodate the City's demands and pressure requirements. This would likely include transmission lines and a pump station. The infrastructure connecting the City's system to a new MWC meter is anticipated to be installed as development occurs in PH-5.

Additionally, it is likely that at some point the City will take over the Charlotte Ann Water District, which includes its own connection to the MWC. This supply connection could also allow abandoning the Experiment BPS supply.

SUPPLY RECOMMENDATIONS

The results of the above supply analyses indicate that the City has sufficient water rights and pumping capacity through buildout. The following supply improvements are recommended:

- Confirm perfection of water rights as part of the regional water rights strategy.
- Expand the RBPS to meet the City's 3.0 mgd allotment of the TAP capacity. Timing and costs will be determined as part of the TAP Water Master Plan.
- Renegotiate the MWC purchase agreement to allow for meeting the City's projected summer demands and for avoiding the peak hour limitation.
- Coordinate with the City of Ashland to develop a new emergency supply from Ashland through the TAP system.
- Plan for a new MWC supply connection in North Phoenix Road and/or the Charlotte Ann Water District.
- Plan for eventually abandoning the Experiment BPS supply, unless development in NE Phoenix does not occur.

PRESSURE ZONES

The ideal static pressure of water supplied to customers is between 40 and 80 pounds per square inch (psi). Pressures within a water distribution system are commonly as high as 120 psi, requiring pressure regulators on individual service lines to reduce the pressure to 80 psi or less. It is difficult for the City's water system (and most others) to maintain distribution pressures between 40 and 80 psi, primarily due to the topography of the water service area. The City has adopted a service goal to provide all customers water pressures ranging between 35 psi and 100 psi as presented in Chapter 2.

Table 4-2 lists each of the City's pressure zones, the highest and lowest elevation served in each zone, and the minimum and maximum distribution system pressures within each zone based on maximum static water conditions (full reservoirs with no demand). While this table presents the results of the pressure evaluations based on the adequacy of the pressure zones under static conditions, the hydraulic analysis section later in this chapter presents the results of the pressure evaluations based on the adequacy of the water mains under dynamic conditions.

As seen in the table, the current pressures to customers meet the City's service goals based on approximate customer elevations and hydraulic grade lines of the City's pressure zones.

Table 4-2
Minimum and Maximum Distribution System Static Pressures

	Highest Elevation Served		Lowest Elevation Served	
Pressure Zone	**Elevation (ft)**	**Static Pressure (psi)**	**Elevation (ft)**	**Static Pressure (psi)**
Phoenix 1681 Zone	1595	37	1461	95
Skyline Zone	1651	65	1565	102

PUMP STATION CAPACITY ANALYSIS

This section evaluates the capacity of the existing Shop and Skyline pump stations for meeting existing and future City demands of each of the zones that they supply. This section also evaluates alternatives for the Experiment, Shop, and Skyline pump stations.

PUMP STATION ANALYSIS CRITERIA

The following criteria were established in Chapter 2.

1. For pressure zones with storage: *firm capacity shall meet maximum day demand*
2. For pressure zones without storage: *firm capacity shall meet peak hour demand plus fire flow*.
3. All pump stations should have *at least two pumps* and *must have back-up power supply*.

PUMP STATION ANALYSIS RESULTS

Shop BPS Analysis

The Shop BPS is unique to the capacity analysis as it serves to boost the Experiment BPS supply to meet the pressures of the City's main pressure zone. With two 500-gpm pumps, the Shop BPS has inadequate firm capacity to deliver the full Experiment BPS supply (1,000 gpm). The Shop BPS is also used to maintain turnover in the Shop Reservoirs. This further complicates the operation of both the Shop BPS and RBPS to maintain water levels in the Eastside Reservoir and supply the City of Talent. Options for eventually removing the need for this pump station are discussed below in the Storage Analysis.

Skyline BPS Analysis

As there is no storage in its service area, the Skyline Pump Station must meet both PHD and fire flow at the same time to meet the City's criterion. The estimated PHD of the Skyline service area is approximately 46 gpm and very limited growth is expected. PHD is not expected to increase in the future. The highest fire flow requirement in this residential area is 1,500 gpm. The Skyline BPS has a firm capacity of 50 gpm, and total capacity of 1,050 gpm with the single fire pump running. The pump station is able to meet PHD with its service pump and provide 1,000 gpm of fire flow protection. However, the pump station cannot meet the criterion of PHD and fire flow with firm

capacity, nor can it meet the new fire flow criterion of 1,500 gpm for residential customers. Replacing the pump station to meet the new criteria is recommended when the pump station requires major rehabilitation.

New Upper Zone BPS

An additional pump station will be needed to serve future customers at higher elevations in the UGB east of the city near the East Side Reservoir. The pump station would need to include two 2.5-hp service pumps and two 50-hp fire pumps to serve projected future customers through buildout conditions (2070). This pump station would be entirely development driven.

New NE BPS

An additional pump station will be needed to serve future customers at higher elevations in PH-5. While growth in this area is undefined at this stage, the previous master plan recommended two service pumps providing 270-gpm and head of 85 feet, and two fire pumps. This pump station would also be entirely development driven.

PUMP STATION RECOMMENDATIONS

RH2 recommends the following pump station improvements:

- Eventually abandoning the Shop Pump Station when the City is able to secure a new MWC supply source or modify the Experiment BPS supply system.
- When Skyline BPS requires major rehabilitation, replace the fire pump with two 70-hp pumps to meet the updated fire flow guidelines for single-family residential areas and firm capacity criterion.
- Plan for a new Upper Zone BPS to serve development near the East Side Reservoir above the 1681 pressure zone.
- Plan for a new NE BPS to serve development in PH-5 that is above the 1681 pressure zone.

STORAGE FACILITIES

This section evaluates the capacity of the City's existing water storage tanks to meet the existing and future storage requirements of the system. This storage analysis only considers the City's active storage tanks. The Skyline storage tanks are no longer in use and are not located at an elevation that benefits the system hydraulics; they are assumed to be abandoned for this analysis.

STORAGE ANALYSIS CRITERIA

Water storage is typically made up of the following components: operational storage; emergency storage; and fire flow storage. Each storage component serves a different purpose and will vary from system to system. A definition of each storage component and the criteria used to evaluate the capacity of the City's storage tanks is provided below.

Operational Storage – Volume of the reservoir used to supply the water system under peak demand conditions when the system demand exceeds the total rate of supply of the sources. Operational storage is calculated as 25 percent of MDD.

Emergency Storage – Volume of the reservoir used to supply the water system under emergency conditions when supply facilities are out of service due to equipment failures, power outages, loss of supply, transmission main breaks, and any other situation that disrupts the supply source. The City's previous criteria assumed 30 percent of MDD for emergency storage. Common emergency criteria in the state of Oregon is to assume emergency storage as two times ADD.

Fire Flow Storage – Volume of the reservoir used to supply water to the system at the maximum rate and duration required to extinguish a fire at the building with the highest fire flow requirement. The magnitude of the fire flow storage is the product of the fire flow rate and duration of the operating area's highest fire flow needs. These fire flow planning goals were established by Jackson County Fire District No. 5 using the Uniform Fire Code and are presented in Chapter 2. Fire suppression for the City's system is based on the Home Depot fire flow requirement: 4,000 gpm for a duration of three hours (0.72 mg total).

Nesting of Storage – Some water systems allow for "nesting" of fire flow and emergency storage, meaning that it is assumed that a fire and a supply disruption would not happen at the same time and therefore only the greater of the two storage volumes is used in the storage analysis.

STORAGE ANALYSIS RESULTS

As shown in **Table 4-3**, the total combined storage capacity of the City's reservoirs is 2.85 million gallons. The storage requirements for operational, emergency, and fire flow are compared to the existing storage to determine storage adequacy for the four planning periods, as summarized in **Table 4-3**. The table includes the storage surplus/deficiency with and without assuming nesting of fire flow and emergency storage volumes.

Table 4-3
Existing Storage Evaluation

Year	2018	2025	2040	2070 (Buildout)
ADD (mgd)	0.77	0.84	1.10	1.48
MDD (mgd)	2.17	2.38	3.13	4.22
Existing Storage (mg)	2.85	2.85	2.85	2.85
Operational Storage (mg)	0.54	0.59	0.78	1.06
Emergency Storage (mg)	1.54	1.69	2.20	2.95
Fire Suppression (mg)	0.72	0.72	0.72	0.72
Total Required Storage with Nesting (mg)	2.09	2.28	2.99	4.01
Total Storage Surplus/Deficiency with Nesting (mg)	**0.76**	**0.57**	**-0.14**	**-1.16**
Total Required Storage without Nesting (mg)	2.81	3.00	3.71	4.73
Total Storage Surplus/Deficiency without Nesting (mg)	**0.04**	**-0.15**	**-0.86**	**-1.88**

The storage evaluation results indicate that the system may have a small storage deficit as soon as 2025 and a total deficit of 1.88 MG at buildout using standard storage calculation methods. Assuming nesting, the City has a small deficiency beginning in 2040 and a total deficit of 1.16 MG at buildout.

STORAGE ALTERNATIVES

By adjusting storage criteria to allow "nesting" of fire and emergency supply, no additional storage is required until approximately 2040. A new reservoir will be needed at this time to meet operational and emergency volumes for future customers. The volume may range from 1.16 to 1.88 MG.

The Shops Reservoirs hold 1.85 MG of the City's storage volume. The Shops Reservoirs are aging and require pumping through the Shop pumps to meet customer demands. A high-level analysis of the tanks indicates that they require maintenance improvements and further study to evaluate structural and seismic performance (**Appendix 2A**). When a seismic performance analysis is complete, RH2 recommends that the City compare the costs of reservoir and pump station improvements to the costs of abandoning the system and constructing a new reservoir at an adequate elevation for serving City customers. This study should include the benefit of reduced pumping. The City would need to replace 1.85 MG of lost volume if the Shop system is abandoned.

A few options were identified for locating a new tank:

- Option 1: Adjacent to East Side Reservoir. Constructing a new tank next to the existing East Side Reservoir meets the hydraulic requirements of the system and modeling predicts no additional infrastructure needed to connect to the new tank.
- Option 2: NE Phoenix. Constructing a new tank at adequate elevation in growth area PH-5 also meets the hydraulic requirements of the system. At least two parallel 12-inch transmission pipes extending from the existing system towards this tank are required to allow

the tank to hydraulically "float" with the East Side Reservoir. These pipes would be required for supplying development in the PH-5 area regardless of a new tank.

- Option 3: Coleman Creek Road. The Experiment BPS supply pipeline passes over a hill at the corner of Coleman Creek Road and Camp Baker Road at an elevation of approximately 1660 feet prior to dropping towards the City's shops. Thus, the Experiment BPS is boosting water to a height close to the City's main pressure zone (1681 feet) before it drops in pressure to reach the City. Constructing a tank on this hill would make use of the existing supply system, while allowing abandonment of the Shop Tanks and BPS.

  The hydraulic model predicts significant head loss from a new tank to the existing water system and to the East Side Reservoir. To allow the two tanks to "float" together, significant transmission capacity improvements would be required for this option:

  - Replace the 12-inch pipe in Camp Baker Road to the Shops with a 24-inch pipe (or install a smaller parallel pipe),
  - Install a 16-inch pipe from the shops to the connection of the East Side Reservoir to the TAP pipeline.

  Additionally, the Experiment Road BPS would need to be able to boost approximately 20-feet higher than it currently does; this may impact pump operations and would need field verification.

STORAGE RECOMMENDATIONS

RH2 recommends the following storage improvements:

- Perform a seismic analysis of the Shop Reservoirs.
- Perform a Cost-Benefit Analysis of improving the Shop Reservoirs or constructing a new reservoir.
- Construct a 1.16 to 3.0 MG Reservoir by 2040. For budgeting purposes in this master plan, a new 3.0 MG Reservoir is assumed to meet buildout conditions. This assumes 1.85 MG of replaced volume from the Shop Reservoirs and 1.15 MG of storage for new growth. Future water master plan updates will likely revise this recommendation as development occurs and demands adjust.
  - Location to be determined. City staff prefer a location in NE Phoenix (Option 2) concurrent with development in the area. If development does not occur, the City will revisit Options 1 and 3.
- Eventually abandon the Shop Reservoirs to simplify operations concurrent with construction of a new reservoir and abandoning the Experiment Station Road supply system.

DISTRIBUTION AND TRANSMISSION SYSTEM

This section evaluates the City's existing distribution and transmission system (i.e., water mains) to determine if they are adequately sized and looped to provide the necessary flow rates and pressures to meet the existing and future requirements of the system.

DISTRIBUTION SYSTEM ANALYSIS CRITERIA

Distribution and transmission mains must be capable of adequately and reliably conveying water throughout the system at acceptable flow rates and pressures. The criteria used to evaluate the City's distribution and transmission system are identified in Chapter 2.

Hydraulic analyses of the existing system were performed under PHD conditions to evaluate its pressure capabilities and identify system deficiencies. The existing system was also analyzed under MDD conditions with fire flow demands to evaluate the fire flow capabilities. Additional hydraulic analyses were then performed with the same hydraulic model under future PHD and MDD conditions and with the proposed improvements to demonstrate that the identified improvements will eliminate the deficiencies and meet the requirements far into the future. The following is a description of the hydraulic model, the operational conditions, and facility settings used in the analyses.

HYDRAULIC MODEL

Description

A computer-based hydraulic model of the existing water system was updated to version 8i of the WaterGEMS® program (developed by Bentley Systems, Inc.) with the City's most recent GIS shapefile, to reflect the best-known information on distribution system geometry and pipe characteristics, including diameter, material, and installation year. This was further refined to include the latest construction projects and changes to the system.

Hydraulic model pipe roughness coefficients were initialized with computed estimates based on the water main material and age information from the City's water main GIS shapefile. Based on the premise that the internal surface of water mains become rougher as they get older, older water mains were assigned higher roughness coefficients than newer water mains.

Demand Data

The hydraulic model of the existing system contains demands based on 2017 individual customer meter water demand data provided by the City. Demand data for each parcel was distributed to the closest representative junction node of the model based on the recorded usage. The peaking factors shown in Chapter 3 were used to analyze the system under PHD and MDD conditions.

Facilities

The hydraulic model of the existing system contains all active existing system facilities. The facility settings for the pressure analyses corresponded to a PHD event in the water system. All sources of supply were set to operate at constant rates (i.e. MDD), which assumes the City is meeting the intent of the MWC Purchase Agreement for constant pumping. Reservoir levels were modeled to reflect full utilization of operational storage.

The hydraulic model for the fire flow analyses contained settings that correspond to MDD events. All sources of supply were set to operate at constant MDD rates, and the reservoir levels were

modeled to reflect full utilization of operational, emergency, and fire flow storage based on the maximum planning-level fire flow requirement.

Calibration

The model was calibrated as part of this Plan. Calibration is achieved by adjusting the roughness coefficients of the water mains in the model so the resulting pressures and flows from the hydraulic analyses closely match the pressures and flows from actual field tests under similar demand and operating conditions. Initial Darcy-Weisbach roughness coefficients were entered in the model based on computed estimates of the coefficients from available pipe age and material data. For example, older water mains were assigned higher roughness coefficients than new water mains; thereby assuming that the internal surface of water pipe becomes rougher as it gets older.

The model was calibrated using three hydrant flow tests performed in the system in the spring of 2018. The model is considered calibrated when model results are within 10 percent of the field results. After identifying a closed valve in the system, the model predicted closely matching results for all three tests (within 10 percent), thus the model is considered adequately calibrated for use in the following system analyses.

HYDRAULIC ANALYSIS RESULTS

Pressure and fire flow analyses of the existing system were performed using the model for 2025, 2040, and 2070 (Buildout).

Pressure Analysis

As discussed in the *Pressure Zones* section of this chapter, ideal water pressures delivered to customers are in the range of 40 to 80 psi and the City's goal is to deliver pressures between 35 and 100 psi. Maps of system pressures color coded by pressure range are shown in **Figure 4-1** and **Figure 4-2**. The 2025 and 2040 pressure analysis results were very similar, so the 2040 results are not presented.

There are no pressure deficiencies in the system in the 2025 planning year. **Figure 4-1** shows pressures below the desired service pressure in areas where there are no services such as at the Shop BPS and Skyline BPS. **Figure 4-1** also indicates lower pressure to the UGB area east of the City limits. Customers in this area will require a pump station to achieve adequate pressure (not included in the model).

The 2070 (Buildout) pressure analysis shown in **Figure 4-2** indicates that some Skyline customers will experience pressures below the desired service pressure by this time if no changes are made to existing infrastructure. However, this is believed to be caused by the pressure settings of the Amerman PRV. It is recommended that the PRV be set to supply 20 to 25 psi so that it should only open for downstream fire flow.

Fire Flow Analysis

Fire flow demands were assigned to the water system based on land use by assigning the fire flows identified in Chapter 2. Maps of fire flow results are shown in **Figure 4-3** and **Figure 4-4**. The maps are color coded to show if each junction in the system satisfies, does not satisfy, or is within 10

percent of delivering assigned fire flows (10 percent is within the error of the model). In the fire flow analysis 2025 and 2040 results are so similar that the 2040 results are not presented.

Several areas with deficient fire flows are part of subdivisions that were built before more stringent fire codes were adopted. These buildings are classified as "existing non-conforming" according to the Jackson County Fire District No. 5 Fire Chief, are in single family residential areas, and since they met previous fire code requirements, improvements to these areas are considered a low priority.

Modeling indicates that the fire pump at the Skyline BPS does not meet the new, more stringent requirements for fire flow capacity (1,500 gpm instead of 1,000 gpm) in the planning years. Skyline customers in 2025 will receive about 1,100 gpm of fire flow. All Skyline customers are shown as deficient in 2025 but this also falls into the "existing non-conforming" category and is considered a low priority. Replacement of the fire pump at Skyline BPS with a larger pump and the addition of a second, redundant fire pump would be necessary to provide 1,500 gpm fire flow to the Skyline customers. Refer to the *Pump Station Recommendations* section of this chapter for pump sizing information.

Future growth areas were also modeled to identify potential needs for infrastructure improvements to meet the predicted future fire flow demands. All future growth areas are predicted to have sufficient fire flow through buildout with the exception of the UGB area east of the City. A new pump station with fire pumps would need to be added to the system to achieve required fire flows for the easterly UGB area as described in the *New Upper Zone BPS* section of this chapter.

DISTRIBUTION SYSTEM RECOMMENDATIONS

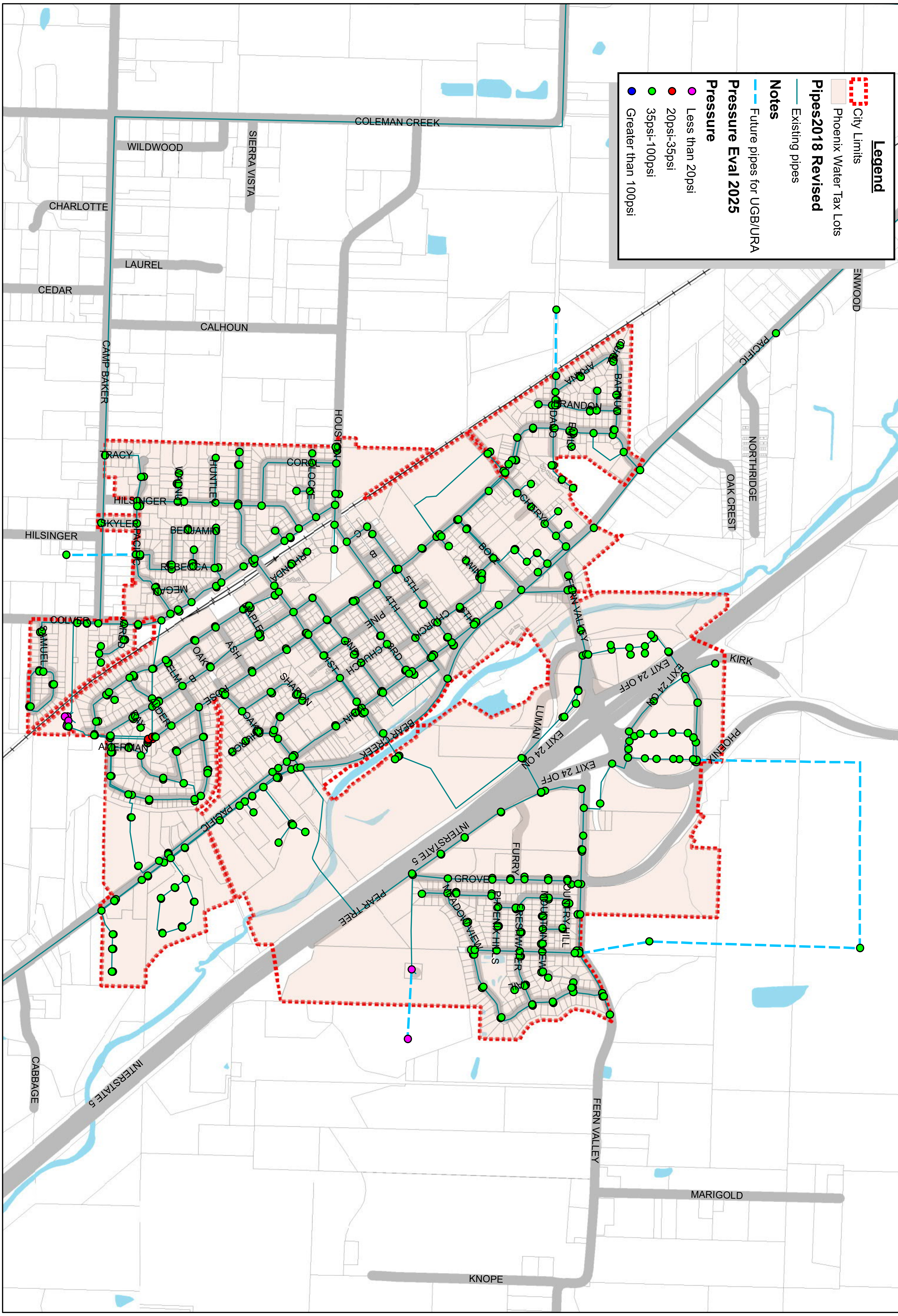
Small pipe improvements are included in **Chapter 5 – Capital Improvement Plan** to address future fire flow deficiencies.

TELEMETRY AND SUPERVISORY CONTROL SYSTEM

This section evaluates the City's existing telemetry and supervisory control system to identify deficiencies related to its condition and current operational capability.

EVALUATION AND DEFICIENCIES

The water system has a headquarters telemetry control panel at the Regional Booster Pump Station. The City also has a remote-control facility located at the Phoenix Shop Pump Station. System facilities including source, storage, and pumping, can be controlled with the telemetry system. SCADA data was exported for this water master plan update to help evaluate efficiency of the current water system. There are no known deficiencies with the existing telemetry/SCADA system; however, some minor changes would improve operations and management. System updates to both hardware and software are recommended as well as expanded coordination with Talent. Recommended SCADA improvements are discussed further in Chapter 5.



C:\USERS\HFARRIS\DESKTOP\FIG4-1_PRESSUREANALYSIS_2025.MXD BY: HFARRIS PLOT DATE: JUL 1, 2020 COORDINATE SYSTEM: NAD 1983 HARN STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

NORTH

1 inch = 1,000 feet

0 255 510 1020 Feet

DRAWING IS FULL SCALE WHEN BAR MEASURES 1"

CITY OF PHOENIX O•R•E•G•O•N

Figure 4-1 Pressure Analysis 2025

City of Phoenix Water Master Plan

Vicinity Map

HERE, Garmin, (c) OpenStreetMap contributors.

