

EXECUTIVE SUMMARY

The purpose of this Water Distribution System Master Plan (WDSMP) is to provide the City of Grants Pass (City) with the information needed to inform long-term water distribution infrastructure decisions. The objectives of the WDSMP include:

- Document existing water system facilities
- Estimate future water requirements including potential water system expansion areas consistent with related City planning efforts
- Identify deficiencies and recommend water facility improvements that correct deficiencies, optimize existing pressure zones and provide for system growth
- Update the City's capital improvement program (CIP)
- Comply with water system master planning requirements for Public Water Systems established under Oregon Administrative Rules (OAR)

Water System Overview

Service Area

The City owns and operates a public water system that supplies potable water to residents, businesses and public institutions within the city limits and a small number of customers in the North Valley area. The City's water system provides fire suppression to the city limits and specific areas of North Valley including North Valley Industrial Area (NVIA) and the Paradise Ranch development. Many residents within the city limits receive potable water from private wells and are not City water customers. Area residents within the City's Urban Growth Boundary (UGB) are eligible to become City water customers with a signed Service and Annexation Agreement.

Supply

The Grants Pass Water Treatment Plant (WTP) uses conventional filtration to treat surface water drawn from an adjacent intake on the Rogue River. The WTP is the sole source of potable water for the City. The WTP's current hydraulic capacity is approximately 20 million gallons per day (mgd). Further evaluation of the City's treatment and supply system may be found in the *2014 Grants Pass Water Treatment Plant Facility Plan Update*.

Distribution System

Water distribution systems are divided into pressure zones in order to provide adequate service pressure to customers at different elevations. Each pressure zone is served by specific facilities, such as, reservoirs or pump stations and related piping which supply pressure to customers. The City's existing distribution system is divided into 5 primary pressure zones served by 8 gravity storage reservoirs and 13 booster pump stations. The City's distribution piping includes approximately 188 miles of pipe in sizes up to 36 inches in diameter. A

summary of existing facilities and the pressure zones they serve is illustrated in **Figure ES-1** at the end of this section.

Water Demand

Water demand refers to all water required by the system including residential, commercial, industrial and institutional uses. Demands are described using water use metrics including average daily demand (ADD) and maximum day demand (MDD). Current water demands by pressure zone are calculated based on total water production from the City’s WTP and customer billing records.

Projected Future Demands

Estimates of future growth and related water demand are developed using the best available information for the City’s service area including the Population Research Center’s (PRC’s) June 2015 *Coordinated Population Forecast for Josephine County*, buildable lands inventory from the City’s *Comprehensive Plan 2014 Update* and current water demand data. Future water demands are forecast at 10-years, 20-years and at saturation development. For the purposes of this WDSMP, saturation development is assumed to occur at 30 years. Current and projected future water demands in mgd are summarized in **Table ES-1**.

**Table ES-1
Water Demand Forecast Summary**

Timeframe	Water Demand (mgd)	
	ADD	MDD
Existing	5.51	11.24
10-Year	7.25	15.27
20-Year	8.98	18.91
Saturation (30-Year)	11.12	23.44

Distribution System Analysis Criteria

Performance guidelines and system criteria are used with water demands presented in **Table ES-1** to assess the water distribution system's ability to provide adequate water service under existing conditions and to guide improvements needed to provide for future water needs.

Criteria are established through a review of State of Oregon requirements, American Water Works Association (AWWA) acceptable practice guidelines, Insurance Services Office, Inc. (ISO) guidelines and operational practices of similar water providers.

Service Pressure

- Normal range under ADD conditions: 35 to 80 pounds per square inch (psi)
- Maximum per *Oregon Plumbing Specialty Code*: 80 psi
- Minimum under emergency or fire flow conditions per State requirements: 20 psi

Storage Volume

Recommended storage volume is the sum of three components:

- Operational Storage: volume of water needed in each zone to meet demands in excess of delivery capacity from the WTP or pump station to reservoirs serving that zone
- Fire Storage: volume of water needed in each zone to meet the largest fire flow demand in that zone for the duration specified in the *Oregon Fire Code*
- Emergency Storage: volume to supply customers in each zone in the event of an emergency which makes supply to the zone temporarily unavailable, such as, pipeline or equipment failure or natural disaster

Pump Station Capacity

Pump stations should have adequate firm capacity to meet peak demands in the zone. Firm capacity is defined as the station capacity with the largest pump out of service.