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Legend

City Limits

Phoenix Water Tax Lots

Pipes2018 Revised

Existing pipes

Notes

Future pipes for UGB/URA

Pressure Eval 2070

Pressure

- Less than 20psi
- 20psi-35psi
- 35psi-100psi
- Greater than 100psi

NWOOD
PACIFIC
NORTHRIDGE
OAK CREST
KIRK
PHOENIX
EXIT 24 ON
EXIT 24 OFF
MARIGOLD
FERN VALLEY
BARTLEY
ARENA
BRANDON
EMILY
IDAHO
CHERRY
BOYD
MAIN
5TH
4TH
PINE
CHURCH
3RD
2ND
1ST
LUMAN
COUNTRY HILL
MOUNTAIN VIEW
FURRY
FRESHWATER
PHOENIX HILLS
GROVE
MEADOW VIEW
INTERSTATE 5
KNOPE
BEAR CREEK
PEAR TREE
COLEMAN CREEK
HOUSTON
CORAL LOCKE
RHONDA
SIERRA VISTA
MAPLE
ASH
SHADOW
OAK CHURCH
PACIFIC
HUNTLEY
WAGNER
BENJAMIN
REBECCA
MEGAN
OAK
ELM
ROSE
ALDER
BAY
AUDREY
WILDWOOD
LAUREL
CALHOUN
HILSINGER
SKYLER
TRACY
JARED
OLIVER
SAMUEL
CAMP BAKER
CHARLOTTE
CEDAR
CABBAGE

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Vicinity Map

C:\USERS\HFARRIS\DESKTOP\FIG4-2_PRESSUREANALYSIS_2070.MXD BY: HFARRIS PLOT DATE: JUL 1, 2020 COORDINATE SYSTEM: NAD 1983 HARN STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

Figure 4-2
Pressure Analysis
2070 (Buildout)
City of Phoenix
Water Master Plan

CITY OF PHOENIX
O • R • E • G • O • N

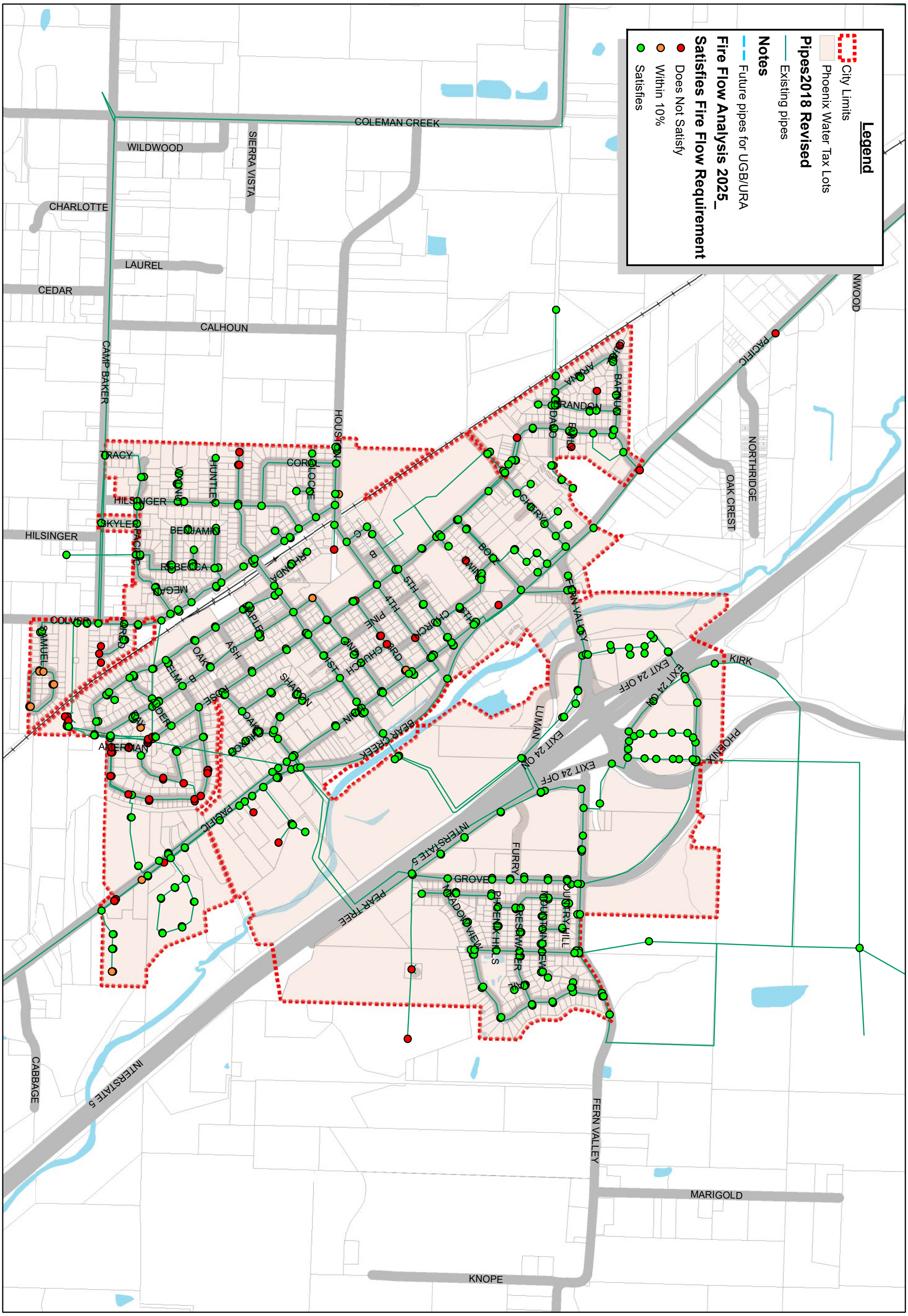
1 inch = 1,000 feet

0 255 510 1,020 Feet

DRAWING IS FULL SCALE
WHEN BAR MEASURES 1"

RH2

NORTH



C:\USERS\HFARRIS\DESKTOP\FIG4-3_FIREFLOWANALYSIS_2025.MXD BY: HFARRIS PLOT DATE: JUL 1, 2020 COORDINATE SYSTEM: NAD 1983 HARN STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

RH2

NORTH

1 inch = 1,000 feet

0 255 510 1,020 Feet

DRAWING IS FULL SCALE WHEN BAR MEASURES 1"

CITY OF PHOENIX O•R•E•G•O•N

Figure 4-3
Fire Flow Analysis 2025

City of Phoenix Water Master Plan

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Legend

City Limits

Phoenix Water Tax Lots

Pipes2018 Revised

Existing pipes

Notes

Future pipes for UGB/URA

Fire Flow Analysis 2070_

Satisfies Fire Flow Requirement

- Does Not Satisfy
- Within 10%
- Satisfies

NWOOD
PACIFIC
NORTHRIDGE
OAK CREST
KIRK
PHOENIX
EXIT 24 ON
EXIT 24 OFF
MARIGOLD
FERN VALLEY
BARTLEY
ARONA
BRANDON
EMILY
IDAHO
CHERRY
BOYD
LUMAN
COUNTRY HILL
MOUNTAIN VIEW
FURRY
FRESHWATER
PHOENIX HILLS
GROVE
MEADOW VIEW
INTERSTATE 5
KNOPE
BEAR CREEK
PEAR TREE
COLEMAN CREEK
HOUSTON
CHURCH
5TH
4TH
3RD
2ND
1ST
MAIN
PINE
CAROL
LOCKE
RHONDA
SHASTA
MAPLE
ASH
OAK
ELM
ROSE
ALDER
PACIFIC
OAKHURST
SIERRA VISTA
HUNTLEY
WAGNER
BENJAMIN
REBECCA
MEGAN
TRACY
HILSINGER
SKYLER
JARED
ARTHUR
WILDWOOD
LAUREL
CALHOUN
CAMP BAKER
CHARLOTTE
CEDAR
COLVER
SAMUEL
CABBAGE

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Vicinity Map

Figure 4-4
Fire Flow Analysis 2070 (Buildout)

City of Phoenix Water Master Plan

CITY OF PHOENIX
O • R • E • G • O • N

1 inch = 1,000 feet

0 255 510 1,020 Feet

DRAWING IS FULL SCALE WHEN BAR MEASURES 1"

RH2

NORTH

C:\USERS\HFARRIS\DESKTOP\FIG4-4_FIREFLOWANALYSIS_2070.MXD BY: HFARRIS PLOT DATE: JUL 1, 2020 COORDINATE SYSTEM: NAD 1983 HARN STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

5 CAPITAL IMPROVEMENT PLAN

5 CAPITAL IMPROVEMENT PLAN

INTRODUCTION

This chapter presents the recommended Capital Improvement Plan (CIP) for meeting the City's level of service goals of continuing to provide safe, reliable water to current and future customers. The improvements described below were developed from the system analysis described in Chapter 4, as well as interviews with City staff, to address current and future water demand conditions and to sustain system reliability. The capital improvement projects are categorized as follows:

- Water Main Improvements
- Pressure Zone Improvements
- Facility Improvements
- Recommended Studies
- Additional Recommendations

The recommended capital improvements included in this master plan focus on the needs of the City's water distribution system. Since the City purchases water wholesale from MWC, capital improvements surrounding source development and water quality are MWC's responsibility unless they are distribution system specific.

A summary of the City CIP is developed and presented in **Table 5-4**. This summary provides total probable costs, a brief description, and prioritizes each capital improvement based on recommended year of implementation. Project priorities should be considered flexible in order to accommodate concurrent construction during other street opening projects, budgetary constraints, specific development projects, and other factors that may affect project implementation.

The following sections include the basis for the cost estimates, a brief description of each improvement, and the recommended prioritization and schedule for implementation. This chapter also reviews the status of all CIP projects previously identified in the 2007 Water Master Plan Update (WMPU).

COST ESTIMATES

Planning level cost estimates were prepared for the recommended projects following the American Association of Cost Estimators (AACE) Class 5 estimates, which assume 0 to 2 percent of project definition as appropriate for master planning. This level of opinions of cost are assumed to be within the range of plus 50 percent to minus 30 percent of the average of contractors' bids. The estimated costs of the facilities should be expected to change along with the accuracy of the estimate as a project proceeds into preliminary and final design. These opinions of probable cost are based on year 2017 dollars and no allowance has been made for inflation in future years.

Since construction costs change periodically, an indexing method to adjust present estimates in the future is useful. The Engineering News Record (ENR) Construction Cost Index (CCI) is a

commonly used index for this purpose. The CCI Index used for this study is 10737, the 2017 20-Cities Average.

Estimated total project costs for each project are comprised of multiple components: directly estimated construction costs, an allowance for contingencies, and an allowance for engineering, legal, and administrative costs. These components are described below.

CONSTRUCTION COSTS

Planning-level construction costs were estimated assuming a traditional public works procurement process of design, bidding, award, and construction by a licensed contractor using commonly accepted means and methods. Property easements or land acquisition and maintenance costs are not included.

Table 5-1 presents the unit construction cost assumptions for pipe improvements used in the CIP. These are based on recent, local projects and include mobilization, materials, labor, contractor overhead and profit, and all elements expected to be included in a contractor's bid. Pump station costs were estimated using previous projects and comparing building square footage, total motor power, ultimate capacity, and startup capacity.

Table 5-1
CIP Estimated Unit Costs

	Diameter (inches)	Unit Construction Cost (2017 $ / Linear Foot)
Pipeline Installation	6	$180
	8	$225
	10	$235
	12	$240
	16	$250
	18	$260
	20	$280

CONTINGENCIES

A contingency of 30 percent was added to the estimated construction costs. The allowance for contingencies covers items such as variations in the project configuration, which are developed during preliminary design and final design, unforeseen site conditions encountered during construction, and reasonable project changes during construction. The contingency allowance does not include major project scope additions or additional costs resulting from permit mitigation requirements (such as wetlands enhancement).

ENGINEERING, LEGAL, ADMINISTRATION

Total construction costs were increased by 25 percent to achieve the total project cost. This markup accounts for engineering design, construction management, legal, and administrative project costs. Costs shown in the CIP are estimated total project costs.

SDC ALLOCATION & DEVELOPMENT CONTRIBUTIONS

Projects that are required for meeting increased demands are eligible to be funded from System Development Charges (SDC) and will be used to estimate an updated SDC value for the City's water system in Chapter 6. Some projects are recommended for capacity upgrades and maintenance or other non-growth-related reasons. The portion eligible for SDC funding was calculated as the additional cost for increasing capacity only.

Other projects are identified below to serve future development areas and will be required by developers to implement when they occur. These projects are noted in **Table 5-4**, CIP Summary.

PREVIOUS CIP PROJECTS

The status of all CIP projects identified in the 2007 WMPU is presented in **Table 5-2**. Most of the 2007 CIP projects have not been completed. Remaining incomplete projects are addressed in the recommendations below.

Table 5-2
Status of CIP Projects Since 2007 WMPU

Phase	Project	Recommended Completion Year	Description	Status
Short-Term	S-1	2010	Install new 8-inch pipe from dead end of North Rose to TAP transmission line.	Completed
	S-2	2011	Install new 8-inch pipe to extend High Zone to 7 additional houses on Amerman Dr.	Completed
	S-3	2012	Install new 8-inch transmission line down Camp Baker Road to reinforce west side of system.	Incomplete
	S-4	2017	Acquisition of additional 1 acre of land at existing East Reservoir Site.	Incomplete
	S-5	2017	Acquisition of 2 acres of land for Proposed North Tanks Site.	Incomplete
Long-Term	L-1	2024	Install New 16-inch Transmission Piping to Connect Tank to New Distribution System.	Incomplete
	L-2	2027	Construct North Reservoir 1 (1.0 MG Storage Tank)	Incomplete
	L-3	2045	Construct North Reservoir 2 (1.0 MG Storage Tank)	Incomplete
	L-4	With CAWD*	Install New 12" Transmission Line Across Tracks to CAWD Tie in on Highway 99.	Incomplete
	L-5	With CAWD	Construct East Reservoir 2 (2.0 MG Storage Tank).	Incomplete
	L-6	With CAWD	CAWD Pump Station Rehabilitation.	Incomplete

*Charlotte Ann Water District (CAWD)

DESCRIPTION OF IMPROVEMENTS

This section provides a general description of the recommended improvements and an overview of the deficiencies they will resolve. Most of the improvements are necessary to resolve existing system deficiencies. Improvements have also been identified for serving future growth. Recommended infrastructure improvements are show in **Figures 5-1** and **5-2**.

PIPE IMPROVEMENTS

The following water main improvements were identified from the results of the distribution and transmission system analyses discussed in Chapter 4. All recommended improvements are assumed to be ductile iron pipe following the City's pipe construction standards.

P-1 through P-6: Fire Flow Improvements

Proposed CIP projects P-1 through P-6 are a group of pipe improvements which address future fire flow deficiencies to be addressed as development occurs or as pipe replacement becomes necessary for maintenance. Several of these projects increase pipe size to accommodate higher fire flow requirements due to the increased fire flow criteria or future land use that requires a higher fire flow rate than current land use. These projects are mostly allocated to the Long-Term planning periods to reflect their low priority; however, the City assumes they will work on P-4 in 2023 as this pipe project has been identified for several years for improvements. The projects are summarized in **Table 5-3** and into a single line-item on the CIP summary shown in **Table 5-4**.

Table 5-3
Fire Flow Pipe Improvements

Project No.	Description	Total Project Cost	Planning Period		
			Short-Term	Mid-Term	Long-Term
P-1	Orchard Pl (from Brandon Way to cul-de-sac end) 6-in DI 219 linear feet	$65,000			$65,000
P-2	4th St (between Main and Rose) 8-in DI 1,017 linear feet	$372,000			$372,000
P-3	3rd St (between Rose and Main) 8-in DI 1,018 linear feet	$373,000			$373,000
P-4	1st St (from Hilsinger to end of road) 8-in DI 600 linear feet	$220,000	$220,000		
P-5	S Pacific Hwy (from Oak to 4655 S Pacific Hwy)16-in DI 2159 linear feet	$878,000			$878,000
P-6	Jared Ct (off of Colver Rd) 8-in DI 527 linear feet	$193,000			$193,000
	Totals	**$2,101,000**	**$220,000**	**$0**	**$1,881,000**

P-7: Annual AC Pipe Replacement

Deficiency: As indicated in Chapter 1, approximately 35,000 feet (27 percent) of the City's water pipes are asbestos cement (AC). Aging AC pipe commonly leaks and is difficult to repair. Asbestos is a known hazardous material.

Improvement: Many other pipes in the City are aging and require maintenance. Having an annual budget for pipe replacement and repair demonstrates proactive management to maintain City assets and provides maintenance staff the flexibility to coordinate these projects with road or other projects in the same areas. An annual allocation of $150,000 was used for the CIP.

T-1: Camp Baker Road Transmission Line

Deficiency: System is not currently looped on Camp Baker Road from Tracy Lane to Colver Road, resulting in several dead-end mains.

Improvement: Provide 12-inch diameter pipe connection from Tracy Lane to Colver Road on Camp Baker Road.

T-2: Transmission Main Looping to PH-5

Deficiency: System will need to expand into PH-5 when development occurs.

Improvement: Provide transmission main looping to PH-5 as shown in **Figure 5-2**. Parallel 12-inch diameter pipes appear sufficient for providing adequate pressure and fire flow to meet the demands assumed in this area. Further hydraulic evaluations will be required as development occurs. Cost sharing for this pipeline between the City and the developer will need to be determined by the City. This pipeline is assumed to be 100 percent SDC eligible.

STORAGE IMPROVEMENTS

The following water system storage improvement was identified from the results of the water system analyses in **Chapter 4**. The storage improvement has been sized to accommodate projected growth.

ST-1: New 3.0-MG Reservoir

Deficiency: Under the City's storage criteria, increased customer demands will require more storage capacity by 2040. Additionally, the City prefers to eventually abandon the Experiment Station Road supply system and associated Shop Reservoirs to improve operations and reduce pumping costs. **Figure 5-2** shows the approximate location for this reservoir.

Improvement: Construct a new 3.0-MG reservoir to accommodate predicted customer demands through Buildout. The assumed location is in the NE Phoenix development area, close to Campbell Road. Alternatively, the City could review constructing two 1.5-MG reservoirs to spread out costs and meet demand-driven storage needs as they occur. Cost sharing for one of these reservoirs between the City and the developer will need to be determined by the City. The reservoir is assumed to be 38 percent SDC eligible, as 1.85 MG of the total reservoir is for replacing the Shop Reservoirs.

PUMP STATION IMPROVEMENTS

The following pump station improvements were identified from the results of the water system analyses in Chapter 4. The improvements are primarily necessary to resolve existing system

deficiencies, but also have been sized to accommodate projected growth. The project costs for pump stations in **Table 5-4** are for the pump stations only and do not include costs of new pipes.

PS-1: Larger Fire Pumps at Skyline BPS

Deficiency: Existing fire pump provides 1,000 gpm fire flow but new, more stringent fire guidelines for this area recommend 1,500 gpm fire flow.

Improvement: Provide a 70-hp fire pump that can provide 1,500 gpm fire flow to the Skyline service area when the Skyline BPS requires major rehabilitation. This project is assumed to be low priority as it addresses an updated fire flow requirement.

PS-2: New Upper Zone BPS

Deficiency: Potential new customers at higher elevations in the area east of the East Side Reservoir require higher pressures than can be provided from the existing water system.

Improvement: Provide new booster pump station with two 2.5-hp pumps (to meet buildout service demands) and a 50-hp fire pump when this area develops in the future. This project is anticipated to be fully funded by the developer of this area.

SUPPLY IMPROVEMENTS

The following improvements are recommended for the City's supply and telemetry system.

S-1: SCADA System Mapping

Deficiency: The network of the current telemetry system and its various facilities are not mapped nor adequately documented, making it difficult to communicate and plan for system changes.

Improvement: Provide mapping and clear documentation of the telemetry system in GIS format to show which stations communicate with each other.

S-2: Update SCADA System

Deficiency: The SCADA system was installed in 2015 and will be due for major updates in 20 years.

Improvement: Updates to the SCADA system assume implementing updated technology and additional monitoring functionality that shows the TAP systems in more detail giving Public Works staff a better understanding of what is happening with the water system and resolve issues more efficiently. It is assumed costs for this project will be shared among the TAP partner agencies as will be confirmed in a TAP Water Master Plan.

S-3: New Supply Connection from MWC in North Phoenix Road

Deficiency: The existing secondary supply (Experiment Station Road BPS) from MWC travels through a long transmission main outside of the City limits to reach the Shop Reservoirs and Shop BPS. This supply connection requires pumping twice to meet system pressures. Maintaining the pump stations and transmission mains could be costly over time and pipe maintenance requires coordination with Jackson County Roads and Parks Department.

Improvement: Provide new supply source from MWC to the northeast of the City near PH-5, abandon the existing Experiment Station Road Supply, and/or takeover Charlotte Ann Water District

(includes MWC supply and BPS). Costs for this connection need to be further defined based on discussions with MWC and Charlotte Ann Water District. **Figure 5-2** shows the proposed connection near the intersection of Campbell Road and North Phoenix Road where a future extension of South Stage Road is anticipated to connect to serve Medford's Urban Growth Area in this vicinity.

S-4: Increase RBPS Capacity

Deficiency: The current Regional BPS firm capacity does not provide enough water to supply the City's 3.0 mgd allotment and other agreed amounts to the rest of the TAP system.

Improvement: Increase RPBS capacity to meet agreed upon delivery quantities as a combined project with TAP. Final capacity and cost to be confirmed as part of a TAP Water Master Plan.

S-5: Relocate TAP Pipeline for ODOT Bridge Project

Deficiency: Current TAP pipeline is in the way of new ODOT bridge project at Coleman Creek crossing.

Improvement: Relocate TAP pipeline to accommodate ODOT project. Costs will be shared with TAP.

RECOMMENDED STUDIES

RS-1: Water Master Plan Update

The Oregon Drinking Water Program (DWP) requires that each water system have a current water master plan. A revised master plan is recommended every ten years to capture changes in demands.

RS-2: Water Management and Conservation Plans (WMCPs)

WMCP progress reports are anticipated every five years, while fully updated plans are required every ten years. It is assumed the ten-year updates of the full plan will be completed concurrently with Water Master Plan updates.

RS-3: TAP Water Master Plans

Since the City's water system is part of the TAP system, it is recommended to assess the entire TAP system together and maintain a current TAP Water Master Plan. A revised TAP Water Master Plan is recommended every ten years.

RS-4: System-Wide Seismic Resilience Assessment

A seismic resilience assessment is recommended in the next fiscal year to meet new state requirements for submitting a Water Master Plan. The assessment is planned to be done in conjunction with the City of Talent to share costs and focus on the shared TAP supply system.

RS-5: Seismic and Structural Analysis of Shop Reservoirs

A seismic and structural analysis of the Shop Reservoirs is recommended based on initial findings presented in **Appendix 4A**. The study will provide cost estimates for improving the resilience of the tanks, allowing the City to perform a cost-benefit analysis (RS-6).

RS-6: Cost-Benefit Analysis of Shop Reservoir Rehabilitation vs. New Reservoir

A cost-benefit analysis can be performed after RS-5 is completed. This analysis would compare rehabilitation of the Shop Reservoirs to abandoning the Shop Reservoirs and building a new reservoir elsewhere in the system (currently assumed as Project ST-1) and would help guide the City's decision-making on storage improvements.

SCHEDULE OF IMPROVEMENTS

The recommended projects were added to an implementation schedule that can be used by the City for preparing its CIP and annual water budget. The implementation schedule for the proposed improvements is shown in **Table 5-4**. As seen in the table, projects are allocated into Short-Term, Mid-Term, and Long-Term schedules. The Short-Term shows projects allocated annually for the next five years. The table also shows the calculated SDC eligibility and costs anticipated to be developer paid.

ADDITIONAL RECOMMENDATIONS

The following recommendations are non-capital improvements that have been identified during this plan for continued safe and reliable operation of the water system.

FUTURE SYSTEM EXPANSION

New NE BPS

Potential new customers at higher elevations in parts of PH-5 require higher pressures than can be provided from the existing water system. A new booster pump station will need to be provided when this area develops in the future. This project is anticipated to be fully funded by the developer of this area.

New Emergency Supply from Ashland through TAP

Phoenix is completely dependent on MWC for its water supply. Minor improvements to the existing connections between the City and Ashland could provide a new emergency supply from Ashland in case of an emergency/failure of the MWC supply. This project would involve coordination with Ashland and the City of Talent and will be addressed as part of an upcoming TAP Water Master Plan.

Table 5-4
Summary of Proposed CIP Projects

CATEGORY	PROJECT NO.	DESCRIPTION	TOTAL PROJECT COST	DEVELOPMENT COST SHARE ($)	CITY COST SHARE ($)	SCHEDULE FOR WATER SYSTEM IMPROVEMENTS							SDC ELIGIBILITY (%)	NOTES
						PLANNING PERIOD (YEARS)								
						SHORT-TERM					MID-TERM	LONG-TERM		
						2019	2020	2021	2022	2023	2024-2040	2040-2070		
Pipelines	P-1 through P-6	Fire Flow Improvements: Various low priority pipe improvements for increased fire flow criteria or future fire flow deficiencies. To be addressed as development occurs or as pipe needs replacement.	$2,101,000	$0	$2,101,000	$0	$0	$0	$0	$220,000	$0	$1,881,000	42%	SDC eligiibility assumes P-5 is 100% eligible. Assumes P-1 through P-4 and P-6 are 0% eligible.
	P-7	Annual AC Pipe Replacement: annual budget for pipe replacement and repair.	$7,650,000	$0	$7,650,000	$150,000	$150,000	$150,000	$150,000	$150,000	$2,400,000	$4,500,000	0%	$150,000/yr. Coordinate replacement projects with road construction or other projects in the area.
	T-1	Camp Baker Rd (from Tracy to Colver) Install 12-in DI pipe	$738,000	$0	$738,000				$738,000				0%	Provides system looping.
	T-2	Transmission Main Looping to PH-5 Install 12-in DI pipe	$3,346,000	$0	$3,346,000						$3,346,000		100%	Provides new piping to serve future growth areas both within City Limits and in URA. Piping near Home Depot on the northeast side of town. City to determine developer cost-share.
Storage	ST-1	New 3 MG Reservoir/Tank	$5,000,000	$0	$5,000,000						$5,000,000		38%	Provide new 3-MG storage tank (or alternatively, two 1.5-MG tanks). Assumes abandonment of Shop Tanks. Does not include property acquisition costs. City to determine developer cost-share.
Pump Stations	PS-1	Add larger fire pump to Skyline BPS to provide 1500 GPM fire flow	$125,000	$0	$125,000							$125,000	0%	Provide new fire pump when pump replacement is required on existing Skyline fire pump. Existing non-conforming.
	PS-2	New Upper Zone BPS	$699,000	$699,000	$0				$0				0%	For future growth. Projected higher elevation new customers on the east side of the city will need boosted water.
Supply	S-1	SCADA system mapping	$10,000	$0	$10,000	$10,000							47%	Assumed City cost.
	S-2	Update SCADA system	$100,000	$0	$100,000						$100,000		47%	Cost to be confirmed and shared with TAP.
	S-3	New Supply Connection from MWC in North Phoenix Rd	$2,000,000	$0	$2,000,000						$2,000,000		47%	To be further defined based on developer needs and discussions with MWC.
	S-4	Increase RBPS capacity	$200,000	$0	$200,000						$200,000		100%	Expansion of RBPS to meet City's 3.0 mgd allotment of TAP capacity. Cost to be shared with TAP and timing and costs to be determined as part of TAP Water Master Plan.
	S-5	Relocate TAP pipeline for ODOT bridge project in Phoenix	$100,000	$0	$100,000		$100,000						0%	Shared cost with TAP, TAP line must be relocated to accommodate ODOT bridge project (Coleman Creek Crossing) in Phoenix.
Recommended Studies	RS-1	City Water Master Plan Update (every 10 years)	$500,000	$0	$500,000						$200,000	$300,000	100%	$100,000 for each study
	RS-2	Water Management and Conservation Plan (every 5 years)	$100,000	$0	$100,000					$10,000	$30,000	$60,000	100%	$10,000 for each study (assumed WMCP is concurrent with WMP updates or is just a progress report)
	RS-3	TAP Water Master Plan Update (every 10 years)	$300,000	$0	$300,000	$50,000					$100,000	$150,000	47%	$50,000 for each study
	RS-4	System-Wide Seismic Resilience Assessment	$20,000	$0	$20,000	$20,000							47%	One-time study.
	RS-5	Seismic and Structural Analysis of Shop Reservoirs	$30,000	$0	$30,000			$30,000					0%	
	RS-6	Cost-Benefit Analysis comparing improvement of Shop Reservoirs to construction of a new reservoir	$15,000	$0	$15,000			$15,000					0%	
		CIP Total[1]	**$23,034,000**	**$699,000**	**$22,335,000**	**$230,000**	**$250,000**	**$195,000**	**$888,000**	**$380,000**	**$13,376,000**	**$7,016,000**		

1. Future costs are in 2018 dollars, no adjustment made for inflation.

Legend

- City Limits
- Existing Pump Station
- Proposed Pump Station
- Existing Reservoir/Tank
- Amerman PRV
- Existing Pipes
- P-1 through P-6 Proposed CIP Low Priority Fire Flow Improvements
- Proposed Transmission Main Improvement

T2

Proposed Upper Zone BPS

East Side Reservoir

Amerman PRV

Skyline Pump Station

Shop Reservoirs and Pump Station

T1

P1 P2 P3 P4 P5 P6

PHOENIX
NORTHRIDGE
OAK CREST
PACIFIC
KIRK
EXIT 24 OFF
EXIT 24 ON
BARNUM
QUAIL
ARANA
EMILY
DANO
CHERYL
FERN VALLEY
LUMAN
EXIT 24 OFF
COUNTRY HILL
MOUNTAIN VIEW
FURRY
FRESHWATER
ABBEY
GROVE
PHOENIX HILLS
MEADOW
INTERSTATE 5
BOLT
TWIN
5TH
MAIN
CHURCH
4TH
PINE
3RD
2ND
B
C
BEAR CREEK
PEAR TREE
HOUSTON
CALHOUN
CORAL
LOCKE
RHONDA
1ST
MAPLE
SHARON
HUNTLEY
HILSINGER
BENJAMIN
WALNUT
COREY
REBECCA
MEGAN
OAK
ELM
ALDER
AMERMAN
SKYLER
JARED
SAMUEL
COLVER
CAMP BAKER
CABBAGE

C:\USERS\HFARRIS\DESKTOP\FIG5-1_PROPOSEDCIPPROJECTS.MXD BY: HFARRIS PLOT DATE: JUL 1, 2020 COORDINATE SYSTEM: NAD 1983 STATEPLANE OREGON SOUTH FIPS 3602 FEET

RH2 NORTH

1 inch = 798 feet

0 205 410 820 Feet

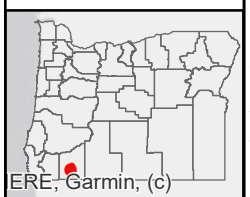
DRAWING IS FULL SCALE WHEN BAR MEASURES 1"

CITY OF PHOENIX OREGON

Figure 5-1
Proposed CIP Projects

City of Phoenix Water Master Plan

Vicinity Map



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Legend

- City Limits
- Urban Growth Boundary

Urban Reserves

- MD-5
- PH-1
- PH-10
- PH-1a
- PH-3
- PH-5
- Existing Pump Station
- Proposed Pump Station
- Existing Reservoir/Tank
- Proposed Reservoir/Tank
- Existing Supply
- Proposed Supply
- Amerman PRV
- Existing Pipes
- Future Pipes
- P-1 through P-6 Proposed CIP Low Priority Fire Flow Improvements
- Proposed Transmission Main Improvement

Existing MWC Supply Sources

Regional (TAP) Booster Pump Station

Experiment Station Road Pump Station

Proposed New MWC Supply Connection

Proposed 3-MG Reservoir

East Side Reservoir

Shop Reservoirs and Pump Station

S3 · ST1 · T2 · T1

MD-5 · PH-5 · PH-1a · PH-3 · PH-1 · PH-10

SPRINGBROOK RD · VALLEY VIEW DR · CANYON AV · SYCAMORE WY · CADET DR · LONE PINE RD · PANORAMA DR · EDGEVALE AV · RUBY DR · E MCANDREWS RD · CAMINA DR · PARK RIDGE DR · SATELLITE DR · GARDEN DR · BROOKDALE AV · N FOOTHILL RD · LAWNRIDGE ST · RIDGE WY · BRENTWOOD DR · PIERCE RD · SUNRISE AV · CAPITAL AV · JACKSON DR · TAMARACK DR · INNSBRUCK RG · MARIPOSA TR · FAIRVIEW DR · HILLCREST RD · RUHL WY · MAIN ST · HARVARD PL · STANFORD AV · PIEDMONT TR · SOUTHVIEW TR · CHERRY LN · S GROVELAND AV · S MODOC AV · WHITE OAK DR · BLACK OAK DR · WINDSOR AV · SUTTER AV · HAVANA AV · CALLE VISTA DR · SUNLEAF AVE · SECKEL ST · LAZY CREEK DR · ST BROOK RD · E BARNETT RD · MURPHY RD · PARKWAY DR · GOLF VIEW DR · HARBROOKE RD · CREEK VIEW DR · SUN OAKS DR · LA MIRADA DR · HERITAGE WY · ALAMEDA ST · ELLENDALE DR · JUANIPERO WY · LA LOMA DR · SHANNON DR · SKYLINE DR · TONIA CR · HONOR DR · COAL MINE RD · OAKMONT WY · CENTER DR · EXIT 27 NB ON · EXIT 27 SB ON · INTERSTATE 5 SB · INTERSTATE 5 NB · S PACIFIC HWY · STEWART AV · S PEACH ST · LOAL ST · S GRAPE ST · CHAR WY · HART AV · LILLIAN ST · KINGS HW · SHELDON AV · WHITMAN ST · GARFIELD ST · DOVE LN · MYERS LN · ANTON RD · PINNER LN · OWRY LN · AGATE ST · ARCHER DR · SHAFER LN · HAPPY VALLEY DR · MARSH LN · SOUTH STAGE RD · REED LN · STARLITE LN · SAMIKE DR · PHOENIX RD · CAMPBELL RD · SURREY DR · CARRIAGE DR · VOORHIES RD · HOYT LN · IRVING LN · CARPENTER HILL RD · BARNUM DR · DANOOR · FERNVALLEY RD · LUMAN RD · FRESHWATER DR · PEARTREE LN · MARIGOLD LN · COLEMAN CREEK RD · HOUSTON RD · CALHOUN RD · CAMP BAKER RD · SAMUEL LN · CABBAGE LN · HILSINGER RD · COLVER RD · PIONEER RD · OLD OX RD · TUCKER DR · OMAHA DR · DARK HOLLOW RD · WHITMORE AV · GRIFFIN CREEK RD · DEER TRAIL LN · HARTLEY RD · RTLEY LN

C:\USERS\HFARRIS\DESKTOP\FIG5-2_PROPOSEDCIPPROJECTS.MXD BY: HFARRIS PLOT DATE: JUL 1, 2020 COORDINATE SYSTEM: NAD 1983 STATEPLANE OREGON SOUTH FIPS 3602 FEET

RH2 · NORTH

1 inch = 2,500 feet

0 650 1,300 2,600 Feet

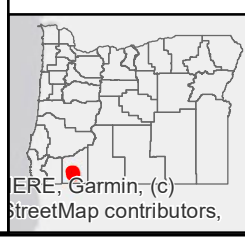
DRAWING IS FULL SCALE WHEN BAR MEASURES 1”

CITY OF PHOENIX OREGON

Figure 5-2
Proposed CIP Projects

City of Phoenix Water Master Plan

Vicinity Map



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6 FINANCIAL ANALYSIS

6 | FINANCIAL ANALYSIS

INTRODUCTION

The CIP identifies approximately $22.3 million in necessary water infrastructure improvements, of which approximately $15.3 million will be needed to serve existing customers and accommodate new growth over the next twenty years. Total costs in current (2018) dollars is shown in **Table 6-1**.

Table 6-1
Summary of Water Capital Costs

CIP Items	Total Est. Costs	Next 20 Yrs 2019-2040	2040+
Pipelines	$13,835,000	$7,454,000	$6,381,000
Storage	$5,000,000	$5,000,000	$0
Pump Stations	$125,000	$0	$125,000
Supply	$2,410,000	$2,410,000	$0
Studies	$965,000	$455,000	$510,000
Total Estimated CIP Costs	**$22,335,000**	**$15,319,000**	**$7,016,000**

This chapter presents a financial plan to support completion of the CIP for the next 20 years. Included in the CIP are infrastructure projects that will benefit both existing and future City water customers; as such, the financial plan includes calculated impacts on the City's water system development charges (SDCs), and impacts on water rates paid by existing customers. The chapter begins with a review of potential funding mechanisms to finance the CIP, and recommendations.

POTENTIAL FUNDING MECHANISMS

The City is eligible to apply for financial assistance from several State of Oregon and federal low-cost funding programs. The most favorable financing terms, and sometimes partial grant-funding or principal forgiveness, is available to Disadvantaged communities. Disadvantaged communities are those with a median household income lower than 80 percent of the State's median household income; a Severely Disadvantaged community has a median household income lower than 60 percent of the State. The 2017 5-year U.S. Census American Community Survey (ACS) estimates Phoenix's median household income is 70 percent of the State's, categorizing Phoenix as Disadvantaged. Even Disadvantaged communities however, must have water bills that are considered 'reasonable' to be eligible for the most advantageous terms. The level of what is considered reasonable, or above a certain affordability threshold, is different by funding agency.

Given the different criteria for best available funding by agency, it can be beneficial to attend a "one-stop" meeting with the funding agencies. Every month the funding agencies meet to discuss

applications for funding; the best terms may be made by combining offers from more than one agency.

The two most applicable State funding programs for Phoenix's CIP include the following:

Safe Drinking Water State Revolving Loan Fund (SDWRLF). The SDWRLF program is part of a national funding program spearheaded by the Environmental Protection Agency (EPA). Each year funds are disbursed to each state and states must capitalize the grants with additional funding, typically through the sales of state General Obligation bonds. Loans repayments also add to the pool of available funding. Typical loan terms are 20 years with interest rates as low as 60 percent of market rates. Disadvantaged communities may receive an interest rate as low as 1 percent and an extended term of 30 years. Ineligible projects include dams, water rights, raw water reservoirs, projects primarily for fire protection, and projects primarily to serve future population growth. Water systems may submit a letter of interest any time online to begin the loan process.

The program is managed by the Oregon Health Authority and the loans are managed by the Oregon Infrastructure Finance Authority (IFA).

Oregon Community Development Block Grant (CDBG). Another program administered by the State but funded federally is the Community Development Block Grant program. The U.S. Department of Housing and Urban Development provides funding for a variety of economic development related projects targeted to residential communities of low- to moderate-income. This is a grant-only program and it is competitive; water infrastructure projects compete with other infrastructure projects (roads, bridges for example) for funding. The maximum grant amount is $3 million. The program is managed by the Oregon Business Development Commission (OBDC) and the grants are managed by the IFA.

Other State and regional funding sources, less likely to be applicable for this CIP, but potentially for other projects in the future, include:

- Oregon Health Authority – the Drinking Water Source Protection Fund (DWSPF) and Sustainable Infrastructure Planning Projects (SIPP) programs
- OBDC – Special Public works Fund (SPWF) and Water Wastewater Financing (WWF)
- Oregon Association of Water Utilities – National Rural Water Association Revolving Loan Fund
- Oregon Water Resources Department – Water Supply Development Account grants and loans

The most applicable Federal funding program for Phoenix is:

USDA – Rural Development (RUS) Water Environmental Program. Communities with population under 10,000 are eligible to apply for loans and grants to construct, repair, or improve water facilities. An application can be made year-round using RD Apply online. The agency can

provide loan repayment periods up to 40 years and the interest rate (fixed for the loan life) track AA rated 20-year municipal bonds. The agency has poverty, intermediate, and market interest rates that are revised every quarter. The interest rate offered to an applicant is partially dependent on the income of the community. Applications for funding are scored on a points system which determines the loan terms, and amount of grant (if any), that can be offered.

Other Federal funding programs may also be applicable for water infrastructure in Talent; for example, the U.S. Economic Development Administration has public works grants available; however, matching funds are required. Funding possibilities for projects can be researched at grants.gov.

In addition to the above State and Federal financing programs, the City can issue bonds to finance projects that cannot be funded with available water rates, SDCs, and water fund cash reserves. Usually, cities finance improvements with the sale of general obligation bonds or revenue bonds. The primary difference between these two types of bonds is that general obligation bonds are backed by the full faith and credit of the city, meaning any discretionary revenues can be used to service debt, whereas revenue bonds are repayable solely by the water enterprise fund. There are advantages and disadvantages to each type of bond; of note, revenue bonds do not require voter approval (general obligation bonds do). Another type of financing often used is formation of a local improvement district (LID). An LID only provides funding for a project of benefit to a specific geographic area; the beneficiaries of the improvements pay assessments to either cash fund or make debt service payments for the infrastructure improvements.

CIP FUNDING PLAN RECOMMENDATIONS

All of the CIP, with the exception of projects T-1 (12-inch pipe installation on Camp Baker Road), ST-1 (new 3MG reservoir), and S-3 (new supply connection from Medford Water Commission in North Phoenix Road), can be paid for with water rates, use of reserves, and SDCs provided that water rates and SDCs are increased as outlined in this chapter. Note that projects T-2 (transmission main) and P-5 (pipeline replacement) are assumed to be improved after the year 2029.

The financing plan that is recommended, and presented in this chapter, based on the assumed need to complete all of the facilities in the CIP in the estimated timeframe they are needed, is to use cash (pay-as-you-go) as much as possible, and seek low cost financing to complete projects T-1, ST-1, and S-3. The financing plan presented in this chapter assumes that the City sells revenue bonds; however, lower cost options including the Oregon IFA and USDA RUS program, should be pursued as they would reduce financing costs. Alternative financing sources may be necessary if growth does not occur as projected.

If projected water rates and SDCs are not adopted, the City would either have to delay projects or seek loans and grants outlined above. It is recommended that as new development plans come forward from applicants that the City evaluate whether a developer contribution is warranted.

COST ALLOCATION

The water CIP costs were identified as either necessary to support existing customers or to accommodate new customers, or serve both customer groups. Infrastructure that supports both customer groups has costs allocated between existing users and new growth according to the approximate percentage of capacity estimated to be utilized by each group. Detailed tables listing the infrastructure projects and cost allocation are provided in **Appendix 6A Tables CIP-0** through **CIP-2**.

Table 6-2 summarizes the infrastructure costs by component of the water system. Approximately two-thirds of costs are for existing customers, with pipelines comprising the greatest cost component.

Costs allocated to existing customers will be recovered through monthly water charges. Costs allocated to future customers will be recovered through water SDCs.

Table 6-2
Allocation of Water Capital Costs

Infrastructure	Cost Allocation to Customers		Total
	Existing	Future	
Recovery	*Rates*	*SDCs*	
Pipelines	$9,611,000	$4,224,000	$13,835,000
Storage	$3,083,333	$1,916,667	$5,000,000
Pump Stations	$125,000	$0	$125,000
Supply	$1,211,030	$1,198,970	$2,410,000
Studies	$213,497	$751,503	$965,000
Total Estimated CIP Costs	**$14,243,861**	**$8,091,139**	**$22,335,000**
Share of Costs through 2040	*64%*	*36%*	*100%*

SYSTEM DEVELOPMENT CHARGES

One-time fees are collected from new development to mitigate capital costs associated with improving the water system to accommodate greater water demand. The City's authority to charge water SDCs is codified in Oregon Revised Statutes 223.297 – 223.314. The City uses the full extent of the law to collect two fee components in the water SDC. These include:

1. **Reimbursement Fee.** This fee component reimburses existing customers for providing up-front funding of facilities that will benefit future customers.
2. **Improvement Fee.** Costs to improve the water system to serve future customers are captured in this fee component. The costs of compliance-activities are also captured in this fee

component. Examples of compliance costs include water master plan updates and rate and fee studies to support capital expenditures.

GROWTH

Total growth assumed for purposes of the financial plan is the average of the low to average growth assumptions developed for the water master plan; approximately 30 new ERUs per year. One ERU is defined as the flow equivalent of a ⅝-inch by ¾-inch water meter. The City currently has 2,449 ERUs. Through buildout of the City, an additional 2,183 ERUs are anticipated. Growth estimates are shown in **Appendix 6B Table SDC-0**.

SDC CALCULATIONS

The fee calculations presented in **Appendix 6B Tables SDC-1** through **SDC-4** document the fee calculations. The SDC improvement fee is based on total cost of $8.1 million, which is the estimated total cost for only the portion of projects that are incurred for new development, as determined in the Master Plan CIP and summarized in **Table SDC-1**. The calculated improvement fee is $5,417 per ERU, as shown in **Table SDC-2**. The SDC reimbursement fee is based on the net book value of the City's water assets, including the original cost of water rights, less outstanding principal for projects that were debt-financed, which totals $2.3 million. The water system is currently 71 percent used; therefore, 31 percent of this cost ($670,197) is included in the reimbursement fee calculation. The calculated reimbursement fee is $307 per ERU, as shown in **Table SDC-3**. Fee components and the total fee per ERU and for larger meter sizes is shown in **Table SDC-4**.

The total new calculated water SDC fee is $5,724 for one ERU (or one ⅝-inch by ¾-inch meter),

Using the City's current methodology to establish the water SDC for larger meter sizes results in much higher fees for customers than use of the American Water Works Association meter ratios. The difference in calculated fees under the two different sets of meter ratios is shown in **Table 6-3**.

Table 6-3
Calculated SDC Fee by Meter Size

Meter Size	Current	Estimated New	
		City Ratios	AWWA Ratios
5/8" x 3/4"	$3,602	$5,724	$5,724
1"	$16,313	$25,925	$14,309
1.5"	$32,626	$51,849	$28,618
2"	$52,201	$82,959	$45,789
3"	$104,402	$165,917	$91,577
4"	$163,128	$259,246	$143,089
6"	$326,255	$518,491	$286,179
8"	$522,008	$829,585	$457,886
10"	$815,638	$1,296,228	$658,211

Source: City of Phoenix and HEC.

WATER SDC RECOMMENDATIONS

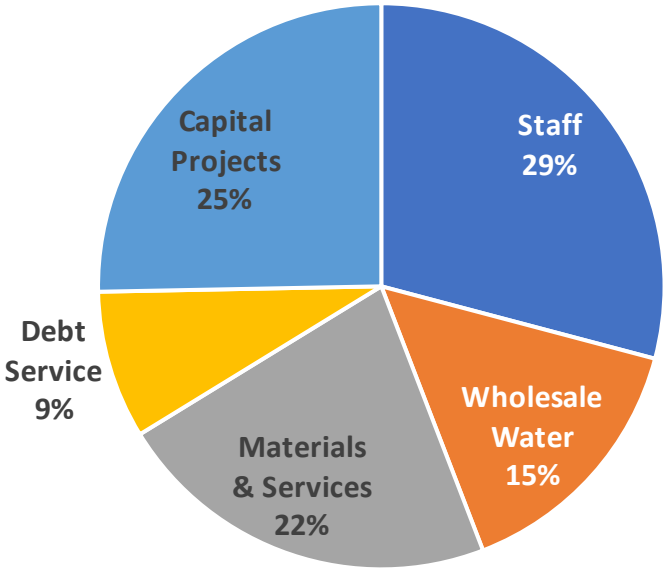
It is recommended that the City:

1. Update and increase the water SDC fee schedule so that growth pays for itself and existing customers only provide minimal assistance, if any, for up-front financing of new water infrastructure.
2. Update the City's meter ratios used to calculate water SDCs to minimize the fee increase impact on customers with larger meter sizes. For example, the City could use AWWA ratios for meters larger than 3-inch, or it could use the same formula as the Medford Water Commission for water meters larger than 3-inch. The City currently only has one meter (out of a total 1,479 meters) on its system that is larger than 3-inch and is unlikely to see a substantial increase in the number of larger sized meters.

WATER RATES

Monthly fees paid by existing customers are also termed water rates. Water rates pay for the annual revenue requirement of the water enterprise which includes typical operating costs (personnel, utilities, materials and services, for example), wholesale water purchases, and debt service, as well as capital costs in the CIP that benefit existing customers. **Figure 6-1** shows the breakdown of the City's fiscal year 2019 adopted water enterprise fund expenses. The largest cost components of the water system are personnel (29 percent of total expenses with benefits included), capital projects, and materials and services costs.

Figure 6-1
Water Enterprise Fund Annual Expenses



Water rates are paid monthly by more than 1,400 customers, of which more than 80 percent are single family residential customers. Other customers include multi-family residential, senior housing, mobile homes and RV parks, as well as irrigation, industrial, commercial, and educational/government customers.

REVENUE REQUIREMENT

The revenue requirement was projected for the next 10 years to account for anticipated CIP expenditures and increased annual operating costs using the fiscal year 2019 budget as the base year. A summary of the past six years of revenues and expenditures is provided in **Table 6-4.** In most years, revenues have covered expenses of the water fund. Capital costs are paid for out of the water capital fund. The transfers out of the operating fund are for capital costs.

Table 6-4
Water Fund Revenues and Expenses

Water Fund	Fiscal Year Ending 2013	2014	2015	2016	2017	2018	Avg. % Change
OPERATING FUND							
Operating Revenues							
Charges for Services	$1,135,250	$1,182,630	$1,178,540	$1,254,253	$1,252,507	$1,331,137	3.2%
Franchise Fees	$18,237	$18,155	$17,455	$15,238	$10,943	$27,615	8.7%
Miscellaneous	$2,828	$192	$204,115	$14,729	$40,145	$6,077	16.5%
Subtotal Operating Revenues	**$1,156,315**	**$1,200,977**	**$1,400,110**	**$1,284,220**	**$1,303,595**	**$1,364,829**	3.4%
Operating Expenses							
Personal Services	$325,396	$340,083	$387,173	$398,666	$378,543	$412,208	4.8%
Capital Outlay	$32,199	$310,912		$10,837	$0	$0	n.a.
Materials and Services [1]	$512,600	$481,843	$577,934	$510,763	$522,789	$497,843	-0.6%
Subtotal Operating Expenses	**$870,195**	**$1,132,838**	**$965,107**	**$920,266**	**$901,332**	**$910,051**	**0.9%**
Debt Service	($134,160)	($134,160)	($2,003,358)	($131,052)	($130,788)	($129,878)	
Refunding Bond Proceeds			$1,929,919				
Transfers In	$25,725	$25,725	$25,725	$177,240	$25,725	$0	
Transfers Out	$0		($751,457)	($167,283)	($183,296)	($274,275)	
Net Operating Fund Capital	**$177,685**	**($40,296)**	**($364,168)**	**$242,859**	**$113,904**	**$50,625**	

Source: City of Phoenix financial reports. hist

[1] Includes wholesale water purchases.

Staffing costs are projected to increase annually 5.0 percent, and materials and supplies 2.0 percent per year. Wholesale water purchases are increased pursuant to the Medford Water Commission's projection through fiscal year 2023 and increased 3.5 percent annually each year thereafter. Collection for system rehabilitation is also included in the revenue requirement; however, it is applied to the capital improvements plan.

The City currently has debt service for Lost Creek storage that will continue through fiscal year 2032, and water revenue bonds with debt service that will continue through fiscal year 2037. Before either of these debts are repaid, the financing strategy includes additional debt to complete project T-1 (12-inch pipe installation on Camp Baker Road) in fiscal year 2022. The additional debt service associated with this project is estimated at $80,700 per year assuming a revenue bond amortized over 20 years at an interest rate of 5.75 percent. It is estimated that debt service payments would begin in fiscal year 2023.

Projects ST-1 and S-3 will most likely also need to be debt-financed. The timing of these improvements is less certain; ideally, they would be completed after the City's existing debt service has retired, which would allow for construction in calendar year 2037. Any excess cash in the water

fund prior to commencement of these projects could be deposited into a designated fund. In the financial analysis presented, $800,000 is collected by the end of fiscal year 2027; this amount is deducted from the total amount debt-funded. Debt service is estimated at $833,000 per year, assuming a revenue bond amortized over 20 years at an interest rate of 5.75 percent. In the model, debt service payments would begin in fiscal year 2029. Of the total debt service, 45 percent would be due from water SDC collections. If insufficient revenues were available from the water SDC fund however, the entire debt service would have to be borne by the water fund. For this reason, it is important that the water fund have a strong debt service coverage ratio.

The projected revenue requirement is presented in **Table 6-5**. Supporting tables are included in **Appendix 6C Table R-0** through **Table R-2**.

Table 6-5

Projected Revenue Requirement

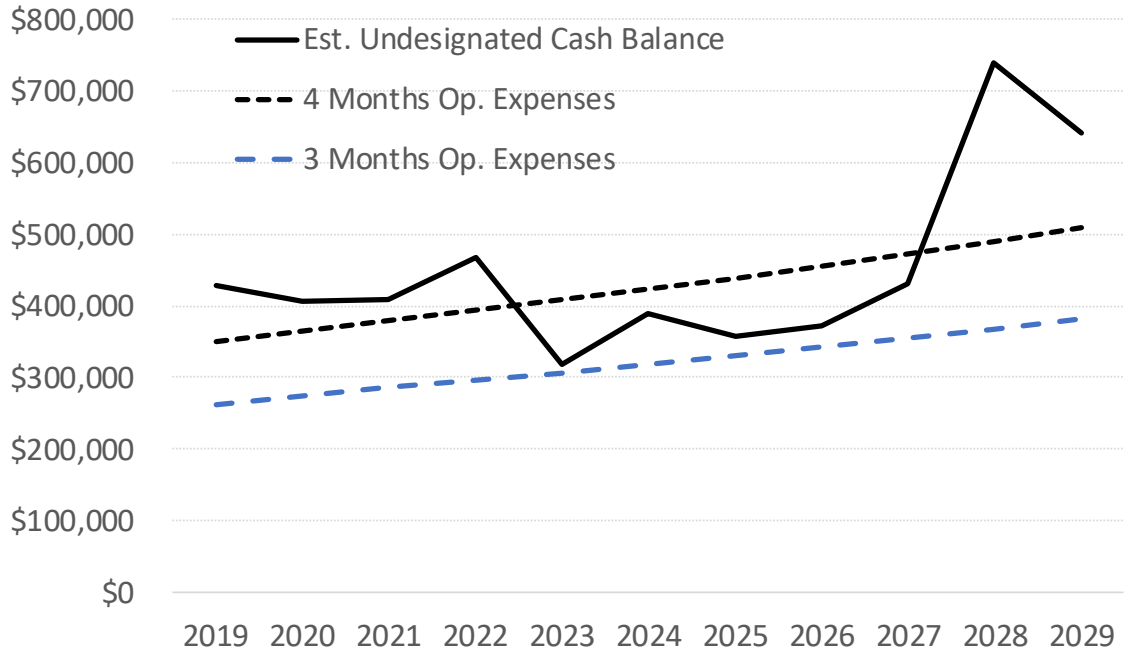
Expenses	Base	Year 1	Year 2	Year 3	Year 6	Year 10
Personal Services	$460,320	$483,336	$507,503	$532,878	$616,873	$749,813
Water Purchases from MWC	$237,600	$256,608	$269,438	$278,330	$307,993	$353,429
Materials and Services	$349,150	$356,133	$363,256	$370,521	$393,200	$425,612
Debt Service [1]	$133,643	$132,343	$131,043	$134,343	$213,668	$670,767
Capital Outlay	$400,000	$257,500	$206,876	$163,909	$186,967	$210,433
Total Expenses	**$1,580,713**	**$1,485,920**	**$1,478,115**	**$1,479,981**	**$1,718,700**	**$2,410,053**
Credits	($15,022)	($15,322)	($15,629)	($15,941)	($16,917)	($18,312)
Revenue Requirement	**$1,565,691**	**$1,470,598**	**$1,462,486**	**$1,464,039**	**$1,701,783**	**$2,391,742**
Amount Collected in Rates	$1,375,992	$1,448,231	$1,524,264	$1,604,287	$1,870,460	$2,295,287

[1] Excludes portion of debt-service payable by water SDC revenues.

To avoid spikes in rate increases, the financial analysis increases the amount collected in water rates by 5.25 percent each year. The total amount collected in rates may be greater or less than the projected revenue requirement for any year; reserves will be used in years that revenue collection is less than actual expenses. In years of excess collection, cash may be deposited in the designated fund for projects ST-1 and S-3 or held in reserve for a future year with less revenues than expenses. **Figure 6-2** shows the projected cash balance of the water fund with increases in rates presented in this chapter, ensuring the cash balance is maintained at least at three months of operating expenses.

Support tables showing detail of the projected cash balance of the water fund, capital water fund and water SDC fund are provided in **Appendix 6C, Tables R-3** and **R-4**. The cash in the SDC fund should deliberately keep increasing because the financial model assumes that SDC revenues pay for new development's share of debt service for projects ST-1 and S-3. The cash balance will quickly be depleted once the SDC fund has to pay debt service.

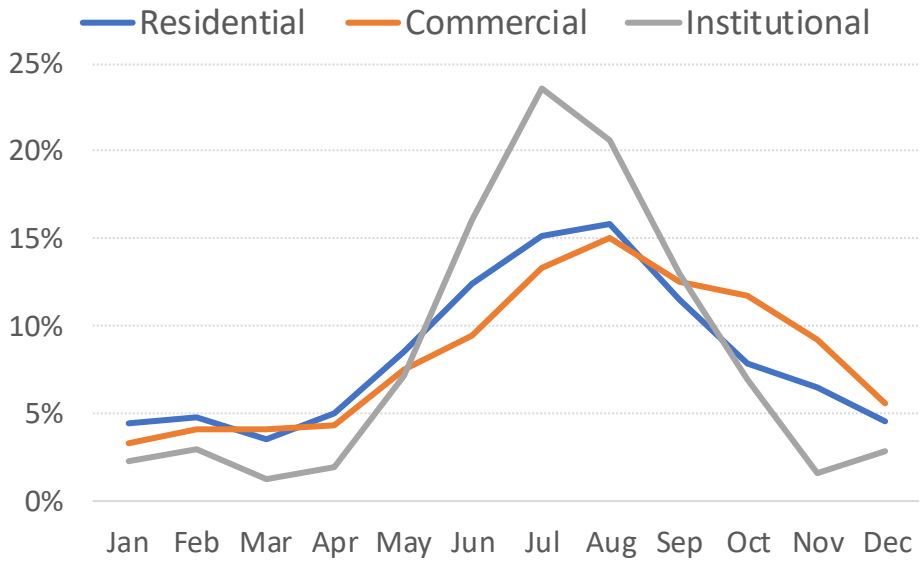
Figure 6-2
Projected Water Fund Cash Balance



RATE STRUCTURE OPTIONS

As part of the financial analysis, water use patterns were analyzed using City metered water use data. **Figure 6-3** illustrates the peak water use pattern, particularly of institutional customers that irrigate heavily during the summer season. The water use pattern indicates a need to reduce summertime water use and to encourage plantings during the spring and fall months.