Fire Flow

The distribution system should be capable of supplying the recommended fire flows while maintaining minimum residual pressures everywhere in the system of 20 psi.

Analysis and System Deficiencies

Using a hydraulic computer model with projected water demands and system mapping, the distribution system was evaluated based on the performance criteria described above. Improvement projects and recommended configuration changes were developed based on the deficiencies identified through this process.

Pressure Zones and Service Pressure

Due to the City's hilly terrain, providing adequate service pressure between 35 and 80 psi is challenging in some areas of the current distribution system. Some customers at slightly higher elevations on the perimeter of the distribution system, those near pressure zone boundaries or those in areas with limited existing water system piping may have pressures below 35 psi. It is recommended that the City consider some pressure zone boundary adjustments as new development occurs to address these deficiencies.

In order to provide service to future development in the City's Urban Growth Boundary (UGB) several new pressure zones and related facilities, like pump stations and reservoirs, will be required. Many of these areas at higher elevations may initially be served by constant pressure pumping similar to the existing Meadow Wood low (Zone 2MW), Allen Creek/New Hope (Zone 2NH) and Laurel Ridge/Starlite Place (Zone 4LR) areas. As growth continues it is recommended that gravity storage be constructed to serve each zone. Gravity storage dampens pressure fluctuations which can occur with constant pressure pumping to larger service areas and provides reliable emergency supply. Existing zones 2MW, 2NH and 4LR are recommended to make this transition from constant pressure pumped to gravity storage service within the 20-year plan as growth and development in these areas continues.

Storage Reservoir Capacity

There are existing storage capacity deficits in Reservoir No. 8 (Zone 3) and Reservoir No. 13 (Zone 4). Future Zone 3 service is anticipated to extend north of I-5 around Granite Hill and Scoville Roads which is a significant distance away from existing Zone 3 supply provided from Reservoir No. 8. It is recommended that additional Zone 3 storage be evaluated as part of the water service plan for this area. In addition to the current capacity deficit, Zone 4 Reservoir No. 13 is located on a constrained site with limited access. It is recommended that Reservoir No. 13 be replaced at a new site, such as, the City-owned property on Ausland Drive northwest of the current reservoir site.

Additional storage reservoirs are also recommended to serve anticipated future growth in the Meadow Wood (Zone 2MW), Allen Creek/New Hope (Zone 2NH) and Laurel Ridge/Starlite Place (Zone 4LR) areas as well as potential industrial development in the Spalding Industrial Area (Zone 2).

Pump Station Capacity

There are existing fire flow capacity deficits at the Meadow Wood high (Zone 3MW) and Panoramic (Zone 3P) constant pressure pump stations. Additional stations are recommended to serve the proposed Zone 4 reservoir replacement and future growth north of the existing city limits.

Pressure Reducing Valves

Several PRVs are recommended in the long term to maintain system looping and water quality, and also to provide emergency fire flow from upper zones. These PRVs are primarily at the perimeter of the existing system and are anticipated to be constructed with large diameter mains as growth in these areas warrants. In the short term, PRVs are recommended to replace the existing Manzanita and 9th & Savage PRVs which have siting and condition issues. These PRVs provide the only supply to Zone 2A at the city center.

Distribution Mains

Fire Flow Capacity

The City's existing distribution piping is, for the most part, well looped and adequately sized to meet existing demands and fire flow requirements. Some areas, particularly in residential neighborhoods, are served by 2-inch diameter mains. These undersized mains do not meet current City standards and are not capable of supplying adequate flow for fire protection. In the long term, several water main projects are recommended to improve system looping and supply anticipated growth.

Age and Routine Pipe Replacement

In order to provide for the continued reliable operation of the distribution system, renewal and replacement of distribution system piping must be planned for. The service life of the City's existing mains have exceeded 60+ years. It is recommended that the City consider a 100-year service life for mains. In order to maintain reliable operation, without significant unexpected main breaks and leaks, it is recommended that capital maintenance budgeting for the distribution system be based on complete main replacement every 100 years. The prioritization and timing of main replacements should be based on known issues (corrosion, main breaks, etc.) and coordinated with other street improvement projects.

Recommended Capital Improvement Program (CIP)

A summary of all recommended improvement projects and estimated project costs is presented in **Table ES-2**. This CIP table provides for project sequencing by showing prioritized projects for the 5-year, 10-year and 20-year timeframes defined as follows:

- 5-year timeframe - recommended completion between 2016 and 2021
- 10-year timeframe - recommended completion between 2022 and 2026
- 20-year timeframe - recommended completion between 2027 and 2036.