Figure 6-3
Water Use Patterns using 2018 Metered Water Use Data



Two rate structure options were modeled to achieve the goal of reducing summertime water use. Under Option A there is no major change to the existing rate structure; however, water in tier 4 (when use in a month exceeds 50,000 gallons) becomes more expensive. Under Option B a peak/ off-peak (seasonal) pricing structure is employed. Tier 2 water use (all water use between 5,000 gallons and 10,000 gallons in a month) is the same price during the peak months (May through September) as all water use greater than 5,000 gallons per month during the off-peak months (October through April). Tier 3 and Tier 4 water use is more expensive during the peak months than under Option A. The seasonal rate structure provides the most incentive for people to use water during the off-peak months yet reduce their historical water use during the peak months.

The calculated water rates under both rate structures are presented in **Table 6-6** for the first three years, year six, and year ten of the projection**.** Supporting tables for the analysis are provided in **Appendix 6C, Tables R-5** through **R-11.**

Table 6-6
Calculated Water Rates

Water Rates	Current	Year 1	Year 2	Year 3	Year 6	Year 10
Monthly Base	$37.21	$37.55	$39.05	$40.61	$45.68	$53.44
Use Charges	**OPTION A: SMALL CHANGE TO CURRENT STRUCTURE**					
Tier 1: Up to 5,000 galls	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Tier 2: 5,001 to 10,000 galls	$2.05	$2.00	$2.08	$2.16	$2.44	$2.85
Tier 3: 10,001 to 50,000 galls	$2.53	$2.50	$2.60	$2.71	$3.04	$3.56
Tier 4: > 50,000 galls	$2.67	$2.80	$2.91	$3.03	$3.41	$3.99
Use Charges	**OPTION B: SEASONAL RATE STRUCTURE**					
Off Peak (Oct-Apr)						
Tier 1: Up to 5,000 galls		$0.00	$0.00	$0.00	$0.00	$0.00
Tier 2: > 5,000 galls		$2.05	$2.13	$2.21	$2.49	$2.91
Peak (May-Sep)						
Tier 1: Up to 5,000 galls		$0.00	$0.00	$0.00	$0.00	$0.00
Tier 2: 5,001 - 10,000 galls		$2.05	$2.13	$2.21	$2.49	$2.91
Tier 3: 10,001 to 50,000 galls		$2.76	$2.87	$2.99	$3.36	$3.93
Tier 4: > 50,000 galls		$3.07	$3.19	$3.32	$3.74	$4.37

BILL IMPACTS

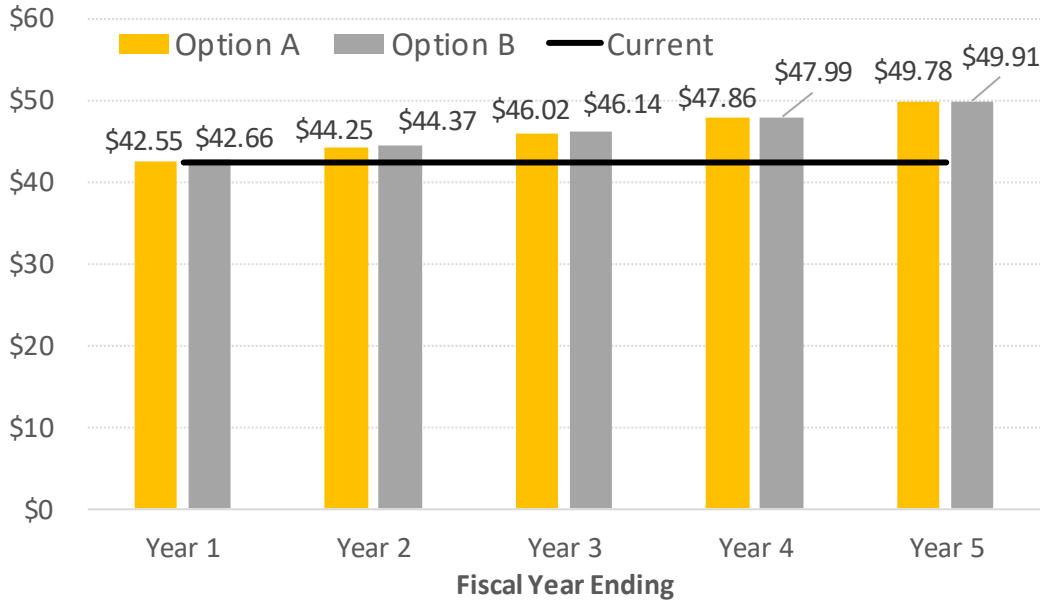
The State of Oregon has an affordability rate of 1.25 percent of area median household income for water bills (using 7,500 gallons in a month). In order to receive preferable financing terms and/or grant funding, the water bill needs to be at least $41.19 when using 7,500 gallons in a month in Phoenix. Currently, the water bill is $42.34 (about 1.28 percent of area median household income). The State uses the last decennial U.S. Census data and adjusts each year to determine the current area median household income. The estimate of area median household income used in this analysis is the 2017 5-year ACS figure for Phoenix.

The total water bill for a residential customer using 7,500 gallons in a month would increase from $42.34 to $42.55 the first year of the rate increase and increase to $49.78 over five years under Option A. Under Option B, the bill would increase to $49.91 in five years.

At 7,500 gallons, approximately 88 percent of the water bill is the base charge, which is the flat-fee portion of the bill charged according to the size of the customer's water meter, and 22 percent use charges, which is a variable fee depending on the amount of water used by the customer in the month. The projected bill impacts are illustrated in **Figure 6-4**.

Appendix 6C Table R-12 shows the impact of the two rate structures at different levels of water use under both rate structures. The impact of the different rate structures becomes more noticeable at higher levels of water use; however, higher levels of water use during the off-peak period would pay less under Option B than under Option A.

Figure 6-4
Projected Bill Impact Residential Customer with ⅝" x ¾" Meter and 7,500 Gallons



WATER RATES RECOMMENDATIONS

It is recommended that the City:

1. Minimize the need for borrowing or sale of bonds to fund water infrastructure by strategically timing commencement of projects and by raising SDCs and rates sufficiently in advance of the need to start commencement of projects.

2. Plan for a rate increase fiscal year 2019/20 to avoid drawing on reserves, as is anticipated will be necessary for fiscal year 2018/19.

3. Consider changing to a seasonal rate structure (Option B presented in this chapter) to encourage water use during low-cost months October through April, and discourage water use during the peak months when MWC rates are also greater. At a minimum, it is recommended the City move to Option A, which increases the cost of water in the highest tier, when water use is more than 50,000 gallons in a month. Water facilities are sized to handle peak demands; if customer peaking factors are reduced, new infrastructure may be delayed or not needed, which provides a cost savings to all water customers.

4. Review available cash in the water fund annually for planned capital expenditures and adjust SDCs and rates as necessary.
5. Maintain reserves of at least 3 to 4 months of operating expenses for unforeseen costs, revenue shortfalls due to drought, emergency repairs, and so forth.
6. Establish a new designated fund for projects ST-1 and S-3. In years that cash reserves are greater than three months of operating expenses, deposit excess cash into the designated fund. In addition, if possible, delay these projects until the Lost Creek and current water revenue bond debts are retired in fiscal year ending 2037.

APPENDIX 1A –

MEDFORD WATER COMMISSION WHOLESALE WATER SERVICE AGREEMENT

WHOLESALE WATER SERVICE AGREEMENT

THIS WATER SERVICE AGREEMENT (Agreement), made and entered in duplicate to commence on the first day of October, **2016**, between the City of Phoenix, a municipal corporation of the State of Oregon, acting as purchaser (Phoenix), and the City of Medford, a municipal corporation of the State of Oregon, acting by and through its Board of Water Commissioners, acting as vendor (MWC), together referred to as the Parties.

RECITALS:

1) MWC is an entity established under the Home Rule Charter (Charter) adopted by the citizens of the City of Medford, comprised of five citizens appointed by the Mayor and confirmed by the City Council, to manage the Water Fund for the purpose of supplying inhabitants of the City of Medford with water; and

2) Under Section 19 of the Charter, the MWC is authorized to sell water and/or supply facilities outside the legal boundaries of the City of Medford, only if said water and/or supply facilities are surplus to the needs of the inhabitants of the City of Medford, and meet certain conditions of MWC Resolution No. 1058; and

3) Under the Charter, the MWC is authorized to set rates for City of Medford inhabitants, and to make all necessary rules and regulations for the sale, disposition and use of water and water service from the City of Medford water system, and the MWC has adopted such rules and regulations; and

4) Per the MWC's projections, reports and plans, the MWC finds it has surplus water and supply facilities capacity available in its system to serve Phoenix; and

5) Phoenix desires to purchase surplus treated and transported water from MWC from October through April, and purchase surplus supply facilities treatment and transport services for Phoenix's own water appropriated under Phoenix's own state-issued water rights from May through September;

NOW, THEREFORE, for and in consideration of the foregoing and of the mutual promises herein, the Parties mutually agree as follows:

AGREEMENT:

ARTICLE 1. SCOPE OF SURPLUS WATER SUPPLY AND SERVICE

Subject to Article 3 of this Agreement, MWC agrees to supply surplus water up to a combined (from all connections) maximum of **440** gallons per minute (GPM) for the months of October through April, and surplus facilities capacity to treat and transport water up to a combined (from all connections) maximum of **1190** GPM for the months of May through September. Phoenix agrees to provide sufficient water storage as part of its water system to assure that the maximum rate of withdrawal in GPM by Phoenix is not exceeded.

During the 5 year term of this agreement the following conditions will be complied with: The above flow rates will not be exceeded between the hours of 5 am and 11 am. During all other hours the maximum flow rate will not exceed 1600 gallons per minute (GPM) in the summer and 1300 gallons per minute (GPM) in the winter. Measurement of total flow rates for the three TAP entities (Talent, Ashland, and Phoenix) will be based on the accumulative summation of the reading of the joint TAP meter at the TAP pump station on Samike Drive and the reading of the 2nd Phoenix meter at Garfield and Kings Highway Medford, Oregon. Notwithstanding the foregoing, in the event this agreement is renewed in October 2021, the maximum flow rates specified in this article may be recalculated by MWC based on future total source supply and future 2020 maximum month demand percentages, and such flow rates will be required over an entire 24 hour period.

Upon written request by Phoenix, this Agreement may be amended to provide supplemental supply and service to Phoenix if MWC determines that it has surplus capacity for Phoenix's use, and Phoenix agrees to reimburse MWC the reasonable cost of providing such supplemental supply and service.

ARTICLE 2. PHOENIX DISTRIBUTION SYSTEM EMERGENCY

Upon notice to MWC by Phoenix of a distribution system emergency, MWC will use its best efforts to provide supplemental water supply or services during the emergency.

For purpose of this agreement, "distribution system emergency" means: Any human or natural caused event that disables or impairs the distribution system such that its use constitutes an immediate threat to human life or health.

ARTICLE 3. MWC CONNECTIONS

MWC owns and is responsible for the construction, extension, maintenance, and operation of the MWC system up to the point of and including the master Phoenix meter(s). Phoenix shall

pay all costs of connections to the MWC system including initial metering, initial and ongoing backflow protection, and annual testing of the backflow device, all in accordance with MWC standards. MWC shall monthly read and annually test the master meter and provide readings and test results to Phoenix.

Phoenix's water supply is provided by the following master meter(s) with backflow connections to MWC:

- 10" Rosemount Spool Mag Meter at the Talent-Ashland-Phoenix (TAP) Pump Station on Samike Drive, Medford, Oregon
- 6" Turbine Meter at the intersection of Kings Highway and Garfield Street, Medford, Oregon

Temporary emergency connections to MWC with prior approval can be provided at the following location(s):

N/A

The following special conditions concerning connections to MWC apply:

- MWC acknowledges Phoenix's right to exchange and transfer water between the cities of Ashland, Talent, and Phoenix, Oregon within the total cumulative contracted GPM of all three noted cities served through TAP and their individual wholesale customer agreements with MWC.

ARTICLE 4. MWC REGULATIONS

Water service under this Agreement shall be in accordance with Section 30 SURPLUS WATER and Section 31 PROVISIONS RELATING TO UTILITY AND MUNICIPAL CUSTOMERS of the MWC Regulations Governing Water Service (Regulations), as now in effect or as may be amended. If there is any inconsistency between this Agreement and the Regulations, the Regulations control. Notwithstanding the foregoing, nothing herein is intended to relieve MWC of its obligation to supply surplus water in accordance with the terms of this Agreement, except as dictated by Federal/State regulations outside the control of MWC. The Parties acknowledge that implementation of this Agreement and the Regulations are subject to federal or state directives.

MWC shall promptly provide Phoenix a copy of any amendments to the Regulations.

ARTICLE 5. URBANIZATION POLICY

Phoenix agrees to provide water and services to customers within Phoenix city limits, or as otherwise approved by MWC in MWC Resolution No. 1058, as may be amended. Phoenix may provide water and services outside of city limits, but within its urban growth boundary, provided that the property requesting service has signed an irrevocable consent to annex to Phoenix, or as otherwise approved in writing by MWC. The current general water service map covering city limits and urban growth boundaries for Phoenix is attached to this Agreement as Exhibit A. Phoenix shall promptly notify MWC and provide a revised map as city limits and urban growth boundaries are modified.

ARTICLE 6. MEETING FUTURE WATER DEMANDS

Water and water services provided by MWC under this Agreement are pursuant to water rights held by the MWC and Phoenix. Nothing in this Agreement shall be construed to confer upon either party a legal or beneficial interest in each other's water rights, or to prevent either party from seeking additions or alterations to their water rights as deemed necessary.

Phoenix shall acquire and maintain such water rights as needed to meet the demand within its service area during the months of May through September. Phoenix may use the MWC intake facility, located at the intersection of Table Rock Road and the Rogue River in White City, as the designated point of diversion for Phoenix water rights. MWC shall cooperate in the perfection of any Phoenix water rights. Phoenix currently holds water rights with a diversion point on the Rogue River at the MWC Intake Facility site at the rate of **8.1** cubic feet per second and/or volume of **1000** acre feet. Delivery of such Phoenix water through MWC facilities shall be subject to the same terms and conditions as delivery of surplus MWC water. MWC shall measure and record at its Robert A. Duff Water Treatment Plant the amount of water withdrawn from the Rogue River by MWC and its municipal water service customers under each of their respective water rights. In its monthly water service invoice, MWC shall provide water use data for Phoenix. Phoenix shall provide MWC updated demand projections.

ARTICLE 7. SYSTEM DEVELOPMENT CHARGES

Pursuant to Resolution No. 774, MWC has established Water System Development Charges (SDCs) and supporting methodology to finance future MWC transmission and treatment facilities expansions. SDCs apply to all new customers, including customers of municipal wholesale customers served by MWC. Phoenix shall collect SDCs set by MWC from new Phoenix customers. MWC reviews the SDCs annually and reserves the right, in its sole

discretion, to modify or replace the SDCs with a different financing mechanism for system improvements.

All SDCs collected by Phoenix will be held in a separate account and forwarded to MWC along with an accounting of the number and sizes of the services installed. Phoenix shall provide MWC with a copy of the section within the annual Phoenix audit that shows accounting of MWC SDCs collected during the audited year. MWC shall, in turn, provide Phoenix an annual accounting of all SDCs collected.

MWC utilizes a utility basis for determining the water usage rate it charges Phoenix. Under this rate analysis, Phoenix is required to pay a return on investment for its share of the facilities paid for by MWC. Facilities funded by SDCs shall not be included in the return on investment portion of the rate analysis.

MWC shall render technical assistance to Phoenix in determining SDCs. MWC shall defend Phoenix against any legal action or appeals which may arise over the development, methodology, or implementation of the SDCs. Phoenix shall cooperate and support MWC in the defense, but shall not be obligated to incur any monetary obligation in such defense.

Upon termination of this Agreement, the following refund policy shall apply:

(a) MWC shall return to Phoenix its prorated share of the unexpended balance of the SDCs fund. This prorated share shall be based upon the actual unexpended SDCs collected by Phoenix for the specific facilities funded by the SDCs, plus the interest earned.

(b) MWC shall return to Phoenix a prorated share of the depreciated plant value of the specific MWC facilities funded by the SDCs and already installed. The prorated share shall be a percentage based upon the total amount of SDCs paid by Phoenix divided by the total SDCs collected and used to fund the facility, not including interest earned during the years in which the SDCs were collected.

(c) In order to avoid a financial hardship, MWC shall develop a reasonable schedule of up to five (5) years for repayment of the depreciated value of the specific MWC facilities funded by the SDCs.

(d) At the request of Phoenix, the MWC shall provide an accounting of the refunds made pursuant to this section.

ARTICLE 8. PAYMENTS TO MWC

Phoenix shall pay monthly for all water and services provided by MWC at MWC's scheduled wholesale rates then in place. Payment shall be made within ten (10) days after the meeting of the Phoenix's Council following receipt by Phoenix of a statement of charges from MWC.

MWC reserves the right, in its sole discretion, to change (with prior written notification of a rate study review) said rate at any time upon sixty (60) days written notice to Phoenix, following rate procedures and protocols in the MWC Regulations.

ARTICLE 9. TERM OF AGREEMENT

This term of this Agreement shall be five (5) years from its commencement. Phoenix may, at its option, extend the term for three additional five-year periods, which periods would run through October of **2026**, **2031**, and **2036** respectively. Extensions shall be subject to the same terms and conditions as this Agreement. Written notice of the election to exercise a five-year extension of this Agreement must be given to MWC not later than January 1st of the year in which the Agreement would otherwise expire. If Phoenix fails to provide MWC such notice, this Agreement shall be deemed canceled at the end of the term then in effect. MWC shall continue service for a reasonable period, determined in MWC's sole discretion, to allow Phoenix to secure other sources of water. Provided, however, Section 19 of the Charter of the City of Medford limits the term of water service contracts to 20 years and, therefore, the obligations of MWC under this Agreement, including renewal periods, shall not exceed that period of time.

ARTICLE 10. ASSIGNMENTS

Phoenix shall make no assignment of this Agreement without written permission from MWC. Any approved assignee or successor shall agree to be bound by the terms and conditions of this Agreement.

ARTICLE 11. WATER CURTAILMENT PLAN

During periods of drought or emergency, Phoenix shall be subject to the MWC Water Curtailment Plan, per MWC Resolution No. 1345, unless Phoenix has in effect a state-approved and adopted Water Curtailment Plan at least as stringent as that of MWC. In the event of a conflict between the Phoenix plan and the MWC plan, the MWC plan shall control. The MWC shall give Phoenix as much advance warning as possible prior to curtailment of water supplies.

The level of curtailment shall be determined by MWC based on the severity of the anticipated shortage. Phoenix shall be responsible for enforcing the MWC curtailment plan or the above mentioned Phoenix plan in its service area.

MWC will require and apply emergency curtailment of water use in an equitable, fair, and consistent manner consistent with Resolution 1345. Continued service during periods of emergency shall neither be construed as a waiver nor limitation of any kind on any water rights held by MWC, or a waiver or curtailment of any water rights held by Phoenix, nor as affecting any other terms in this Agreement.

ARTICLE 12. ANNUAL WATER QUALITY REPORTING

MWC will gather annual water quality data and prepare informational reports as required under state Consumer Confidence Reporting (CCR) rules. These CCR reports will include water quality information for MWC and all participating municipal water customers. Annual costs involved will be proportionally shared among participating municipal water customers and billed separately to each.

Statistical data necessary to create the CCR report for the prior year must be provided by Phoenix to MWC no later than April 1st of each year. If bulk mailing is the primary distribution method utilized, Phoenix shall also provide MWC with postal routes covering their respective service areas by April 1st of the delivery year. MWC reserves the right to utilize other approved delivery methods (e.g.; electronic), which may impact responsibilities for Phoenix.

In the event that Phoenix receives water into its system that is supplied by an entity other than MWC, the composite MWC report for that year will not include data for Phoenix. Phoenix shall be responsible for preparation of its own annual CCR, and MWC will provide MWC data by April 1st of the delivery year.

MWC maintains water quality test points throughout the MWC system and one specifically at the master meter location(s) of Phoenix. These test points are used to collect water samples for meeting required state water quality parameters on a weekly, monthly, and annual basis. All information collected is of public record and is accessible through state or MWC databases. Responsibility for water quality is transferred to Phoenix at the point of the master meter location(s), except where water quality problems are attributable to MWC.

ARTICLE 13. MUTUAL INDEMNITY

To the extent allowed by law, Phoenix and MWC shall each defend, indemnify and hold the other, and their officers, employees, and agents harmless from any and all claims, suits, actions, or losses arising solely out of the acts and omissions of the Party's own officers, employees, or agents while acting under this agreement.

ARTICLE 14. PARTIAL INVALIDITY

If any term, covenant, condition, or provision of this Agreement is found by a court of competent jurisdiction to be invalid, void, or unenforceable, the remainder of the provisions hereof shall remain in force and effect, and shall in no way be affected, impaired, or invalidated thereby.

ARTICLE 15. INTEGRATION

This Agreement represents the entire understanding of MWC and Phoenix as to those matters contained herein. No prior oral or written understanding shall be of any force or effect with respect to those matters covered herein. This Agreement may not be modified or altered except in writing signed by both parties.

ARTICLE 16. DEFAULT

For purposes of this Agreement "default" means failure to comply with any of the terms of this Agreement. If either party determines that a default has occurred, it shall provide the other party written notice of the default, which such party shall have thirty days in which (a) to cure the default, (b) show that the default is of such a nature that it cannot be reasonably cured within thirty days, or (c) show that no default occurred.

MWC and Phoenix will work in good faith to amicably resolve the default. If after thirty days of the notice of default, MWC determines, in its sole discretion, that Phoenix is unable or unwilling to cure the default within a reasonable time, MWC may impose escalating penalties as follows: (a) ten percent surcharge for a period of thirty days; (b) twenty percent surcharge for the next thirty days; and (c) termination of this Agreement. Such penalties are in addition to any other remedies at law or equity that may be available to MWC. Failure to issue notice of default or to enforce its remedies under this Article 16 shall not preclude MWC from taking such action for future defaults.

If after thirty days, Phoenix determines, in its sole discretion, that MWC is unable or unwilling to cure the default within a reasonable time, Phoenix may terminate this Agreement and pursue any other remedies at law or in equity that may be available to Phoenix.

ARTICLE 17. FORCE MAJEURE

Neither party hereto shall be liable for delays in performance under this Agreement by reason of fires, floods, earthquakes, acts of God, wars, strikes, embargoes, necessary plant repairs or replacement of equipment, of any other cause whatsoever beyond the control of such party, whether similar or dissimilar to the causes herein enumerated. This clause does not include causes related to water supply and demand planning or failure to engage in such planning.

ARTICLE 18. DISPUTE RESOLUTION

If a dispute arises out of or relates to this contract, and if the dispute cannot be settled through negotiation, the parties agree first to try to settle the dispute by non-binding mediation before resorting to litigation or other process. The parties agree to share equally the costs of mediation.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be signed by their proper officers on the dates noted below.

THE CITY OF MEDFORD
BY AND THROUGH ITS
BOARD OF WATER COMMISSIONERS

Leigh Johnson, Chair

Karen Spoonts, City Recorder

October 5, 2016
Date

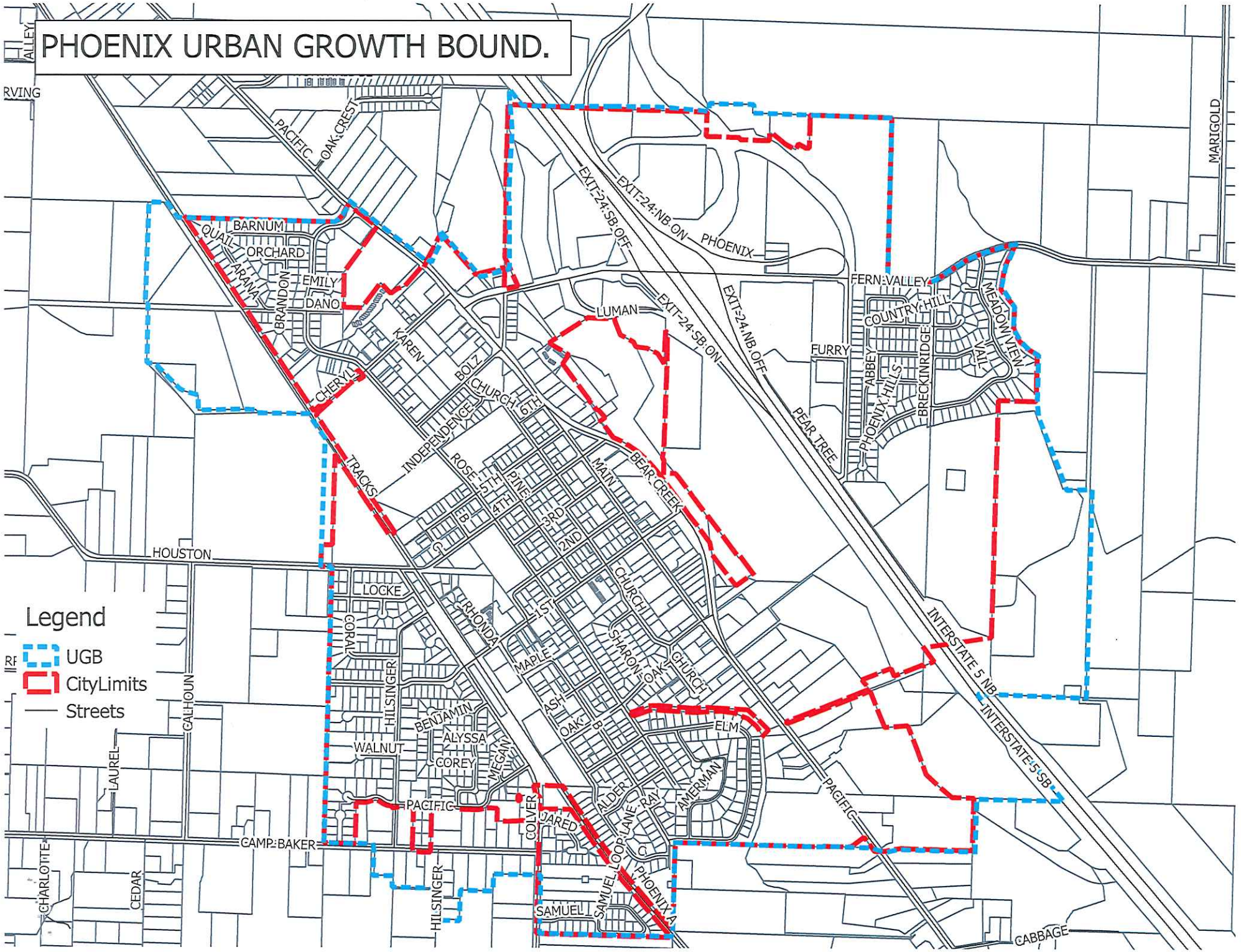
THE CITY OF PHOENIX

Mayor

City Recorder

9-22-2016
Date

PHOENIX URBAN GROWTH BOUND.



APPENDIX 1B –

INTERGOVERNMENTAL AGREEMENT TAP PROJECT, 2000

INTERGOVERNMENTAL AGREEMENT

Between

The cities of
Talent, Ashland and Phoenix
Municipal Corporations within the State of Oregon

for

TAP PROJECT

(Water Intertie Pipeline and Water System Improvements)

INTERGOVERNMENTAL AGREEMENT

Between

The cities of
Talent, Ashland and Phoenix
Municipal Corporations within the State of Oregon

This Agreement is entered into between the cities of Talent, Ashland and Phoenix, hereinafter referred to collectively as the CITIES, WITNESSETH THAT:

WHEREAS, CITIES are Municipal Corporations within the State of Oregon;

WHEREAS, CITIES have embarked upon the construction of a supplemental water supply conveyance system, which will transport and store potable water from the Medford Water Commission to their respective distribution systems. Scheduled completion of this project's construction is December 31, 2001;

WHEREAS, the cities of Talent and Phoenix will have use of the facilities upon completion of construction, and the city of Ashland is participating in project costs as a protected future user; and

WHEREAS, the purpose of this Agreement is to make provisions for CITIES to perform assigned tasks contained in this Agreement.

NOW THEREFORE, in consideration of the terms, conditions, stipulations and covenants herein contained, the CITIES do mutually agree to the following:

I PROJECT COMPONENTS

Water Intertie Pipeline and Water System Improvements, hereinafter referred to as TAP PROJECT, is designed to serve the municipalities of Talent, Ashland (protected future use) and Phoenix.

A. ENGINEER

The CITIES have entered into an "Agreement for Engineering Services" with Montgomery Watson. See Exhibit A.

B. PRIME CONTRACTOR

The CITIES have entered into a contract with James W. Fowler to be the prime contractor for the construction of the TAP Water Intertie. See Exhibit B.

C. MEDFORD WATER COMMISSION

The CITIES have entered into an agreement with the Medford Water Commission for

maintenance of the Regional Booster Pump Station. See Exhibit C.

The city of Talent has an agreement with the Medford Water Commission, dated June 17, 1998 entitling the city of Talent to a water supply source in the Rogue River utilizing storage in the Lost Creek reservoir and desire to have such water diverted from the Rogue River, treated to obtain potability and transported to its metering point in South Medford, and further that CITY desires to purchase surplus water from the municipal water system of the City of Medford during the winter months.

The city of Phoenix has an agreement with the Medford Water Commission, dated January 27, 1982 entitling the city of Phoenix a water supply source in the Rogue River utilizing storage in the Lost Creek reservoir and desires to have such water diverted from the Rogue River, treated to obtain potability and transported to South Medford, and further that CITY desires to purchase surplus water from the municipal water system of the City of Medford during the winter months.

D. COST SHARING

When a component requires the sharing of costs, the CITIES agree to the following flow-based percentage splits:

TAP Flow-based percent of capacity splits:

- Talent 58.83%
- Ashland 19.39%
- Phoenix 21.78%

It should be noted that the flow-basis protects each CITY for the following maximum capacity amounts in the TAP Intertie Transmission line and the Regional Pump Station:

- Full load-peak day demand required by Phoenix and Talent, plus 25% of the average day demand for Ashland. See Exhibit "D"

E. TAP PROJECT COMPONENTS for construction and future maintenance:

▸ 24" Diameter Water Pipeline	all three CITIES - flow-based percent of capacity proportion
▸ 12" Diameter Phoenix Pipeline "A"	100% Phoenix only
▸ 12" Diameter Phoenix Pipeline "B"	100% Phoenix only
▸ 16" Diameter Talent Pipeline "A"	100% Talent only
▸ 16" Diameter Phoenix Pipeline	100% Phoenix only
▸ 16" Diameter Talent Pipeline "B"	100% Talent only
▸ Phoenix 1.0 MG Reservoir	100% Phoenix only
▸ Talent 1.0 MG Reservoir	100% Talent only
▸ Regional Booster Pump Station	all three CITIES -as outlined in Exhibit C
▸ Talent Booster Pump Station	100% Talent only
▸ Phoenix Booster Pump Station	100% Phoenix only

F. SPECIFICATIONS

The joint use of the 24" diameter pipeline and Regional Booster Pump Station covered by this Agreement shall at all times be in conformity with accepted modern methods and at all times shall conform to the requirements as set forth in Volume's 1 and 2 Contract Documents prepared by Montgomery Watson for Talent, Ashland, Phoenix Water Intertie Pipeline and Water System Improvements, and subsequent revisions thereof, except where the lawful requirements of CITIES may be more stringent, in which case the latter will govern.

CITIES shall at all times maintain all of its attachments in accordance with the specifications mentioned above.

G. TAP COMMITTEE

During Construction Phase:

- The CITIES shall continue with their present TAP Committee for project review and decisions. The TAP Committee consists of four (4) member from each jurisdiction appointed by their governmental unit. The Committee shall meet on the second Tuesday of each month at 5:30 P.M. at the Talent City Council Chambers.
- The responsibilities of the TAP Committee are to a) Make project decisions associated with the pipeline that are not monetary; b) Refer project monetary decisions to respective City Councils, and; c) Ensure elected officials of respective jurisdictions are informed of the project's progress, potential problems and delays.

When Water System is in use:

- The CITIES shall maintain a TAP Committee for ongoing review of project after completion of construction. The TAP Committee shall consist of four (4) members from each jurisdiction appointed by their governmental unit. The Committee shall meet quarterly on the second Tuesday during the months of January, April, July and October. The existing TAP Bylaws will be amended to reflect change of meeting schedule.
- The responsibilities of the TAP Committee are to a) Make project decisions associated with the pipeline that are not monetary; b) Refer project monetary decisions to respective City Councils, and; c) Ensure elected officials of respective jurisdictions are informed of the project's progress, potential problems and delays.

H. CHANGE ORDERS

- Change orders for the 24" Diameter Water Pipeline shall be approved and signed by CITIES.
- Change orders for the Regional Booster Pump Station shall be approved and signed by CITIES.
- Change orders for components of project that are solely one CITY'S

responsibility need not be approved by CITIES.

II CITY OF TALENT RESPONSIBILITIES

A. Shall pay below percentage of costs to construct and later maintain 24" Diameter Water Pipeline.

Construction Cost (% of construction cost)
Talent 58.83%
24" Pipeline Maintenance Cost
Medford to Phoenix 48.2%
Phoenix to Talent 75%

- After construction is complete and the system is in use, maintenance provider to be determined by contractual agreement between CITIES.

B. Shall pay 100% of costs to construct and later maintain 16" Diameter Talent Pipeline "A".

C. Shall pay 100% of costs to construct and later maintain 16" Diameter Talent Pipeline "B"

D. Shall pay 100% of costs to construct and later maintain Talent 1.0 MG Reservoir

E. Shall pay 100% of costs to construct and later maintain Talent Booster Pump Station.

F. Shall pay 58.83% of costs to construct Regional Booster Pump Station. Maintenance shall be on a percent allocation basis based upon actual water delivery through TAP pipelines to each of the CITIES. See Exhibit C.

III CITY OF ASHLAND RESPONSIBILITIES

A. Shall pay below percentage of costs to construct and later maintain 24" Diameter Water Pipeline.

Construction Cost (% of construction cost)
Ashland 19.39%
24" Pipeline Maintenance Cost
Medford to Phoenix 15.7%
Phoenix to Talent 25%

- After construction is complete and system is in use, maintenance provider to be determined by contractual agreement between CITIES.

B. Shall pay 19.39% of costs to construct Regional Booster Pump Station. Maintenance shall be on a percent allocation basis based upon actual water delivery through TAP pipelines to each of the CITIES. See Exhibit C.

IV CITY OF PHOENIX RESPONSIBILITIES

A. Shall pay below percentage of costs to construct and later maintain 24" Diameter Water Pipeline.

Construction Cost (% of construction cost)
Phoenix 21.78%
24" Pipeline Maintenance Cost
Medford to Phoenix 36%
Phoenix to Talent 0%

- After construction is complete and system is in use, maintenance provider to be determined by contractual agreement between CITIES.

B. Shall pay 100% of costs to construct and later maintain 12" Diameter Phoenix Pipeline "A".

C. Shall pay 100% of costs to construct and later maintain 12" Diameter Phoenix Pipeline "B".

D. Shall pay 100% of costs to construct and later maintain 16" Diameter Phoenix Pipeline.

E. Shall pay 100% of costs to construct and later maintain Phoenix 1.0 MG Reservoir.

F. Shall pay 100% of costs to construct and later maintain Phoenix Booster Pump Station.

G. Shall pay 21.78% of costs to construct Regional Booster Pump Station. Maintenance shall be on a percent allocation basis based upon actual water delivery through TAP pipelines to each of the CITIES. See Exhibit C.

V. CREATION OF PROPERTY OWNERSHIP INTEREST.

A. Each party to this agreement shall have an undivided property interest in the 24" pipeline (the "TAP Intertie Transmission Line") equal to the following percentages: Talent = 58.83%; Ashland = 19.39%; Phoenix = 21.78%. Title to the TAP Intertie Transmission Line shall be held in the name of each of the parties in its respective undivided interest.

B. The TAP Intertie Transmission Line is to be held, conveyed, encumbered, leased, rented, occupied and improved subject to limitations, restrictions, covenants and conditions set forth in this Agreement. The Line is dedicated for domestic and municipal water supply purposes.

C. Each CITY shall have the indefeasible right to use the TAP Intertie Transmission Line for the transmission of domestic water and municipal water to its respective city. The City of Talent and the City of Phoenix plan to use the water upon completion of the Project. The City of Ashland anticipates its use of the TAP Intertie Transmission Line at an unspecified time in the future. At such time as the City of Ashland begins to use the

TAP Intertie Transmission Line, it shall be entitled to sufficient capacity within the TAP Intertie Transmission Line to produce a flow and quantity of water equaling 1.6 million gallons per day (1.6 mgd) at the point of diversion located within the City of Talent for the City of Ashland's water.

VI. OPERATION AND MANAGEMENT OF THE PROJECT UPON COMPLETION.

The Rogue Valley Council of Governments (the "Managing Coordinator") shall have the initial responsibility to manage and coordinate the operation, repair and replacement of the Project components after the Project has been completed in December, 2001. The Managing Coordinator shall have the responsibility and authority to perform the following functions and may make decisions with respect to such matters, unless otherwise provided in this Agreement:

A. Operation, Maintenance, Repair, and Replacement. To coordinate contracts, with direction from the TAP Committee, or perform work with its own forces for operation, maintenance and repair of the TAP Intertie Transmission Line pursuant to an approved budget by the Committee.

B. Managing Coordinator's Use of Own Work Forces. The Managing Coordinator may perform work with its own forces. However, The CITIES are in the process of selecting a third party for operation and maintenance of the TAP Intertie Transmission Line. To the extent that any CITY uses its own employees in the performance of its duties under this Agreement, that entity shall be responsible for complying with all applicable state and federal laws and for all employment related benefits and deductions, workers' compensation premiums and pension contributions.

C. Coordination with Medford Water Commission. As necessary, the Managing Coordinator, with direction from the TAP Committee, will coordinate meetings between the Medford Water Commission operators and the CITIES to coordinate ongoing water demands, water quality concerns and any other ongoing operational considerations.

D. Charges. To collect and deposit the charges due from the CITIES into an account established for the Project; to mail written notice to any CITY who is more than 30 days delinquent in payment of any charges; and to mail written notice to the CITIES for additional charges whenever it appears that the funds on hand will be insufficient to cover future expenses.

E. Payment of expenses. To pay when due the expenses of the Project, and all other expenses or payments duly authorized by the TAP Committee.

F. Records. To maintain complete and accurate records of all receipts and expenditures for the CITIES.

G. Improvements or Fixtures. No improvements or fixtures shall be made or attached to the Project which could cause interference with the operation of the TAP Intertie Transmission Line or be an obligation of a fiscal nature for the CITIES without the prior written consent of the CITIES.

VII PAYMENTS

A. The maintenance of the 24" pipeline shall be by contractual agreement between CITIES. Responsible CITY who provides maintenance will invoice other CITIES for maintenance requiring shared costs on a monthly basis, to be reimbursed to responsible CITY within 30 days of receipt.

B. The maintenance of the Regional Booster Pump Station shall be done by the Medford Water Commission (Exhibit C). Payment schedules shall be according to terms set forth in CITIES agreement with the Medford Water Commission.

VIII AMENDMENTS

A. This document and attached Exhibits constitutes the entire Agreement between the CITIES. Any amendments or changes to the provisions of this Agreement shall be reduced to writing and signed by all CITIES.

IX DISPUTE RESOLUTION

If a dispute arises between the parties regarding this Agreement, the parties shall attempt to resolve the dispute through the following steps:

A. Step One - Negotiation. The TAP committee members, or such other persons designated by each CITY, will negotiate on behalf of the CITY they represent. If the dispute is resolved at this step, there shall be a written determination of such resolution signed by the committee members or designated persons and ratified by their respective governing body, which shall be binding upon each of the CITIES.

B. Step Two - Mediation. If the dispute cannot be resolved within 30 days of commencing Step One, the parties shall submit the matter to non-binding mediation. Committee members shall attempt to agree on a mediator. If they cannot agree, then they shall request the Jackson County Circuit Court to appoint a mediator as provided in ORS 36.200. The cost of mediation shall be borne equally between the CITIES. Each CITY shall be responsible for its own costs and fees. The CITIES agree to mediate in good faith. If the issues are resolved at this Step, a written determination of such resolution shall be signed by each city mayor and ratified by each city council.

C. Step Three - Arbitration. If the CITIES are unsuccessful at Steps One and Two, then the dispute shall be settled by arbitration. The parties shall attempt to agree on an arbitrator. If they cannot agree upon an arbitrator with ten days, the parties

shall submit the matter of determining an arbitrator to the Presiding Judge of the Jackson County Circuit Court. Judgment upon the award rendered by the arbitrator may be entered in any court having jurisdiction. The decision of the arbitrator shall be final and binding upon all parties and there shall be no appeal to any court. Expenses of arbitration shall be borne by the losing party or parties. Each party shall pay its own attorney fees in such arbitration unless the arbitrator orders otherwise.

X PROJECT DURATION - TERMINATION

A. This agreement shall take effect as of the last date signed below. The term of this Intergovernmental Agreement shall be perpetual.

Any termination of this Agreement shall not prejudice any rights or obligations accrued to the parties prior to termination.

XI ENTIRE AGREEMENT - AMENDMENTS AND ASSIGNMENTS

A. This document and attached Exhibits shall constitute the entire Agreement between the CITIES.

B. All amendments, modifications, or changes to the provisions of this Agreement in whole or in part, may be entered into at any time upon mutual agreement, signed by all CITIES.

C. Neither party shall assign or transfer any of its interest in this Agreement without the prior written consent of the other CITIES.

XII REPORTS AND RECORDS

A. All work produced by or for the CITIES regarding the TAP Intertie Project shall be the exclusive property of CITIES provided a CITY may obtain a copy of any public record information by paying for the reproduction costs.

XIII INDEMNIFICATION

A. Subject to the limitations and conditions of the Oregon Tort Claims Act, ORS 30.260 through 30.300 and the Oregon Constitution, Article XI, Section 7, the CITIES agree to save, hold harmless and indemnify each other from any loss, damage, injury, claim, or demand by a third party against either party to this agreement arising from the activities of the other party in connection with this Agreement. No party shall be required to indemnify any other party for any liability arising out of the wrongful act of another party or the wrongful act of an agent of another party.

IN WITNESS WHEREOF, CITIES have caused this Agreement to be executed by their authorized representatives as of the date of the last signature affixed below:

PARTIES TO THE AGREEMENT

Marian Telerski 27Oct00

Marian Telerski, Mayor Date
City of Talent

10/27/00

Greg Scoles, City Administrator Date
City of Ashland

Larry Parducci 10/27/2000

Larry Parducci, Mayor Date
City of Phoenix

AGREEMENT FOR
TALENT – ASHLAND – PHOENIX WATER INTERTIE PIPELINE AND WATER SYSTEM IMPROVEMENTS

EJCDC
STANDARD FORM OF AGREEMENT
BETWEEN OWNER AND CONTRACTOR
ON THE BASIS OF A STIPULATED PRICE

FUNDING AGENCY EDITION

THIS AGREEMENT is by and between The Cities of Talent, Ashland and Phoenix (hereinafter called OWNER) and James W. Fowler Co. (hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE I - WORK

1.01 CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

The WORK includes the furnishing and installation of approximately 28,835 LF of 24-inch diameter water transmission pipe within Oregon State Highway 99 from the city of Medford south to the City of Talent, the construction of a Regional Booster Pump Station, the construction of two 1.0 million gallon reinforced concrete storage reservoirs located in the Cities of Talent and Phoenix, the furnishing and installation of approximately 3,770 LF of 16-diameter and 1,255 LF of 12-inch diameter water transmission pipe for the City of Phoenix, the furnishing and installation of 5,706 LF of 16-inch diameter water transmission pipe for the City of Talent, and existing booster pump station modification for the Cities of Phoenix and Talent.

ARTICLE 2 - THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows:

Cities of Talent, Ashland and Phoenix: TALENT – ASHLAND – PHOENIX, WATER INTERTIE PIPELINE AND WATER SYSTEM IMPROVEMENTS

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ARTICLE 3 - ENGINEER

3.01 The Project has been designed by MONTGOMERY WATSON who is hereinafter called ENGINEER and who is to act as OWNER's representative, assume all duties and responsibilities, and have the rights and authority assigned to ENGINEER in the Contract Documents in connection with the completion of the Work in accordance with the Contract Documents.

ARTICLE 4 - CONTRACT TIMES

4.01 Time of the Essence

A. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 Days to Achieve Substantial Completion and Final Payment

A. The Work will be substantially completed within **500 days** after the date when the Contract Times commence to run as provided in paragraph 2.03 of the General Conditions, and completed and ready for final payment in accordance with paragraph *14.07* of the General Conditions within **500 days** after the date when the Contract Times commence to run.

4.03 Liquidated Damages

A. CONTRACTOR and OWNER recognize that time is of the essence of this Agreement and that OWNER will suffer financial loss if the Work is not completed within the time(s) specified in paragraph *4.02* above, plus any extensions thereof allowed in accordance with Article *12* of the General Conditions. The parties also recognize the delays, expense , and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not completed on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty), CONTRACTOR shall pay OWNER **$2000 for each day** that expires after the time specified in paragraph *4.02* for Substantial Completion until the Work is substantially complete. After Substantial Completion, if CONTRACTOR shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER **$ 1000 for each day** that expires after the time specified in paragraph *4.02* for completion and readiness for final payment until the Work is completed and ready for final payment.

ARTICLE 5 - CONTRACT PRICE

5.01 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to the prices for all Work, at the prices stated in CONTRACTOR's Bid, per the attached Section 00300 – BID FORMS.

ARTICLE 6 - PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

A. CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by ENGINEER as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

A. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment on or about the 20TH day of each month, during performance of the Work, as provided in

Paragraphs 6.02.A. I and 6.02.A.2 below. All such payments will be measured by the schedule of values established in paragraph 2.07.A of the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no schedule of values, as provided in the General Requirements.

1. Prior to Substantial Completion, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as ENGINEER may determine or OWNER may withhold, in accordance with paragraph 14.02 of the General Conditions:

a. 95% of Work completed (with the balance being retainage); and

b. 95 % of cost of materials and equipment not incorporated in the Work but delivered and suitably stored in a location and manner agreed to in writing and pursuant to paragraph 14.02.A. I of the General *Conditions (with the balance being retained).*

2. Upon Substantial Completion, OWNER shall pay an amount sufficient to increase total payments to CONTRACTOR to 95 % of the Work completed, less such amounts as ENGINEER shall determine in accordance with paragraph 14.02.B.5 of the General Conditions.

6.03 *Final Payment*

A. Upon final completion and acceptance of the Work in accordance with paragraph 14.07 of the General Conditions, OWNER shall pay the remainder of the Contract Price as recommended by ENGINEER as provided in said paragraph 14.07.

ARTICLE 7 - INTEREST

*1.*01 All moneys not paid when due as provided in Article 14 of the General Conditions shall bear interest at the rate of 4 % per annum.

ARTICLE 8 - CONTRACTOR'S REPRESENTATIONS

8.01 In order to induce OWNER to enter into this Agreement CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and the other related data identified in the Bidding Documents.

B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.

D. CONTRACTOR has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.02 of the General Conditions and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site which has been identified in the Supplementary Conditions as provided in paragraph 4.06 of the General Conditions.

E. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or erformance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, including applying the specific means, methods, techniques, sequences, and procedures of construction, if any, expressly required by the Contract Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto.

F. CONTRACTOR does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

G. CONTRACTOR is aware of the general nature of work to be performed by OWNER and others at the Site that relates to the Work as indicated in the Contract Documents.

H. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations. tests, studies. and data with the Contract Documents.

I. CONTRACTOR has given ENGINEER written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract Documents, and the written resolution thereof by ENGINEER is acceptable to CONTRACTOR.

J. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

\RTICLE 9 - CONTRACT DOCUMENTS

9.01 *Contents*

A. The Contract Documents consist of the following:

1. This Agreement (pages 005001 to 005007 inclusive);
2. Performance Bond;
3. Payment Bond;
4. Conditions of the Contract (pages 007001-1 to 00800-7 inclusive);
5. General Requirements (pages 01010-1 to 01700-2 inclusive);
6. Technical Specifications as listed in the table of contents of the Project Manual;
7. Drawings consisting of a cover sheet and sheets numbered G1 through I4, inclusive, with each sheet bearing the following general title: Rogue Valley Council of Governments Talent– Ashland – Phoenix, Water Intertie Pipeline and Water System Improvements, Volume 2 – Drawings.
8. Addenda (numbers 1 to 6, inclusive);
9. Exhibits to this Agreement (enumerated as follows):
    a. Notice to Proceed;
    b. CONTRACTOR's Bid;
    c. Documentation submitted by CONTRACTOR prior to Notice of Award
10. The following which may be delivered or issued on or after the Effective Date of the Agreement and are not attached hereto
    a. Written Amendments;
    b. Work Change Directives;
    c. Change Order(s).

B. The documents listed in paragraph 9.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 9.

D. The Contract Documents may only be amended, modified, or supplemented as provided in paragraph 3.04 of **the General** Conditions.

ARTICLE 10 - MISCELLANEOUS

10.01 Terms

A. Terms used in this Agreement will have the meanings indicated in the General Conditions.

10.02 Assignment of Contract

A. No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

10.03 *Successors and Assigns*

A. OWNER and CONTRACTOR each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

10.04 Severability

A. Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

10.05 Other Provisions

IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed eight copies of this Agreement. One counterpart each has been delivered to OWNER, CONTRACTOR and ENGINEER. All portions of the Contract Documents have been signed, initialed or identified by OWNER and CONTRACTOR or identified by ENGINEER on their behalf.

This Agreement will be effective on, - (which is the Effective Date of the Agreement). (This Agreement shall not be effective unless and until concurred in by AGENCY's (Rural Development) designated representative.)

CONTRACTOR: James W. Fowler Company

By: James W. Fowler
President

[CORPORATE SEAL]

Attest: John B. Fowler
Vice President

License No. 63701

Agent for service of process: N/A

Address for giving notices:
P.O. Box 489, 12775 Westview Dr.
Dallas, OR 97338

(If CONTRACTOR is a corporation or a partnership, attach evidence of authority to sign.)

Designated Representative:
Name: James W. Fowler
Title: President
Address: P.O. Box 489, Dallas OR 97338
Phone: 503-623-5373
Facsimile: 503-623-9117

OWNER(s): Cities of Talent, Phoenix and Ashland

City of Talent
By: Marian Telerski 27 Oct 00
Marian Telerski, Mayor Date

Address for giving notices:
P.O. Box 445
Talent, OR 97540

City of Phoenix
By: Larry Parducci 10/27/2000
Larry Parducci, Mayor Date

Address for giving notices:
P.O. Box 666
Phoenix, OR 97535

City of Ashland
By: [signature] 10/27/00
Greg Scoles, City Administrator Date

Address for giving notices:
20 EAST MAIN ST
ASHLAND, OR 97520

EXHIBIT 'C'

MEDFORD WATER COMMISSION

200 South Ivy Street - Room 177 Medford, Oregon 97501-8601
• Phone (541) 774-2440 • Fax (541) 774-2555 •

October 19, 2000

Pat Foley
Community Planner
Rogue Valley Council of Governments
155 South 2nd Street
P. O. Box 3275
Central Point, Oregon 97502

RE: TAP – Pump Station Maintenance Agreement

Dear Pat,

The Board of Water Commissioners approved Resolution No. 1015 at their meeting held on Wednesday, October 19, 2000. A copy of the resolution is enclosed. Note that the term of the agreement is for five years, commencing from the start up date of the pump station.

Also enclosed is the fully executed agreement. Section 6 has been left blank pending start up of the pump station.

Sincerely,

Edward N. Olson
Manager

mh

enclosures

PUMP STATION
MAINTENANCE AGREEMENT

THIS AGREEMENT made and entered into in duplicate on this 18 day of October 2000, by and between the Cities of Phoenix, Talent, and Ashland, municipal corporations of the State of Oregon herein called the PURCHASERS, and the Medford Water Commission, herein called the VENDOR, witnesseth:

WHEREAS, PURCHASERS are constructing a regional pump station to supply treated domestic water to the cities of Phoenix, Talent and Ashland from the Vendor, and

WHEREAS, PURCHASERS do not have nor want the joint manpower and inventory required to regularly review, maintain, and generally operate said pump station, and

WHEREAS, PURCHASERS agree to the need of one entity to be in charge of general operation and maintenance of the pump station, and

WHEREAS, VENDOR needs to be keenly aware of the use and operation of the pump station regarding being able to supply sufficient water to meet the needs of the station,

NOW, THEREFORE, THE PARTIES HERETO AGREE AS FOLLOWS:

1.

All regulations governing service of the VENDOR as now in effect or as VENDOR may, from time to time, prescribe, shall be deemed a part of this Agreement, and PURCHASERS agree to comply therewith. Nothing contained herein this Agreement shall be deemed to modify, alter or repeal any such regulations now or hereafter adopted.

2.

VENDOR agrees to use reasonable diligence in making all ordinary repairs and provide normal maintenance of PURCHASERS pump station. The VENDOR shall obtain prior approval to perform any non-routine repair or maintenance task which would incur a cost to PURCHASERS in excess of $1,000.00. Prior approval is not needed during an emergency or during after hours when the PURCHASERS approval cannot be obtained in a timely manner. The VENDOR shall make a reasonable effort to notify the PURCHASERS of any such events as soon as reasonably possible.

3.

The definition of routine operation and maintenance shall mean weekly site inspections, routine building and site maintenance and cleaning, routine landscape and irrigation maintenance and employee response to problems during normal working hours.

The definition of non-routine maintenance shall include, but not be limited to, employee response to problems after normal working hours, pump repair and replacement, repainting or replacement of buildings or building components, landscaping, or irrigation replacement and major on-site pipeline repair or replacement.

4.

THE CITIES OF PHOENIX AND TALENT (AND ASHLAND WHEN THEY BECOME A USER) agree that during the term of this Agreement they shall each pay monthly to VENDOR a proportional cost, based on metered flow amounts, of a fixed fee for routine operation, maintenance, and utility billing overhead in an amount of $200.00 to be revised annually on July 1st utilizing the current January Engineering News Record Construction Cost Index.

THE CITIES OF PHOENIX AND TALENT (AND ASHLAND WHEN THEY BECOME A USER) agree that during the term of this Agreement they shall each pay monthly a variable amount based on metered flow amounts, to VENDOR for all utility costs associated with the pump station as billed to VENDOR by other entities

PURCHASERS agree that non-routine operation and maintenance expenses will be billed on a time and material basis plus 10 percent (10%) for overhead and billing and agree that during the term of this Agreement they shall each pay a variable amount, based on a percentage split determined by a separate agreement between Phoenix, Talent, and Ashland, to VENDOR for all non-routine maintenance costs.

The percent allocation of fees and costs are the sole responsibility of the PURCHASERS and shall be established such that the VENDOR will be able to bill each entity on a monthly basis as shown on Addendum A and as may be amended from time to time.

5.

PURCHASERS agree to indemnify VENDOR, and to hold the same harmless from any liability or obligation it may incur or become liable for to PURCHASERS customers or third persons and arising out of its performance of this Agreement. VENDOR shall not be required to service or repair PURCHASERS facility other than in its ordinary course of business in connection with the service and maintenance of its own water facility system.

6.

The agreement shall be in full force and effect until the_____day of _____and PURCHASERS shall make no assignment of the rights or interest granted without written permission from the VENDOR.

7.

It is further understood and agreed by and between the parties hereto that this Agreement may be terminated by mutual consent by either party upon sixty (60) days' notice, in writing and delivered by certified mail or in person.

8.

In the event any suit, action or other proceeding is brought with regard to this Agreement, or to enforce any of the provisions hereof, the prevailing party in any such suit, action or other proceeding, or any appeal therefrom, shall be entitled to reasonable attorney's fees.

IN WITNESS WHEREOF, the Cities of Phoenix, Talent and Ashland have caused this Agreement to be executed in duplicate by its duly authorized officers and the City of Medford, acting by and through its Board of Water Commissioners has caused the same to be executed in duplicate by the Chair of said Commission and its City Recorder, all on the day and year first above written.

CITY OF PHOENIX

Mayor

City Recorder

CITY OF TALENT

Mayor

City Recorder

CITY OF ASHLAND

City Administrator

Director of Public Works

Content review by MB on 2/5/2001

Legal review by [illegible] on 9/27/00

MEDFORD WATER COMMISSION

Leigh T. Johnson
Chair

Beverly Sandbeast
City Recorder

Addendum A

Pump Station Maintenance Agreement

Re: Item 4

Routine operation and maintenance expenses shall be shared by Phoenix and Talent (and Ashland when they become a user) on a percent allocation basis based upon actual water delivery through TAP pipelines to each of the cities; Talent and Phoenix (and Ashland upon becoming a user).

All non-routine items will be discussed by the TAP Committee and adjudicated based upon actual work performed. It is the intent that Ashland provide reimbursement for items that will benefit the system in total for the future use of those items. Non-routine items include (but are not limited to) pump rebuild, bearings, etc. In general, non-routine operation and maintenance expenses will be on a percent allocation basis as shown below:

Phoenix	21.78%
Talent	58.83%
Ashland	19.39%

Medford Water Commission shall bill Phoenix, Talent and Ashland separately on a monthly basis.

EXHIBIT D

Talent, Ashland & Phoe. Waterline Intertie Study
Population & Flow Projections - revised 1/17/97

City	1996			2015			2030			2040			2050		
	Pop.	ADD	PDD	Pop.	ADD	PDD	Pop.	ADD	PDD	Pop.	ADD	PDD	Pop.	ADD	PDD
Ashland	18370	3.110	6.000	21101	3.587	7.174	28086	4.775	9.549	29000	4.930	9.860	29800	5.066	10.132
Phoenix	3699	0.604	1.290	4249	0.722	1.546	5655	0.961	2.057	6843	1.163	2.489	8280	1.408	3.012
Talent	4878	0.664	1.420	5603	0.953	2.038	7458	1.268	2.713	9024	1.534	3.283	10919	1.856	3.972
Totals	*26947*	*4.378*	*8.710*	*30953*	*5.262*	*10.758*	*41199*	*7.004*	*14.320*	*44867*	*7.627*	*15.632*	*48999*	*8.330*	*17.117*

Notes:
Future flows/demands based on average use of 170 gallons per day per capita.
Population projections based on future growth of 2% per year.
Year 1996 Ashland ADD & PDD from 1996 production records.
ADD = average daily demand in million gallons per day (MGD).
PDD = peak daily demand in MGD.
Peaking factor for Phoenix and Talent = 2.14 (from Phoenix Water Master Plan).
Peaking factor for Ashland = 2.0 (from 1996 production records).
MWC projection for Phoenix 2030 PDD = 2.5 mgd.
Talent 1996 demand revised per annual totals. Previous quantities based off 8 months.

*Full load peak day demand required by Phoenix and Talent, plus 25% of the average day demand for Ashland.

EXHIBIT 'D'

Addendum to Intergovernmental Agreement

Between
The Cities of
Talent, Ashland and Phoenix
Municipal Corporations within the State of Oregon
For
TAP Project
(Water Intertie Pipeline and Water System Improvements)

This Agreement is made by and between the cities of Talent, Ashland, and Phoenix, Oregon (the "Cities"). This Agreement modifies the Intergovernmental Agreement (IGA) previously entered into by the Cities on October 27, 2000 (attached as part of this agreement) for construction of the TAP Project (Water Intertie Pipeline and Water System Improvements), and supersedes all addenda thereto.

Recitals

A. ORS 190.010 authorizes units of local government, including cities, to enter into written agreements with other units of local government for the performance of any or all of the functions and activities that parties to the agreement themselves have the authority to perform.

B. The Cities entered into an intergovernmental agreement dated October 27, 2000 (the "Original IGA") for construction of a supplemental water supply conveyance system to transport and store potable water from the Medford Water Commission to their respective distribution systems. The system includes a regional booster pump system (the "Regional Pump Station") and a water transmission pipeline (the "TAP Intertie Transmission Line") running beneath Highway 99 south from the booster pump to Talent. Each of the Cities owns an undivided property interest in the TAP Intertie Transmission Line and Regional Pump Station. The system is commonly referred to as the "TAP" system (the "TAP System").

C. Construction of the TAP System as contemplated in the Original IGA has been completed.

D. Section I.G of the Original IGA created a "TAP Committee" for ongoing planning, review, oversight, and maintenance of the TAP system. The TAP committee consists of appointees of the Cities as described in the Bylaws referred to below. The appointees represent the specific interests of the Cities as described in Section 1 below.

E. The duties of the TAP Committee are described in the Original IGA, addenda to the IGA, and in the Bylaws referred to below. This Agreement consolidates all of these duties into one document.

F. The Cities originally contracted with the Rogue Valley Council of Governments ("RVCOG") to perform most of the TAP duties, including coordination of TAP Committee meetings, monitoring of the TAP System, and provision of administrative duties. The Cities now wish to assume the RVCOG responsibilities themselves pursuant to the terms and conditions of this Agreement. The Cities also wish to allocate and clarify these responsibilities.

G. Within the authority granted to the TAP Committee by the Cities, the Cities intend the TAP Committee to monitor TAP System implementation, status, performance, and expenses in order to help ensure that the project meets its intended purpose in the most efficient and effective manner.

H. These Recitals are part of the Agreement

NOW THEREFORE, the Cities of Talent, Ashland, and Phoenix agree as follows:

Agreement

Section 1. Responsibilities of the TAP Committee

1.1 General. The TAP Committee hereby assumes the responsibilities of "Manager Coordinator" set forth in the attached Exhibit A, which is incorporated by reference as a part of this agreement, and as otherwise necessary or appropriate for the overall management, operation, maintenance, repair and replacement of the TAP System. The TAP Committee as a whole will administer these responsibilities unless specifically delegated to and accepted by one of the Cities or contracted to others pursuant to this Agreement.

1.2 Authority to Contract with RVCOG or Others. The TAP Committee may contract with RVCOG or others at its reasonable discretion to perform all or any portion of the duties described in Section 1.1 above.

1.3 Authority of Members to Act on Behalf of Cities. Actions of the members of the TAP Committee must reflect the policies and directives of the Cities they represent. Nothing herein is intended to broaden the authority of the TAP Committee over what was contemplated in the Original IGA.

Section 2. Membership, Voting Privileges And Meetings

2.1 Membership. The TAP Committee will be composed of one (1) representative appointed by each City. Each representative will serve until replaced by

his or her City. Each City shall appoint an alternate to serve in the absence of the representative.

2.2 Voting Privileges. Each member will have one (1) vote. No proxy votes shall be allowed.

2.3. Approval. Any matter may be approved only by the vote of a majority of the members.

2.4 Meetings.

2.4.1 Quorum. A quorum shall consist of a majority of the members.

2.4.2 Frequency. Meetings shall be held at least once every four (4) months (April, August and December) on the second Tuesday of the month at 1:30 p.m. Notice of each regularly scheduled meeting shall be provided at least one week in advance by the Secretary (2.5). Said notice shall be provided to both the member and the alternate of each of the three cities. Meetings shall also be held at any time for any reason upon the request of any one (1) member upon two (2) day's oral or written notice.

2.4.3 Time And Place. The time and place of meeting shall be scheduled and determined by the Secretary in consultation with the TAP Committee members.

2.4.4 Special Meetings. Special meetings may be held at the request of any one (1) TAP Committee member.

2.4.5 Emergency Polls in Lieu of Meetings. Emergency poll votes may be conducted in lieu of meetings if necessary or otherwise advisable. Each member shall have two (2) days to respond to the poll. Non-responding member/alternate shall be contacted by the Secretary as referenced in section 2.5 to ensure notice had been received and to obtain a confirmation of position. Once the results are received, they may be acted upon immediately. Any such results shall be ratified at the next face-to-face meeting.

2.5 Secretary. The members shall appoint a Secretary at the first meeting of each calendar year.

2.6 Minutes. Written Minutes shall be taken at each meeting. The Secretary shall prepare minutes. Minutes shall record all decision items taken by the TAP Committee and all major discussion items.

2.7 Conduct of Meetings. In the event of a dispute, parliamentary procedure shall be conducted in accordance with the latest version of Robert's Rules of Order.

Section 3. Contract Performance And Review

Each TAP Committee member will maintain its own copy of all contracts connected with the construction, ownership, operation, coordination, oversight, maintenance, repair and other components of the TAP System. A list of contracts current as of the date of this Agreement is included under Section 9.

The TAP Committee will monitor the implementation, status and performance of all agreements concerning the TAP System and shall recommend clarifications or changes to these agreements to the Cities as the need arises. As needed, the TAP Committee may prepare reports to the Cities concerning contract status, policies, priorities, and funding.

The TAP Committee will monitor the specific obligations of the Cities set forth in Sections II, III and IV of the Original IGA to the extent that these obligations create current or future commitments or otherwise have a material effect on any aspect of the TAP System.

The TAP Committee will evaluate proposed material changes to the TAP System and make recommendations to the Cities as appropriate.

Section 4. Meetings with the Medford Water Commission And Other Agencies

The Cities entered into an Agreement with the Medford Water Commission for maintenance of the Regional Pump Station on October 18, 2000. This Agreement was subsequently amended in March 2002 to include provisions for allowing the cities to be responsible for routine maintenance of the Pump Station. Talent and Phoenix have each also entered into an independent agreement with the Medford Water Commission for the treatment and delivery of potable water. The TAP Committee will meet with the Medford Water Commission periodically and as otherwise needed to coordinate ongoing and future water demands, water quality concerns, and operational considerations.

Section 5. Duties Delegated to the City of Talent

5.1 Processing And Payment of Bills. The City of Talent shall assume the following responsibilities with respect to the TAP System:

A. Receipt of Bills. The City of Talent will receive and process all bills and other charges connected with the TAP System. Talent will promptly record all such bills and charges, and will apportion each

City's responsibility for payment pursuant to the Original IGA and other applicable agreements.

B. **Confirmation of Accuracy of Bills.** Talent will make every reasonable effort to confirm the accuracy of all bills and charges received. However, each City shall share responsibility for attempting to ensure that source billing information such as meter reads are timely and accurate.

C. **Payment of Bills And Notification to Each City of Its Share.** Talent will promptly pay all bills and charges received no later than the dates they are due. Talent shall notify each City of its contractual share of each bill received and paid by Talent. Notification shall include a copy of the applicable bill or charge.

D. **Customary Bills.** The Customary Bills, while not exhaustive, shared by all three cities will include the annual insurance premiums, annual audit fee and the monthly City of Medford Utility Fees assessed on the Regional Pump Station. Bills shared by just the cities of Phoenix and Talent will include the monthly water bills from the Medford Water Commission and the monthly electrical bills from Pacific Power

1) Billing for the City of Ashland will be once a year for its Proportionate share (19.39%) of the insurance premiums, Medford Utility Fee for 12-month period, and the audit.

2) Billing for the City of Phoenix will be monthly for its proportionate share of the water (based on consumption), power (based on consumption), and Medford Utility Fees (21.78%). Annual bills for the Insurance Premiums and the annual audit are also based on the proportionate share of 21.78%.

3)The City of Talent will be responsible for the payment of the remaining 58.83%

E. **Reimbursement by Cities.** Each City shall promptly reimburse Talent for its share of the bills paid by Talent pursuant to this Agreement. Payment shall be made no later than twenty (20) days after the date of mailing of the notice described in subpart B above.

F. **Reminder Notices.** Talent shall send a reminder notice to any City that has failed to pay a billed charge thirty (30) days after the date of mailing.

5.2 Accounting. The City of Talent shall keep accurate books and records of all bills and other charges received and paid in connection with the TAP System, and of all payments received by Cities in reimbursement of these bills and charges. Talent will establish a separate reserve fund for the receipt of funds and payment of bills under this Section 5. Records shall be provided at each regularly scheduled TAP meeting or upon request.

5.3 Audit. The City of Talent will coordinate an annual audit of TAP System books and procedures. Talent will provide TAP Committee members copies of all audit reports and written materials provided by the auditors, and will immediately notify TAP Committee members in the event that auditors identify material irregularities or recommend substantive changes to accounts, payments, receipts, accounting, record keeping or any other matter connected with the auditor's services. Audit fees directly related to the audit of this "reserve fund" shall be shared by the three cities based on their proportionate shares.

5.4 Notification to TAP Committee Members. The City of Talent will notify TAP Committee members of important events or findings connected with or discovered as a result of the City's services under this Section 5.

5.5 Fees for Services. The City of Talent and the City of Phoenix mutually agree that rather than exchange fees for services to compensate for the services provided by each of the cities as referenced in Section 5.1 and Section 6 of this agreement, that the value of said services will be $100/ month. Neither party will bill the other for these services.

5.6 Term of Services. Talent shall continue to provide the services described in this Section 5 until Talent or one (1) or more of the other TAP Committee Members desires otherwise.

Section 6. Duties Delegated to the City of Phoenix

The City of Phoenix will perform general landscaping services at the Regional Pump station until such time as it, or any other TAP Committee member, desires otherwise.

Section 7. City of Ashland

At such time as the City of Ashland notifies the Cities of Phoenix and Talent that they intend to connect to the TAP Intertie Transmission Line and begin to draw water from the TAP system, the TAP Committee will meet to identify the coordination steps necessary for this to take place. The purpose of this coordination is to ensure appropriate preparation and evaluation is completed to meet the intent of all previous agreements as well as any new requirements current operating system(s). TAP

Committee coordination will help identify the responsibilities of all of the parties and help ensure a smooth transition when the City of Ashland executes its right to tie into the TAP system.

Section 8. TAP Committee Status

The TAP Committee is not an intergovernmental entity pursuant to ORS 294.316(14) or other distinct legal entity, but is instead a purely advisory board whose members strictly represent the interests of the Cities. As such, the Cities are not required to adopt an ordinance ratifying the creation of the TAP Committee pursuant to ORS 190.085 and are not subject to ORS 294 generally, including any requirement therein to undergo an annual budget process. TAP Committee members do not have the discretion to make independent policy decisions but instead carry out policy established by each City regarding the delivery of water to each city on behalf of the Cities that they represent. The TAP committee performs certain purely ministerial duties in addition to its advisory function on behalf of the Cities.

Section 9. Documents that will continue to remain In Force:

1) Intergovernmental Cooperation Agreement-Medford Water Intertie Project, signed by Talent, Ashland, and Phoenix signed October 18, 1995.
2) Intergovernmental Cooperation Agreement-Medford Water Intertie Project, signed by Talent, Ashland, and Phoenix signed October 27, 2000 and Amendment No. 1 signed March 20,25,27, 2002 and Amendment No. 2 generator signed----------.
3) Pump Station Maintenance Agreement between the cities of Phoenix, Talent and Ashland and the Medford Water Commission – dated October 18, 2000 and amended on May 7, 2002.
4) Agreement and Contract for Mutually Granted Easements at Medford Sports and Community Park.
5) Intergovernmental agreement between the City of Talent and the City of Talent for the Provision of Emergency Water Services dated April 19, 2006

Section 10. Documents Superseded by this Agreement:

1) RVCOG Intergovernmental Agreements and amendments
   a) Talent, Ashland and Phoenix effective January 15, 1996
   b) Talent, Ashland and Phoenix effective July 1, 1997
   c) Talent and Phoenix, signed April 7 and 8, 1998
   d) Ashland, June 8, 1999 through June 30, 2000
   e) Ashland, July 1, 2000 through December 30, 2001

f) Talent, Ashland and Phoenix, July 1, 2000 thru December 31, 2001 and amendments No. 1-5 dated respectively April 30, 2002, June 30, 2002, July 31, 2002, September 30, 2002 and November 30, 2002.

2) RVCOG Intergovernmental Agreements and amendments regarding the Managing Coordinator, Amendment 1 to city's IGA effective March 27, 2002 through June 30, 2002. Amendments No. 1-5 dated respectively through June 30, 2003, June 30, 2004, June 30, 2005, June 30, 2006 and June 30, 2007.

3) TAP Bylaws dated March 1999 and as amended June, 2000, January 2001, January 2002, February 2003, August 2004, and June 2005.

This Agreement modifies the following documents:

■ ■ ■

City of Talent

By _____ Date _____

City of Ashland

By _____ Date 5/17/07

City of Phoenix

By _____ Date _____

f) Talent, Ashland and Phoenix, July 1, 2000 thru December 31, 2001 and amendments No. 1-5 dated respectively April 30, 2002, June 30, 2002, July 31, 2002, September 30, 2002 and November 30, 2002.

2) RVCOG Intergovernmental Agreements and amendments regarding the Managing Coordinator, Amendment 1 to city's IGA effective March 27, 2002 through June 30, 2002. Amendments No. 1-5 dated respectively through June 30, 2003, June 30, 2004, June 30, 2005, June 30, 2006 and June 30, 2007.

3) TAP Bylaws dated March 1999 and as amended June, 2000, January 2001, January 2002, February 2003, August 2004, and June 2005.

This Agreement modifies the following documents:

■ ■ ■

City of Talent

By Betty Wheeler Date 5/15/07

City of Ashland

By _____ Date _____

City of Phoenix

By _____ Date 5/15/07

APPENDIX 2A –

RESERVOIR VULNERABILITY STUDY, RH2 ENGINEERING, INC., JULY 20, 2018

TECHNICAL MEMORANDUM

Client:	City of Phoenix		
Project:	Water Master Plan Update		
Project File:	1018-019	Project Manager:	Rachel Lanigan, PE
Composed by:	Rachel Lanigan, PE		
Reviewed by:	Jeff Ballard, PE		
Subject:	Task 8 – Reservoir Vulnerability Review		
Date:	July 20, 2018		

EXPIRES: 12/13/2018

RESERVOIR VULNERABILITY REVIEW

This report summarizes the vulnerability review RH2 Engineering, Inc., (RH2) performed on the existing water storage facilities for the City of Phoenix (City). The assessment considered general condition, potential seismic performance, and maintenance needs related to overall vulnerability. Because no structural evaluations were performed on the reservoirs, this study is considered a high-level overview of reservoir vulnerability.

REVIEW OF BACKGROUND INFORMATION

The City's water system includes three reservoirs, two located at the City operations center called the "Shop" on B Street, and a third located on the east side of the City. Basic information about the reservoirs is presented in **Table 1**. This analysis focuses mostly on the Shop Reservoirs as the East Side Reservoir was built in 2000 and is assumed to be significantly less vulnerable than the Shop Reservoirs.

Table 1
Reservoir Material and Dimensions

Reservoir Name	Material	Year Built	Diameter (ft)	Volume (MG)	Fill/Draw Pipe Diameters (inches)
Shop 1	Concrete	1973	55	0.35	12
Shop 2	Steel	1982	116	1.50	12
East Side	Concrete	2000	80	1.00	16

For this assessment, RH2 reviewed the latest reservoir inspection documents, available as-builts, and performed a visual inspection of the exterior of the reservoirs on May 23rd, 2018. In 2014, LiquiVision Technology, Inc. performed a dive inspection of the Shop Reservoirs as well as visual inspections of the exterior. The following sections summarize the findings, general vulnerability, and recommendations for each storage facility based on the data from these reports and the site visit.

SHOP RESERVOIRS

The two Shop Reservoirs are at-grade storage tanks that are supplied from the Experiment Road Pump Station, several miles away. Water from the tanks is boosted to meet the pressure of the East Side Reservoir and City customers with the Shop Pump Station. Due to their age, the two Shop tanks lack features that make current storage facilities more robust and reliable. For steel tanks these features include adequate foundation size based on site specific soil conditions, foundation anchors from the walls to the foundation, and adequate shell thickness to resist shell buckling during a seismic event. Both steel and concrete tanks need adequate freeboard to accommodate sloshing wave height and may need separate inlet and outlet piping for proper mixing and modern instrumentation for management of the tank in varying conditions. The LiquiVision dive inspection report indicates that the interior of the structures are in good condition overall. The primary findings were minor areas of corrosion in the steel tank.

There is a history of the pressure transducer which communicates with the Shop Pump Station failing due to freezing. The current insulation is intact, but this may be a future maintenance issue.

Shop 2 Steel Reservoir

The following additional notes pertain to the Shop 2 Steel Reservoir:

- Soil fill is present on one side of the reservoir. The soil is very likely causing corrosion in the shell and the base joint. The longevity of steel tanks is highly dependent on the quality of the coatings. Given the date of construction the original coating is likely reaching the end of its useful life. The soil against the shell blocks access to the shell for recoating and traps moisture and debris against the shell which accelerates the deterioration of the coatings.
- An access hatch is located at ground level around the back of the reservoir which is surrounded by a concrete box structure. This access port is required by code for air flow within the tank while personnel are inside. The concrete enclosure against

the shell also accelerates deterioration in the coatings and contributes to shell corrosion.

- Though the reservoir was built 4 years after lead paint was outlawed and it has not been tested, it may be possible that the reservoir is coated with lead paint (as indicated by the color of the paint) and there are multiple locations of chipping paint.
- The reservoir is located at a low point that is poorly drained on one side. Vegetation is growing up against the reservoir and water ponds here. The presence of water against the steel can be a major cause of corrosion and should be addressed.

The Shop 2 Reservoir is considered highly vulnerable to ongoing corrosion and both tanks have potential for significant damage during a seismic event. Saturated soils and lack of shell anchoring could result in Shop 2 Reservoir lifting or sliding off its foundation. Potential damages for Shop 1 Reservoir during a seismic event include shell cracking and roof collapse. Additionally, lead paint may pose a hazard to the public works staff if present in the Shop 2 Reservoir coatings.

Figure 1: Shop 1 Reservoir

Figure 2: Pressure Transducer Insulated Line Entering Shop Booster Bump Station

Figure 3: Shop 1 Reservoir (left), Shop 2 Reservoir (right)

Figure 4: Dirt fill against side of Shop 2 Reservoir

Figure 5: Shop 2 Reservoir Access Hatch not Easily Accessible

Figure 6: Shop 2 Reservoir Corrosion and Coatings Failure

Figure 7: Shop 2 Reservoir Vegetation Growing Against Side of Tank, Poor Drainage

EAST SIDE CONCRETE RESERVOIR

The East Side Concrete Reservoir was built in 2000 and appears to be in good condition. The reservoir is located on top of a hill just east of Interstate 5 and is partially buried with waterproofing between the buried portion of the tank and the hillside. Minor cracking and efflorescence (white mineral deposits) are visible on the tank exterior. The roof of the tank shows ponding in each of the four quadrants of the tank, which indicates poor drainage and possibly sagging in the elevated concrete slab. There is also significant staining around the shell due to roof runoff. These items are primarily cosmetic in nature and do not appear to create any structural concerns. Over time these items may produce some issues that require some maintenance such as epoxy injection of cracks or repair of spalled concrete.

Figure 8: East Side Reservoir

Figure 9: East Side Reservoir Minor Cracking and Efflorescence, Typical

RECOMMENDATIONS

The two Shop reservoirs are generally in functional condition but are at risk for ongoing maintenance, and damage in a seismic event. Further evaluation is recommended to determine structural deficiencies. If the structural evaluation shows that the Shop reservoirs have longevity then RH2 recommends the following actions:

- Install a short retaining wall around the north side of the Shop 2 Reservoir and remove the soil in contact with the steel shell.
- Test the coatings of Shop 2 Reservoir for lead.
- Recoat the exterior of Shop 2 Reservoir.
- Install a drainage system to alleviate the saturated soils around the both of the Shop reservoirs.
- Perform a full seismic evaluation of the two Shop reservoirs to determine their specific structural deficiencies.

The East Side Reservoir is in functional condition but is close to 20 years old. RH2 recommends a full structural evaluation and seismic performance evaluation of the East Side Reservoir. Based on the cursory visual inspection, evaluation of the East Side Reservoir could be deferred for five years but performing a seismic evaluation on all three reservoirs may be financially beneficial.

APPENDIX 6A –
HANSFORD ECONOMIC CONSULTING
CAPITAL IMPROVEMENT PLAN PROJECTS

6A-CIP

DRAFT

Phoenix Water MP Financial Analysis

Capital Improvement Plan Projects

Water System Component Upgrades						Schedule for Water System Improvements								
						Planning Period (Years)								
						SHORT-TERM					MID-TERM	LONG-TERM	SDC	
Category	Project No.	Description	Total Project Cost	DEVELOPMENT COST SHARE	CITY COST SHARE	2019	2020	2021	2022	2023	2024-2039	2040-2070	ELIGIBILITY	NOTES
				$	$								%	
Pipelines	P-1 through P-6	Fire Flow Improvements: Various low priority pipe improvements for increased fire flow criteria or future fire flow deficiencies. To be addressed as development occurs or as pipe needs replacement.	$2,101,000	$0	$2,101,000	$0	$0	$0	$0	$220,000	$0	$1,881,000	42%	SDC eligiibility assumes P-5 is 100% eligible. Assumes P-1 through P-4 and P-6 are 0% eligible.
	P-1	Orchard Pl (from Brandon Way to cul-de-sac end) Replace 4-in pipe with 6-in pipe	$65,000	$0	$65,000							$65,000	0%	Adjacent hydrant is slightly over 250 feet away and has adequate fire flow.
	P-2	4th St (between Main and Rose) Replace 6-in pipe with 8-in pipe	$372,000	$0	$372,000							$372,000	0%	Ensure connection to existing 4-in pipe at Church St.
	P-3	3rd St (between Rose and Main) Replace 6-in pipe with 8-in pipe	$373,000	$0	$373,000							$373,000	0%	
	P-4	1st St (from Hilsinger to end of road) Replace 6-in pipe with 8-in pipe	$220,000	$0	$220,000					$220,000			0%	Without the improvement 1100 gpm is available. To be included with roadway improvement project.
	P-5	S Pacific Hwy (from Oak to 4655 S Pacific Hwy) Replace 8-in PVC PR200 with 16-in DI pipe	$878,000	$0	$878,000							$878,000	100%	For future growth to become commercial area. Hydrant currently receives about 2200 gpm but will need 3000 gpm. Timing depends on development of commercial properties on Highway 99.
	P-6	Jared Ct (off of Colver Rd) Replace 6-in PVC PR200 with 8-in DI pipe	$193,000	$0	$193,000							$193,000	0%	Project would include a hydrant at the end of cul-de-sac. Fire flow is available at hydrant closer to Colver Rd but more than 250 feet from houses on the cul-de-sac. Existing piping was installed in 1999. To be included with roadway improvement project.
	P-7	Annual AC Pipe Replacement: annual budget for pipe replacement and repair.	$7,650,000	$0	$7,650,000	$150,000	$150,000	$150,000	$150,000	$150,000	$2,400,000	$4,500,000	0%	$150,000/yr. Coordinate replacement projects with road construction or other projects in the area.
	T-1	Camp Baker Rd (from Tracy to Colver) Install 12-in DI pipe	$738,000	$0	$738,000				$738,000				0%	Provides system looping.
	T-2	Transmission Main Looping to PH-5 Install 12-in DI pipe	$3,346,000	$0	$3,346,000						$3,346,000		100%	Provides new piping to serve future growth areas both within City Limits and in URA. Piping near Home Depot on the northeast side of town. City to determine developer cost-share.
Storage	ST-1	New 3 MG Reservoir/Tank	$5,000,000	$0	$5,000,000						$5,000,000		38%	Provide new 3-MG storage tank (or alternatively, two 1.5-MG tanks). Assumes abandonment of Shop Tanks. Does not include property acquisition costs. City to determine developer cost-share.
Pump Stations	PS-1	Add larger fire pump to Skyline BPS to provide 1500 GPM fire flow	$125,000	$0	$125,000							$125,000	0%	Provide new fire pump when pump replacement is required on existing Skyline fire pump. Existing non-conforming.
	PS-2	New Upper Zone BPS	$699,000	$699,000	$0				$0				0%	For future growth. Projected higher elevation new customers on the east side of the city will need boosted water.
Supply	S-1	SCADA system mapping	$10,000	$0	$10,000	$10,000							47%	Assumed City cost.
	S-2	Update SCADA system	$100,000	$0	$100,000						$100,000		47%	Cost to be confirmed and shared with TAP.
	S-3	New Supply Connection from MWC in North Phoenix Rd	$2,000,000	$0	$2,000,000						$2,000,000		47%	To be further defined based on developer needs and discussions with MWC.
	S-4	Increase RBPS capacity	$200,000	$0	$200,000						$200,000		100%	Expansion of RBPS to meet City's 3.0 mgd allotment of TAP capacity. Cost to be shared with TAP and timing and costs to be determined as part of TAP Water Master Plan.
	S-5	Relocate TAP pipeline for ODOT bridge project in Phoenix	$100,000	$0	$100,000		$100,000						0%	Shared cost with TAP, TAP line must be relocated to accommodate ODOT bridge project (Coleman Creek Crossing) in Phoenix.
Recommended Studies	RS-1	City Water Master Plan Update (every 10 years)	$500,000	$0	$500,000						$200,000	$300,000	100%	$100,000 for each study
	RS-2	Water Management and Conservation Plan (every 5 years)	$100,000	$0	$100,000					$10,000	$30,000	$60,000	100%	$10,000 for each study (assumed WMCP is concurrent with WMP updates or is just a progress report)
	RS-3	TAP Water Master Plan Update (every 10 years)	$300,000	$0	$300,000	$50,000					$100,000	$150,000	47%	$50,000 for each study
	RS-4	System-Wide Seismic Resilience Assessment	$20,000	$0	$20,000	$20,000							47%	One-time study.
	RS-5	Seismic and Structural Analysis of Shop Reservoirs	$30,000	$0	$30,000			$30,000					0%	
	RS-6	Cost-Benefit Analysis comparing improvement of Shop Reservoirs to construction of a new reservoir	$15,000	$0	$15,000			$15,000					0%	
Total1			**$23,034,000**	**$699,000**	**$22,335,000**	**$230,000**	**$250,000**	**$195,000**	**$888,000**	**$380,000**	**$13,376,000**	**$7,016,000**		

1. Future costs are in 2018 dollars, no adjustment made for inflation.

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6A - Table CIP-1

Phoenix Water MP Financial Analysis

Total CIP in Current and Inflated Dollars

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CIP Items by Type	Fiscal Year Ending 2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
CIP Items (Current Dollars)											
Pipelines	$150,000	$150,000	$150,000	$888,000	$370,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000
Storage	$0	$0	$0	$0	$0	$0	$0	$0	$0	$5,000,000	$0
Pump Stations	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Supply	$10,000	$100,000	$0	$0	$0	$18,750	$18,750	$18,750	$18,750	$2,018,750	$18,750
Studies	$70,000	$0	$45,000	$0	$10,000	$20,625	$20,625	$20,625	$20,625	$20,625	$20,625
Total Estimated CIP Costs	**$230,000**	**$250,000**	**$195,000**	**$888,000**	**$380,000**	**$189,375**	**$189,375**	**$189,375**	**$189,375**	**$7,189,375**	**$189,375**
CIP Items (Inflated Dollars)											
Pipelines	$150,000	$154,500	$159,135	$970,342	$416,438	$173,891	$179,108	$184,481	$190,016	$195,716	$201,587
Storage	$0	$0	$0	$0	$0	$0	$0	$0	$0	$6,523,866	$0
Pump Stations	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Supply	$10,000	$103,000	$0	$0	$0	$21,736	$22,388	$23,060	$23,752	$2,634,011	$25,198
Studies	$70,000	$0	$47,741	$0	$11,255	$23,910	$24,627	$25,366	$26,127	$26,911	$27,718
Total Estimated CIP Costs	**$230,000**	**$257,500**	**$206,876**	**$970,342**	**$427,693**	**$219,538**	**$226,124**	**$232,907**	**$239,895**	**$9,380,504**	**$254,504**
Funding Source											
Funded by Rates (cash)	$192,124	$257,500	$206,876	$163,909	$416,438	$181,521	$186,967	$192,576	$198,353	$204,304	$210,433
Funded by Sinking Fund	$0	$0	$0	$0	$0	$0	$0	$0	$0	$800,000	$0
Funded by rates (debt)	$0	$0	$0	$806,433	$0	$0	$0	$0	$0	$4,597,119	$0
Subtotal Existing Customers	**$192,124**	**$257,500**	**$206,876**	**$970,342**	**$416,438**	**$181,521**	**$186,967**	**$192,576**	**$198,353**	**$5,601,423**	**$210,433**
Funded by SDCs (cash)	$37,876	$0	$0	$0	$11,255	$38,016	$39,157	$40,331	$41,541	$42,788	$44,071
Funded by SDCs (debt)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$3,736,294	$0
Subtotal Future Customers	**$37,876**	**$0**	**$0**	**$0**	**$11,255**	**$38,016**	**$39,157**	**$40,331**	**$41,541**	**$3,779,081**	**$44,071**
Total Funding	**$230,000**	**$257,500**	**$206,876**	**$970,342**	**$427,693**	**$219,538**	**$226,124**	**$232,907**	**$239,895**	**$9,380,504**	**$254,504**

Source: RH2 Engineering, January 2019.

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6A - Table CIP-2

Phoenix Water MP Financial Analysis DRAFT

Estimated New Debt

Project	Assumptions	Amount
Project T-1		
Total Estimated Project Cost (Inflated $s)	Construct in FY 2022	$806,433
Bond Sizing		
Capitalized Interest	*6 months*	$23,180
Issuance Costs	*3%*	$24,190
Underwriter's Discount	*1%*	$8,060
Bond Reserve Fund	*1 year debt service*	$80,700
Estimated Bond Size		**$942,563**
Bond Size Adjusted for Rounding	*1.170 bond load*	**$944,000**
Estimated Annual Debt Service	**[1]**	**$80,700**
Projects ST-1 and S-3		
Total Estimated Project Cost (Inflated $s)	Construct in FY 2028	$9,133,412
SDC Share	41%	$3,736,294
Rates Share	59%	$5,397,119
less Sinking Fund Collection (from rates)		($800,000)
Project Costs Debt-Funded		**$8,333,412**
SDC Share	45%	$3,736,294
Rates Share	55%	$4,597,119
Bond Sizing		
Capitalized Interest	*6 months*	$239,590
Issuance Costs	*3%*	$250,000
Underwriter's Discount	*1%*	$83,330
Bond Reserve Fund	*1 year debt service*	$833,000
Estimated Bond Size		**$9,739,330**
Bond Size Adjusted for Rounding	*1.170 bond load*	**$9,751,000**
Estimated Annual Debt Service	**[1]**	**$833,000**
SDC Annual Debt Service Share	**45%**	**$373,476**
Ratepayers Debt Service Share	**55%**	**$459,524**

Source: RH2 Engineering, and HEC. new debt

[1] Debt service estimate based on sale of revenue bonds with the following terms:

interest rate: 5.75%

years: 20

Assumed first payment due the following fiscal year.

APPENDIX 6B –
HANSFORD ECONOMIC CONSULTING
SYSTEM DEVELOPMENT CHARGES

6B - Table SDC-1 DRAFT

Phoenix Water MP Financial Analysis
Estimated Growth and Water Demand Projections

Year	Average # of ERUs
Avg. # ERUs 2018	2,449
Avg. # ERUs Buildout	4,632
Estimated Growth in ERUs through Buildout	**2,183**

Source: 2019 Water Master Plan Update. grow

Table SDC-1

Phoenix Water MP Financial Analysis

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SDC Eligible Project Costs

	SDC-Eligible Projects	Total Estimated Cost	% SDC Eligible	Costs In SDC
Pipelines				
P-5	S Pacific Hwy (from Oak to 4655 S Pacific Hwy)			
	Replace 8-in PVC PR200 with 16-in DI pipe	$878,000	100%	$878,000
T-2	Transmission Main Looping to PH-5			
	Install 12-in DI pipe	$3,346,000	100%	$3,346,000
Storage				
ST-1	New 3 MG Reservoir/Tank	$5,000,000	38%	$1,916,667
Supply				
S-1	SCADA system mapping	$10,000	47%	$4,734
S-2	Update SCADA system	$100,000	47%	$47,345
S-3	New Supply Connection from MWC in North Phoenix Rd	$2,000,000	47%	$946,891
S-4	Increase RBPS capacity	$200,000	100%	$200,000
Studies				
RS-1	City Water Master Plan Update (every 10 years)	$500,000	100%	$500,000
RS-2	Water Management and Conservation Plan (every 5 years)	$100,000	100%	$100,000
RS-3	TAP Water Master Plan Update (every 10 years)	$300,000	47%	$142,034
RS-4	System-Wide Seismic Resilience Assessment	$20,000	47%	$9,469
Total SDC Eligible Improvement Costs				**$8,091,139**

Source: RH2 Engineering.

sdc elig

6B - Table SDC-2 DRAFT

Phoenix Water MP Financial Analysis
Calculation of Water SDC: Improvement Fee

Item	Amount
Costs Basis	
Estimated Improvement Costs	$8,091,139
Debt Financing Costs	$3,733,234
Total Cost Basis	**$11,824,373**
Growth in ERUs	2,183
Cost per ERU for Improvement	**$5,417**

Source: RH2 Engineering. imp fee

6B - Table SDC-3 DRAFT

Phoenix Water MP Financial Analysis
Calculation of Water SDC: Reimbursement Fee

Item	Amount
Net Book Value of Water Assets	$3,323,588
Original Water Rights Cost for 1,000 ac-ft	$710,425
Total Unused Capacity Cost	**$4,034,013**
less Outstanding Principal	$1,753,107
Water System Valuation	**$2,280,906**
Percentage of Capacity Remaining	
Current ERUs Served	2,449
Additional ERUs City can Serve Today	1,019
Total ERUs can be Served Existing System	**3,468**
Capacity Remaining	**29%**
Net Cost Basis for Reimbursement Fee	**$670,197**
Growth in ERUs	2,183
Cost per ERU for Reimbursement	**$307**

Source: RH2 Engineering. reimb fee

6B - Table SDC-4

DRAFT

Phoenix Water MP Financial Analysis
Summary SDC Calculations

Meter Size	City Ratios	Fees using City Ratios			AWWA Ratios	Fees Using AWWA Ratios		
		Reimbursement	Improvement	**Total**		Reimbursement	Improvement	**Total**
5/8" x 3/4"	1.00	$307	$5,417	**$5,724**	1.00	$307	$5,417	**$5,724**
1"	4.53	$1,391	$24,534	**$25,925**	2.50	$768	$13,541	**$14,309**
1.5"	9.06	$2,781	$49,068	**$51,849**	5.00	$1,535	$27,083	**$28,618**
2"	14.49	$4,450	$78,509	**$82,959**	8.00	$2,456	$43,333	**$45,789**
3"	28.99	$8,900	$157,017	**$165,917**	16.00	$4,912	$86,665	**$91,577**
4"	45.29	$13,906	$245,341	**$259,246**	25.00	$7,675	$135,414	**$143,089**
6"	90.59	$27,811	$490,680	**$518,491**	50.00	$15,350	$270,829	**$286,179**
8"	144.94	$44,498	$785,087	**$829,585**	80.00	$24,561	$433,326	**$457,886**
10"	226.47	$69,528	$1,226,700	**$1,296,228**	115.00	$35,306	$622,906	**$658,211**

Source: RH2 Engineering, American Water Works Association, and the City of Phoenix.

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APPENDIX 6C –
HANSFORD ECONOMIC CONSULTING
WATER SYSTEM RATE ANALYSIS

6C - Table R-1

Phoenix Water MP Financial Analysis

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Summary of Inflated CIP Costs included in Rates

CIP Item	Fiscal Year Ending 2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Pipelines	$150,000	$154,500	$159,135	$970,342	$416,438	$173,891	$179,108	$184,481	$190,016	$195,716	$201,587
Storage	$0	$0	$0	$0	$0	$0	$0	$0	$0	$4,023,051	$0
Pump Stations	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Supply	$5,266	$103,000	$0	$0	$0	$3,815	$3,930	$4,047	$4,169	$1,378,362	$4,423
Studies	$36,859	$0	$47,741	$0	$0	$3,815	$3,930	$4,047	$4,169	$4,294	$4,423
Total Inflated CIP Costs	**$192,124**	**$257,500**	**$206,876**	**$970,342**	**$416,438**	**$181,521**	**$186,967**	**$192,576**	**$198,353**	**$5,601,423**	**$210,433**
Financing Assumptions											
Cash-Funded	$192,124	$257,500	$206,876	$163,909	$416,438	$181,521	$186,967	$192,576	$198,353	$204,304	$210,433
Debt-Funded (T-1, ST-1 & S-3)	$0	$0	$0	$806,433	$0	$0	$0	$0	$0	$5,397,119	$0
Total Rates Funded CIP Costs	**$192,124**	**$257,500**	**$206,876**	**$970,342**	**$416,438**	**$181,521**	**$186,967**	**$192,576**	**$198,353**	**$5,601,423**	**$210,433**

Source: RH2 Engineering and HEC.

cip rates

6C - Table R-1

Phoenix Water MP Financial Analysis
Depreciation of Water System Assets

DRAFT

Assets	Fiscal Year In Service	Original Cost	Years Life	Depreciation per Year	Remaining Years	Annual Depreciation
Buildings						
Shop	1975	$35,814	40	$895	0	$0
Shop pump building	1975	$12,090	10	$1,209	0	$0
Shop reservoir	1980	$252,256	50	$5,045	10	$5,045
Rose St. reservoir	1980	$85,632	50	$1,713	10	$1,713
Experimentation Station	1988	$19,728	50	$395	18	$395
Equipment storage	1999	$45,264	40	$1,132	19	$1,132
Public Works Office	2002	$71,918	40	$1,798	22	$1,798
East side reservoir	2002	$825,000	50	$16,500	32	$16,500
Update 82 water project	2002	$15,000	20	$750	2	$750
Samile Rd, booster pump	2003	$191,664	20	$9,583	3	$9,583
Skyline pump station '02	2003	$8,960	20	$448	3	$448
Skyline pump station '04	2004	$33,956	10	$3,396	0	$0
Skyline pump station '04	2004	$157,320	20	$7,866	4	$7,866
Subtotal Buildings		**$1,754,602**				**$45,229**
Infrastructure						
Water pipelines	2002	$1,968,474	40	$49,212	22	$49,212
Waterline replacement	2004	$139,722	30	$4,657	14	$4,657
1st street engineering	2005	$16,694	15	$1,113	0	$0
Meter accessories	2006	$34,793	10	$3,479	0	$0
1st/Alder st	2006	$136,305	40	$3,408	26	$3,408
4th Street project	2009	$106,541	40	$2,664	29	$2,664
Bolz Rd	2009	$63,849	40	$1,596	29	$1,596
Software	2010	$14,672	15	$978	5	$978
1st street engineering	2010	$5,470	15	$365	5	$365
Amerman Waterline	2011	$76,544	40	$1,914	31	$1,914
Charlotte Ann Water District	2013	$6,337	40	$158	33	$158
Infrastructure '15	2015	$358,137	40	$8,953	35	$8,953
Infrastructure '16	2016	$99,642	40	$2,491	36	$2,491
TAP '16	2017	$50,232	40	$1,256	37	$1,256
TAP '17	2017	$9,931	40	$248	37	$248
N. Rose Waterline	2017	$65,745	40	$1,644	37	$1,644
Church St Storm	2017	$37,473	40	$937	37	$937
Miscellaneous Water	2017	$448,882	40	$11,222	37	$11,222
Subtotal Infrastructure		**$3,639,443**				**$91,703**
Equipment						
Pumping equipment	1984	$32,461	15	$2,164	0	$0
telemetry	1986	$60,885	15	$4,059	0	$0
99 Tacoma	2000	$27,800	15	$1,853	0	$0
generators	2001	$58,760	15	$3,917	0	$0
01 backhoe	2003	$53,538	15	$3,569	0	$0
mole boring machine	2003	$5,066	15	$338	0	$0
91 dump truck	2004	$21,500	15	$1,433	0	$0
generators	2004	$43,000	10	$4,300	0	$0
jet flusher/vacuum truck	2004	$183,742	20	$9,187	4	$9,187
telemetry	2004	$15,000	15	$1,000	0	$0
Toyotas	2004	$15,275	15	$1,018	0	$0
VFD project	2005	$24,681	10	$2,468	0	$0
05 Ford	2006	$16,241	10	$1,624	0	$0
air compressor	2006	$11,354	10	$1,135	0	$0
pipe and supply	2006	$16,600	10	$1,660	0	$0
utility cutter	2006	$7,640	10	$764	0	$0
modifications	2006	$5,119	10	$512	0	$0
07 Ford	2008	$14,051	7	$2,007	0	$0
07 Chevy	2010	$5,700	7	$814	0	$0
handhelds	2011	$11,500	10	$1,150	1	$1,150
water meters	2013	$11,415	20	$571	13	$571
other equipment	2014	$3,750	10	$375	4	$375
Subtotal Equipment		**$645,078**				**$11,283**
Total		**$6,039,123**				**$148,214**

Source: City of Phoenix.

assets

6C - Table R-2

Phoenix Water MP Financial Analysis

Estimated Revenue Requirement Projection

DRAFT

Expenses	Inflator	Fiscal Year Ending 2019 Budget	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Operating Expenses												
Personal Services	5.0%	$460,320	$483,336	$507,503	$532,878	$559,522	$587,498	$616,873	$647,716	$680,102	$714,107	$749,813
Water Purchases from MWC	[1]	$237,600	$256,608	$269,438	$278,330	$287,515	$297,578	$307,993	$318,773	$329,930	$341,477	$353,429
Materials and Services	2.0%	$349,150	$356,133	$363,256	$370,521	$377,931	$385,490	$393,200	$401,064	$409,085	$417,267	$425,612
Subtotal Operating Expenses		**$1,047,070**	**$1,096,077**	**$1,140,197**	**$1,181,729**	**$1,224,968**	**$1,270,566**	**$1,318,065**	**$1,367,553**	**$1,419,117**	**$1,472,851**	**$1,528,854**
Debt Service												
Existing Debt Service		$133,643	$132,343	$131,043	$134,343	$132,242	$130,143	$132,968	$130,343	$132,243	$133,943	$130,543
New Debt Service			$0	$0	$0	$80,700	$80,700	$80,700	$80,700	$80,700	$80,700	$540,224
Subtotal Debt Service		**$133,643**	**$132,343**	**$131,043**	**$134,343**	**$212,942**	**$210,843**	**$213,668**	**$211,043**	**$212,943**	**$214,643**	**$670,767**
Transfers Out												
System Rehabilitation	3.0%	$148,214	$152,661	$157,241	$161,958	$166,817	$171,821	$176,976	$182,285	$187,754	$193,386	$199,188
CIP in Excess of Typical System Rehab.		$43,910	$104,839	$49,635	$1,951	$249,622	$9,700	$9,991	$10,291	$10,600	$10,918	$11,245
Other		$207,876										
Subtotal Transfers Out		**$400,000**	**$257,500**	**$206,876**	**$163,909**	**$416,438**	**$181,521**	**$186,967**	**$192,576**	**$198,353**	**$204,304**	**$210,433**
Credits												
Franchise Fees	2.0%	$12,450	$12,699	$12,953	$13,212	$13,476	$13,746	$14,021	$14,301	$14,587	$14,879	$15,176
Miscellaneous	2.0%	$2,572	$2,623	$2,676	$2,729	$2,784	$2,840	$2,896	$2,954	$3,014	$3,074	$3,135
Subtotal Credits		**$15,022**	**$15,322**	**$15,629**	**$15,941**	**$16,260**	**$16,586**	**$16,917**	**$17,256**	**$17,601**	**$17,953**	**$18,312**
Estimated Revenue Requirement		**$1,565,691**	**$1,470,598**	**$1,462,486**	**$1,464,039**	**$1,838,088**	**$1,646,344**	**$1,701,783**	**$1,753,916**	**$1,812,813**	**$1,873,846**	**$2,391,742**
Percentage Increase in Rates Needed			*5.25%*	*5.25%*	*5.25%*	*5.25%*	*5.25%*	*5.25%*	*5.25%*	*5.25%*	*5.25%*	*5.25%*
Estimated Charges for Services		$1,375,992	$1,448,231	$1,524,264	$1,604,287	$1,688,513	$1,777,159	$1,870,460	$1,968,660	$2,072,014	$2,180,795	$2,295,287
Estimated (Use) Gain of Working Capital		($189,699)	($22,366)	$61,777	$140,248	($149,575)	$130,815	$168,677	$214,743	$259,202	$306,949	($96,455)
less Sinking Fund for ST-1 & S-3				($60,000)	($80,000)	$0	($60,000)	($200,000)	($200,000)	($200,000)	$0	$0
Estimated End of Year Fund Balance		**$428,483**	**$406,117**	**$407,894**	**$468,142**	**$318,567**	**$389,382**	**$358,059**	**$372,803**	**$432,004**	**$738,954**	**$642,499**

Source: City of Phoenix, Medford Water Commission, and HEC 2019 financial analysis.

rev req

[1] Based on revenue requirement as provided in the Medford Water Commission Comprehensive Water Rate Study, November 2018 through fiscal year 2023; thereafter 3.5% per year.

6C - Table R-3

Phoenix Water MP Financial Analysis

Water Operating Fund Estimated Cash Flow

DRAFT

Revenues and Expenses	Fiscal Year Ending										
	2019	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**
Revenues											
Charges for Services	$1,375,992	$1,448,231	$1,524,264	$1,604,287	$1,688,513	$1,777,159	$1,870,460	$1,968,660	$2,072,014	$2,180,795	$2,295,287
Other Revenues	$15,022	$15,322	$15,629	$15,941	$16,260	$16,586	$16,917	$17,256	$17,601	$17,953	$18,312
Total Revenues	**$1,391,014**	**$1,463,554**	**$1,539,893**	**$1,620,229**	**$1,704,773**	**$1,793,745**	**$1,887,378**	**$1,985,915**	**$2,089,615**	**$2,198,748**	**$2,313,598**
Operating Expenses	**$1,047,070**	**$1,096,077**	**$1,140,197**	**$1,181,729**	**$1,224,968**	**$1,270,566**	**$1,318,065**	**$1,367,553**	**$1,419,117**	**$1,472,851**	**$1,528,854**
Net Operating Income	**$343,944**	**$367,477**	**$399,696**	**$438,500**	**$479,805**	**$523,179**	**$569,312**	**$618,362**	**$670,498**	**$725,896**	**$784,745**
Debt Service	$133,643	$132,343	$131,043	$134,343	$212,942	$210,843	$213,668	$211,043	$212,943	$214,643	$670,767
Debt Service Coverage	*2.57*	*2.78*	*3.05*	*3.26*	*2.25*	*2.48*	*2.66*	*2.93*	*3.15*	*3.38*	*1.17*
Net Revenue	**$210,301**	**$235,134**	**$268,653**	**$304,157**	**$266,863**	**$312,336**	**$355,644**	**$407,319**	**$457,555**	**$511,253**	**$113,978**
Beginning Balance [1]	$618,182	$428,483	$406,117	$407,894	$468,142	$318,567	$389,382	$358,059	$372,803	$432,004	$738,954
Add Net Revenue	$210,301	$235,134	$268,653	$304,157	$266,863	$312,336	$355,644	$407,319	$457,555	$511,253	$113,978
Transfers Out	($400,000)	($257,500)	($206,876)	($163,909)	($416,438)	($181,521)	($186,967)	($192,576)	($198,353)	($204,304)	($210,433)
Estimated Ending Balance	**$428,483**	**$406,117**	**$467,894**	**$548,142**	**$318,567**	**$449,382**	**$558,059**	**$572,803**	**$632,004**	**$738,954**	**$642,499**
Sinking Fund for Projects ST-1 and S-3			($60,000)	($80,000)		($60,000)	($200,000)	($200,000)	($200,000)		
Undesignated Cash	**$428,483**	**$406,117**	**$407,894**	**$468,142**	**$318,567**	**$389,382**	**$358,059**	**$372,803**	**$432,004**	**$738,954**	**$642,499**

Source: City of Phoenix and HEC.

flow

[1] Unappropriated fund balance.

6C - Table R-4

Phoenix Water MP Financial Analysis

All Water Funds Estimated Cash Flow

DRAFT

Fund	Fiscal Year Ending 2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Water Fund											
Beginning Balance	$618,182	$428,483	$406,117	$467,894	$608,142	$458,567	$589,382	$758,059	$972,803	$1,232,004	$738,954
Net Revenues	$210,301	$235,134	$268,653	$304,157	$266,863	$312,336	$355,644	$407,319	$457,555	$511,253	$113,978
SDC Fund Debt Service	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$373,476
Transfers Out	($400,000)	($257,500)	($206,876)	($163,909)	($416,438)	($181,521)	($186,967)	($192,576)	($198,353)	($1,004,304)	($210,433)
Transfers In - SDC Fund for Debt Service		$0	$0	$0	$0	$0	$0	$0	$0	$0	($373,476)
Ending Balance	**$428,483**	**$406,117**	**$467,894**	**$608,142**	**$458,567**	**$589,382**	**$758,059**	**$972,803**	**$1,232,004**	**$738,954**	**$642,499**
Capital Fund (Water Portion)											
Beginning Balance	$0	$195,725	$195,725	$195,725	$195,725	$195,725	$195,725	$195,725	$195,725	$195,725	$195,725
Transfer In - Water Fund	$400,000	$257,500	$206,876	$163,909	$416,438	$181,521	$186,967	$192,576	$198,353	$1,004,304	$210,433
Transfer In - Water SDC Fund	$25,725	$0	$0	$0	$11,255	$38,016	$39,157	$40,331	$41,541	$42,788	$44,071
Bond Proceeds	$0	$0	$0	$806,433	$0	$0	$0	$0	$0	$8,333,412	$0
Project Expenses	($230,000)	($257,500)	($206,876)	($970,342)	($427,693)	($219,538)	($226,124)	($232,907)	($239,895)	($9,380,504)	($254,504)
Ending Balance	**$195,725**	**$195,725**	**$195,725**	**$195,725**	**$195,725**	**$195,725**	**$195,725**	**$195,725**	**$195,725**	**$195,725**	**$195,725**
Water SDC Fund	*add'l ERUs*	*29*	*25*	*27*	*28*	*25*	*23*	*24*	*44*	*42*	*42*
Beginning Balance	$160,414	$169,664	$334,503	$478,737	$630,984	$780,562	$885,635	$979,838	$1,076,872	$1,289,458	$1,487,061
SDC Revenues [1]	$34,975	$164,839	$144,234	$152,247	$160,833	$143,089	$133,359	$137,366	$254,127	$240,390	$239,246
Transfers Out - Capital Fund	($25,725)	$0	$0	$0	($11,255)	($38,016)	($39,157)	($40,331)	($41,541)	($42,788)	($44,071)
Transfers Out - Debt Service	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	($373,476)
Ending Balance	**$169,664**	**$334,503**	**$478,737**	**$630,984**	**$780,562**	**$885,635**	**$979,838**	**$1,076,872**	**$1,289,458**	**$1,487,061**	**$1,682,235**
TOTAL	**$793,872**	**$936,345**	**$1,142,356**	**$1,434,852**	**$1,434,854**	**$1,670,742**	**$1,933,622**	**$2,245,400**	**$2,717,187**	**$2,421,739**	**$2,520,459**

Source: City of Phoenix and HEC.

tot flow

[1] Assumes calculated fiscal year 2020 SDCs are adopted.

6C - Table R-5

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Phoenix Water MP Financial Analysis
Water Consumption Calendar Years 2017 and 2018

Customer Group	Billing Codes	2017 Calendar Year Information				2018 Calendar Year Information			
		Accounts		Water Use		Accounts		Water Use [1]	
Residential									
Single Family	SFR	1,151	81.7%	115,310,184	47.7%	1,174	81.7%	111,540,332	45.5%
Multi-Family	MFR	91	6.5%	23,547,040	9.7%	91	6.3%	22,856,764	9.3%
Senior Housing	SNR	6	0.4%	4,603,940	1.9%	6	0.4%	6,446,264	2.6%
Mobile Homes	MHP	14	1.0%	41,113,072	17.0%	15	1.0%	37,614,676	15.3%
RV Park	RVP	4	0.3%	10,650,024	4.4%	4	0.3%	9,117,372	3.7%
Subtotal Residential		**1,266**	**89.9%**	**195,224,260**	**80.8%**	**1,290**	**89.8%**	**187,575,408**	**76.5%**
Commercial									
Low Volume Commercial	LV1	36	2.6%	5,549,413	2.3%	37	2.6%	5,646,652	2.3%
Low Volume Commercial	LV2	17	1.2%	11,193,820	4.6%	18	1.3%	21,963,132	9.0%
Low Volume Commercial	LV3	15	1.1%	3,953,180	1.6%	15	1.0%	4,407,216	1.8%
Business Park	BP	5	0.4%	1,613,436	0.7%	5	0.3%	1,923,108	0.8%
High Volume Commercial	HVC	9	0.6%	4,738,580	2.0%	10	0.7%	4,931,564	2.0%
Industrial	IND	4	0.3%	357,284	0.1%	4	0.3%	224,400	0.1%
Lodging	LOD	3	0.2%	4,257,616	1.8%	3	0.2%	4,066,128	1.7%
Mini Warehouse	MW	3	0.2%	671,184	0.3%	4	0.3%	1,956,020	0.8%
Offices	OFF	21	1.5%	1,950,036	0.8%	22	1.5%	2,229,040	0.9%
Warehouse/Furniture	WF	1	0.1%	268,532	0.1%	1	0.1%	354,552	0.1%
Subtotal Commercial		**114**	**8.1%**	**34,553,081**	**14.3%**	**119**	**8.3%**	**47,701,812**	**19.4%**
Institutional									
Church/Institution	CI	13	0.9%	1,342,660	0.6%	13	0.9%	1,501,984	0.6%
City	CTY	6	0.4%	1,208,020	0.5%	6	0.4%	983,620	0.4%
Schools	SC1	2	0.1%	483,956	0.2%	2	0.1%	899,844	0.4%
Schools	SC2	4	0.3%	7,735,816	3.2%	4	0.3%	6,189,480	2.5%
Schools	SC3	3	0.2%	1,184,532	0.5%	3	0.2%	434,588	0.2%
Subtotal Institutional		**28**	**2.0%**	**11,954,984**	**4.9%**	**28**	**1.9%**	**10,009,516**	**4.1%**
Total Water Accounts		**1,408**	**100.0%**	**241,732,325**	**100.0%**	**1,437**	**100%**	**245,286,736**	**100%**

Source: City of Phoenix and HEC. use

[1] Accounts with very high reads were corrected by HEC under the assumption there were leaks or breaks at the properties.

6C - Table R-6

DRAFT

Phoenix Water MP Financial Analysis
Water Demand Projection

Customer Type	2019	Fiscal Year Ending 2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Single Family	111,540,332	110,929,719	112,260,876	113,608,006	114,971,302	116,350,958	117,747,169	119,160,135	120,590,057	122,037,138	123,501,583
Other Residential	76,035,076	75,656,056	76,563,929	77,482,696	78,412,488	79,353,438	80,305,680	81,269,348	82,244,580	83,231,515	84,230,293
Commercial	47,701,812	47,429,881	47,999,039	48,575,028	49,157,928	49,747,823	50,344,797	50,948,935	51,560,322	52,179,046	52,805,194
Institutional	10,009,516	9,954,160	10,073,610	10,194,494	10,316,827	10,440,629	10,565,917	10,692,708	10,821,020	10,950,873	11,082,283
Total Water Consumed	**245,286,736**	**243,969,816**	**246,897,454**	**249,860,224**	**252,858,546**	**255,892,849**	**258,963,563**	**262,071,126**	**265,215,979**	**268,398,571**	**271,619,354**
Billable Consumption [1]	**171,700,715**	**170,778,871**	**172,828,218**	**174,902,157**	**177,000,982**	**179,124,994**	**181,274,494**	**183,449,788**	**185,651,186**	**187,879,000**	**190,133,548**

Source: City of Phoenix and HEC.

d proj

[1] Only water in excess of 5,000 gallons per month per account is currently billed.

6C - Table R-7

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Phoenix Water MP Financial Analysis
Seasonal Expenditures for Calendar Year 2018

Expense Item	Fixed (F) or Variable (V)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Peak	Off-Peak	Peak as % of Total
Salaries & Wages	F	$38,511	$42,646	$25,031	$35,882	$24,826	$53,642	$37,286	$39,611	$40,850	$43,178	$37,159	$41,905	**$460,529**	$214,568	$245,961	47%
Supplies	F	$644	$1,410	$1,967	$1,083	$896	$2,788	$640	$4,951	$10,593	$597	$1,908	$128	**$27,604**	$19,569	$8,036	71%
Safety Equipment	F	$630	$15	$0	$26	$65	$13	$0	$222	$0	$20	$358	$0	**$1,349**	$255	$1,094	19%
Postage	F	$688	$716	$1,000	$718	$650	$650	$1,000	$650	$650	$650	$687	$0	**$8,059**	$3,600	$4,459	45%
Dues	F	$0	$1,013	$164	$744	$0	$99	$1,324	$720	$0	$351	$410	$182	**$5,007**	$2,494	$2,512	50%
Printing	F	$0	$0	$0	$0	$0	$128	$0	$140	$0	$99	$0	$0	**$367**	$367	$0	100%
Publications	F	$0	$0	$0	$32	$20	$0	$0	$0	$0	$0	$0	$0	**$52**	$0	$52	0%
Professional Services	F	$0	($184)	$470	$0	$0	$0	$600	$413	$0	$20	$0	$0	**$1,319**	$1,033	$286	78%
Engineering Services	F	$0	$1,173	$1,353	$492	$0	$0	$0	$0	$0	$378	$0	$2,522	**$5,917**	$378	$5,539	6%
Auditor	F	$8,800	$0	$0	$0	$0	$0	$0	$0	$0	$5,600	$0	$1,350	**$15,750**	$5,600	$10,150	36%
City Attorney	F	$305	$0	$149	$316	$367	$483	$0	$0	$149	$448	$0	$294	**$2,511**	$1,079	$1,431	43%
Contracted Services	F	$378	$538	$2,909	$527	$438	($1,786)	$93	$1,030	$368	$463	$155	$216	**$5,330**	$168	$5,162	3%
Testing	F	$224	$140	$168	$140	$140	$758	$308	$114	$466	$526	$84	$168	**$3,236**	$2,172	$1,064	67%
Travel	F	$102	$191	$116	$58	$167	$844	$0	$420	$0	$140	$1,758	$358	**$4,154**	$1,404	$2,750	34%
Uniforms	F	$48	$19	$0	$79	$157	$124	$0	$1,075	$0	$630	$72	$0	**$2,205**	$1,829	$375	83%
Insurance	F	$2,251	$2,251	$0	$0	$0	$0	$51,385	$0	$2,348	$0	$2,348	$0	**$60,583**	$53,733	$6,851	89%
Utilities	V	$3,506	$2,454	$2,692	$2,605	$3,575	$2,637	$2,876	$2,761	$4,459	$2,992	$2,118	$1,977	**$34,655**	$15,727	$18,928	45%
Telephone	F	$558	$583	$522	$384	$774	$854	$152	$491	$468	$472	$496	$492	**$6,247**	$2,437	$3,810	39%
Equip & Small Tools	F	$0	$0	$0	$1,907	$310	$0	$0	$1,917	$0	$0	$43	$0	**$4,177**	$1,917	$2,260	46%
Equip Lease	F	$0	$167	$0	$0	$167	$0	$0	$0	$0	$0	$0	$0	**$333**	$0	$333	0%
Computer Equipment	F	$0	$0	$0	$0	$0	$0	$0	$0	$0	$80	$30	$0	**$110**	$80	$30	73%
Software	F	$0	$0	$156	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$156**	$0	$156	0%
Software Maintenance	F	$0	$0	$2,500	$0	$0	$0	$0	$0	$0	$0	$0	$0	**$2,500**	$0	$2,500	0%
Repairs	F	$868	$875	$0	$263	$0	$0	$695	$0	$0	$0	$1,195	$802	**$4,698**	$695	$4,003	15%
Skyline Pump	F	$0	$0	$617	$0	$0	$0	$0	$0	$0	$0	$3,578	$1,710	**$5,905**	$0	$5,905	0%
Lost Creek Reservoir	V	$0	$0	$0	($10,643)	$0	$0	$25,416	$0	$0	$0	$0	$0	**$14,773**	$25,416	($10,643)	172%
Ground Repairs	F	$80	$1,664	$0	$210	$0	$0	$0	$377	$0	$835	$3,075	$0	**$6,240**	$1,212	$5,028	19%
IT Maintenance	F	$3,931	$2,101	$261	$319	$69	$863	$1,222	$154	$161	$248	$583	$332	**$10,247**	$2,649	$7,598	26%
Vehicle Maintenance	F	$34	$344	$1,517	$1,491	$0	$223	$176	$0	$0	$962	$0	$36	**$4,784**	$1,361	$3,423	28%
Tires	F	$0	$0	$0	$899	$0	$0	$562	$660	$0	$0	$0	$0	**$2,121**	$1,221	$899	58%
Equip. Maintenance	F	$1,423	$297	$109	$2,179	$0	$1,007	$0	$530	$0	$2,045	$121	$601	**$8,313**	$3,583	$4,730	43%
Fuel	F	$1,347	$268	$334	$433	$491	$1,168	$0	$431	$561	$601	$364	$433	**$6,430**	$2,760	$3,670	43%
Meters - New Connections	F	$9,297	$7,231	$1,868	($1,318)	$0	$0	$0	$0	$0	$0	$0	$0	**$17,078**	$0	$17,078	0%
Water Transmission Treat.	V	$7,953	$7,593	$6,550	$8,704	$10,628	$48,408	$0	$32,801	$36,084	$34,925	$8,425	$3,954	**$206,027**	$152,219	$53,808	74%
TAP - Water Treatment	V	$184	$2,117	$1,180	$61	$1,532	$3,552	$0	$243	$776	$2,653	$270	$0	**$12,568**	$7,224	$5,344	57%
Other Miscellaneous	F	$0	$0	$4	$219	$35	$0	$0	$0	$0	$0	$86	$0	**$344**	$0	$344	0%
Other Purchased Services	F	$0	$0	$0	$0	$0	$0	$0	$0	$0	$550	$168	$28	**$746**	$550	$196	74%
Credit Card Fees	F	$0	$0	$0	$0	$0	$2,402	$548	$293	$362	$303	$287	$255	**$4,449**	$3,908	$541	88%
Total		**$81,764**	**$75,623**	**$51,636**	**$47,812**	**$45,309**	**$118,858**	**$124,284**	**$90,004**	**$98,295**	**$99,768**	**$65,777**	**$57,743**	**$956,872**	**$531,209**	**$425,663**	**56%**
Percent of Total		9%	8%	5%	5%	5%	12%	13%	9%	10%	10%	7%	6%				
Fixed (level month basis)	72%	$57,404	$57,404	$57,404	$57,404	$57,404	$57,404	$57,404	$57,404	$57,404	$57,404	$57,404	$57,404	**$688,849**	Peak	Off Peak	
Variable	28%	$11,643	$12,164	$10,422	$727	$15,735	$54,598	$28,293	$35,806	$41,319	$40,571	$10,813	$5,931	**$268,023**	$200,587	$67,437	**75%**
Total		**$69,047**	**$69,568**	**$67,826**	**$58,131**	**$73,140**	**$112,002**	**$85,697**	**$93,210**	**$98,723**	**$97,975**	**$68,217**	**$63,335**	**$956,872**			
Percent of Total		7%	7%	7%	6%	8%	12%	9%	10%	10%	10%	7%	7%	100%			

Source: City of Phoenix calendar year 2018 financial data.

season

6C - Table R-8

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Phoenix Water MP Financial Analysis

Allocation of Revenue Requirement to Base and Use Charges

Charges	Recovery	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Rate Year ----->		1	2	3	4	5	6	7	8	9	10
Total		$1,448,231	$1,524,264	$1,604,287	$1,688,513	$1,777,159	$1,870,460	$1,968,660	$2,072,014	$2,180,795	$2,295,287
Base	70%	$1,013,762	$1,066,985	$1,123,001	$1,181,959	$1,244,012	$1,309,322	$1,378,062	$1,450,410	$1,526,556	$1,606,701
Use	30%	$434,469	$457,279	$481,286	$506,554	$533,148	$561,138	$590,598	$621,604	$654,238	$688,586

Source: City of Phoenix and HEC.

proj

6C - Table R-9

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Phoenix Water MP Financial Analysis
Bill Tabulation Summary

	Single Family		All Other Users		Total	
Block	Usage	Percentage of Use	Usage	Percentage of Use	Usage	Percentage of Use
Block 1	0	0%	0	0%	0	0%
Block 2	53,705,740	48%	12,053,352	9%	65,759,092	27%
Block 3	24,956,856	22%	8,817,512	7%	33,774,368	14%
Block 4	32,033,120	29%	31,997,324	24%	64,030,444	26%
Block 5	844,616	1%	80,878,216	60%	81,722,832	33%
Total	**111,540,332**	**100%**	**133,746,404**	**100%**	**245,286,736**	**100%**
Billable	**57,834,592**	**52%**	**121,693,052**	**91%**	**179,527,644**	**73%**

Source: City of Phoenix 2018 calendar year metered water use data. tab sum

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6C - Table R-10
Phoenix Water MP Financial Analysis
Bill Tabulation Summary for Seasonal Rates

Block	Single Family		All Other Users		Total		TOTAL
	Peak	Off Peak	Peak	Off Peak	Peak	Off Peak	
Block 1	0	0	0	0	0	0	0
Block 2	25,747,852	27,957,888	5,457,616	6,595,736	31,205,468	34,553,624	65,759,092
Block 3	18,278,212	6,678,644	4,438,760	4,378,752	22,716,972	11,057,396	33,774,368
Block 4	28,171,732	3,861,388	18,105,424	13,891,900	46,277,156	17,753,288	64,030,444
Block 5	705,476	139,140	53,676,048	27,202,168	54,381,524	27,341,308	81,722,832
Total	**72,903,272**	**38,637,060**	**81,677,848**	**52,068,556**	**154,581,120**	**90,705,616**	**245,286,736**
Billable	**47,155,420**	**10,679,172**	**76,220,232**	**45,472,820**	**123,375,652**	**56,151,992**	**179,527,644**

Source: City of Phoenix 2018 calendar year metered water use data.

seas tab

6C - Table R-11

Phoenix Water MP Financial Analysis

Alternative Rate Structures

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Item		2020 1	2021 2	2022 3	2023 4	2024 5	2025 6	2026 7	2027 8	2028 9	2029 10
Costs to Recover		$1,013,762	$1,066,985	$1,123,001	$1,181,959	$1,244,012	$1,309,322	$1,378,062	$1,450,410	$1,526,556	$1,606,701
Base Charges Calculation					*Number of Accounts Growth per Year = 1.20%*						
Number of Units		2,250	2,277	2,304	2,332	2,360	2,389	2,417	2,446	2,476	2,506
Annual Base Charge		$450.56	$468.59	$487.33	$506.82	$527.10	$548.18	$570.11	$592.90	$616.62	$641.27
Monthly Base Charge		**$37.55**	**$39.05**	**$40.61**	**$42.24**	**$43.93**	**$45.68**	**$47.51**	**$49.41**	**$51.38**	**$53.44**
Use Charges	**OPTION A: SMALL CHANGE TO CURRENT STRUCTURE**										
Allocated Cost		$434,469	$457,279	$481,286	$506,554	$533,148	$561,138	$590,598	$621,604	$654,238	$688,586
Est. Consumption (thousands galls) [1]		170,779	172,828	174,902	177,001	179,125	181,274	183,450	185,651	187,879	190,134
Cost per Thousand Galls		$2.54	$2.65	$2.75	$2.86	$2.98	$3.10	$3.22	$3.35	$3.48	$3.62
Tier 1: Up to 5,000 galls		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Tier 2: 5,001 to 10,000 galls	**1.00**	**$2.00**	**$2.08**	**$2.16**	**$2.25**	**$2.34**	**$2.44**	**$2.53**	**$2.63**	**$2.74**	**$2.85**
Tier 3: 10,001 to 50,000 galls	**1.25**	**$2.50**	**$2.60**	**$2.71**	**$2.81**	**$2.93**	**$3.04**	**$3.17**	**$3.29**	**$3.42**	**$3.56**
Tier 4: > 50,000 galls	**1.40**	**$2.80**	**$2.91**	**$3.03**	**$3.15**	**$3.28**	**$3.41**	**$3.55**	**$3.69**	**$3.83**	**$3.99**
Use Charges	**OPTION B: SEASONAL RATE STRUCTURE**										
Off Peak (Oct - Apr)	**Cost Alloc:**	$109,316	$115,055	$121,095	$127,453	$134,144	$141,187	$148,599	$156,401	$164,612	$173,254
Tier 1: Up to 5,000 galls		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Tier 2: > 5,000 galls		**$2.05**	**$2.13**	**$2.21**	**$2.30**	**$2.39**	**$2.49**	**$2.59**	**$2.69**	**$2.80**	**$2.91**
Peak (May - Sep)	**Cost Alloc:**	$325,153	$342,224	$360,191	$379,101	$399,004	$419,951	$441,999	$465,204	$489,627	$515,332
Tier 1: Up to 5,000 galls		$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Tier 2: 5,001 - 10,000 galls	**1.00**	**$2.05**	**$2.13**	**$2.21**	**$2.30**	**$2.39**	**$2.49**	**$2.59**	**$2.69**	**$2.80**	**$2.91**
Tier 3: 10,001 to 50,000 galls	**1.35**	**$2.76**	**$2.87**	**$2.99**	**$3.11**	**$3.23**	**$3.36**	**$3.50**	**$3.64**	**$3.78**	**$3.93**
Tier 4: > 50,000 galls	**1.50**	**$3.07**	**$3.19**	**$3.32**	**$3.45**	**$3.59**	**$3.74**	**$3.88**	**$4.04**	**$4.20**	**$4.37**

Source: HEC.

rate ops

[1] Excludes all use less than 5,000 gallons in a month.

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Phoenix Water MP Financial Analysis
Comparison Bills under Rate Structures A and B

	Option A						Option B: Off Peak			Option B: Peak				
Monthly Use		Use				**Total**	Use		**Total**	Use				**Total**
in Gallons	**Base**	Tier 1	Tier 2	Tier 3	Tier 4	**Bill**	Tier 1	Tier 2	**Bill**	Tier 1	Tier 2	Tier 3	Tier 4	**Bill**
		$0.00	$2.00	$2.50	$2.80		$0.00	$2.05		$0.00	$2.05	$2.76	$3.07	
1,000	$37.55	$0	$0	$0	$0	**$37.55**	$0	$0	**$37.55**	$0	$0	$0	$0	**$37.55**
2,000	$37.55	$0	$0	$0	$0	**$37.55**	$0	$0	**$37.55**	$0	$0	$0	$0	**$37.55**
3,000	$37.55	$0	$0	$0	$0	**$37.55**	$0	$0	**$37.55**	$0	$0	$0	$0	**$37.55**
4,000	$37.55	$0	$0	$0	$0	**$37.55**	$0	$0	**$37.55**	$0	$0	$0	$0	**$37.55**
5,000	$37.55	$0	$0	$0	$0	**$37.55**	$0	$0	**$37.55**	$0	$0	$0	$0	**$37.55**
6,000	$37.55	$0	$2.00	$0	$0	**$39.55**	$0	$2.05	**$39.59**	$0	$2.05	$0	$0	**$39.59**
7,000	$37.55	$0	$4.00	$0	$0	**$41.55**	$0	$4.09	**$41.64**	$0	$4.09	$0	$0	**$41.64**
8,000	$37.55	$0	$6.00	$0	$0	**$43.55**	$0	$6.14	**$43.69**	$0	$6.14	$0	$0	**$43.69**
9,000	$37.55	$0	$8.00	$0	$0	**$45.55**	$0	$8.19	**$45.73**	$0	$8.19	$0	$0	**$45.73**
10,000	$37.55	$0	$10.01	$0	$0	**$47.55**	$0	$10.23	**$47.78**	$0	$10.23	$0	$0	**$47.78**
11,000	$37.55	$0	$10.01	$2.50	$0	**$50.05**	$0	$12.28	**$49.83**	$0	$10.23	$2.76	$0	**$50.54**
12,000	$37.55	$0	$10.01	$5.00	$0	**$52.56**	$0	$14.33	**$51.87**	$0	$10.23	$5.53	$0	**$53.30**
13,000	$37.55	$0	$10.01	$7.50	$0	**$55.06**	$0	$16.37	**$53.92**	$0	$10.23	$8.29	$0	**$56.07**
14,000	$37.55	$0	$10.01	$10.01	$0	**$57.56**	$0	$18.42	**$55.97**	$0	$10.23	$11.05	$0	**$58.83**
15,000	$37.55	$0	$10.01	$12.51	$0	**$60.06**	$0	$20.47	**$58.01**	$0	$10.23	$13.81	$0	**$61.59**
16,000	$37.55	$0	$10.01	$15.01	$0	**$62.56**	$0	$22.51	**$60.06**	$0	$10.23	$16.58	$0	**$64.36**
17,000	$37.55	$0	$10.01	$17.51	$0	**$65.06**	$0	$24.56	**$62.10**	$0	$10.23	$19.34	$0	**$67.12**
18,000	$37.55	$0	$10.01	$20.01	$0	**$67.57**	$0	$26.60	**$64.15**	$0	$10.23	$22.10	$0	**$69.88**
19,000	$37.55	$0	$10.01	$22.51	$0	**$70.07**	$0	$28.65	**$66.20**	$0	$10.23	$24.87	$0	**$72.64**
20,000	$37.55	$0	$10.01	$25.02	$0	**$72.57**	$0	$30.70	**$68.24**	$0	$10.23	$27.63	$0	**$75.41**
25,000	$37.55	$0	$10.01	$37.52	$0	**$85.08**	$0	$40.93	**$78.48**	$0	$10.23	$41.44	$0	**$89.22**
30,000	$37.55	$0	$10.01	$50.03	$0	**$97.58**	$0	$51.16	**$88.71**	$0	$10.23	$55.26	$0	**$103.04**
35,000	$37.55	$0	$10.01	$62.54	$0	**$110.09**	$0	$61.40	**$98.94**	$0	$10.23	$69.07	$0	**$116.85**
40,000	$37.55	$0	$10.01	$75.05	$0	**$122.60**	$0	$71.63	**$109.17**	$0	$10.23	$82.88	$0	**$130.66**
45,000	$37.55	$0	$10.01	$87.55	$0	**$135.11**	$0	$81.86	**$119.41**	$0	$10.23	$96.70	$0	**$144.48**
50,000	$37.55	$0	$10.01	$100.06	$0	**$147.61**	$0	$92.09	**$129.64**	$0	$10.23	$110.51	$0	**$158.29**
55,000	$37.55	$0	$10.01	$100.06	$14.01	**$161.62**	$0	$102.33	**$139.87**	$0	$10.23	$110.51	$15.35	**$173.64**
60,000	$37.55	$0	$10.01	$100.06	$28.02	**$175.63**	$0	$112.56	**$150.11**	$0	$10.23	$110.51	$30.70	**$188.99**
65,000	$37.55	$0	$10.01	$100.06	$42.03	**$189.64**	$0	$122.79	**$160.34**	$0	$10.23	$110.51	$46.05	**$204.34**
70,000	$37.55	$0	$10.01	$100.06	$56.03	**$203.65**	$0	$133.02	**$170.57**	$0	$10.23	$110.51	$61.40	**$219.69**
75,000	$37.55	$0	$10.01	$100.06	$70.04	**$217.66**	$0	$143.26	**$180.80**	$0	$10.23	$110.51	$76.74	**$235.04**
80,000	$37.55	$0	$10.01	$100.06	$84.05	**$231.66**	$0	$153.49	**$191.04**	$0	$10.23	$110.51	$92.09	**$250.38**
85,000	$37.55	$0	$10.01	$100.06	$98.06	**$245.67**	$0	$163.72	**$201.27**	$0	$10.23	$110.51	$107.44	**$265.73**
90,000	$37.55	$0	$10.01	$100.06	$112.07	**$259.68**	$0	$173.95	**$211.50**	$0	$10.23	$110.51	$122.79	**$281.08**
95,000	$37.55	$0	$10.01	$100.06	$126.08	**$273.69**	$0	$184.19	**$221.73**	$0	$10.23	$110.51	$138.14	**$296.43**
100,000	$37.55	$0	$10.01	$100.06	$140.09	**$287.70**	$0	$194.42	**$231.97**	$0	$10.23	$110.51	$153.49	**$311.78**

Source: HEC.

bill imp