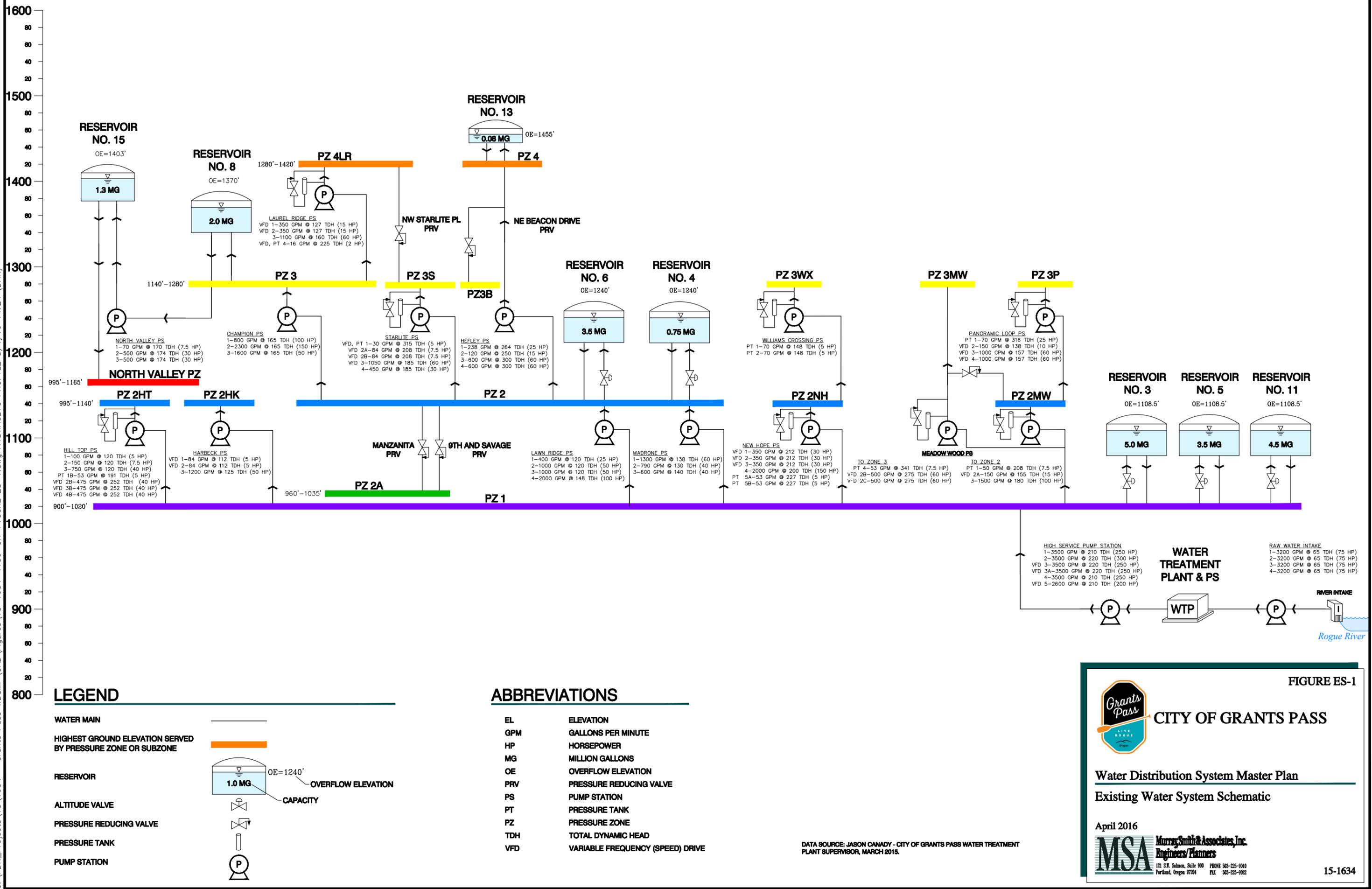
Estimated project costs presented in the CIP are intended to provide guidance in system master planning and long-range project scheduling and implementation. Final project costs will vary depending on actual labor and material costs, market conditions for construction, regulatory factors, final project scope, project schedule and other factors.

Cost Allocation to Growth

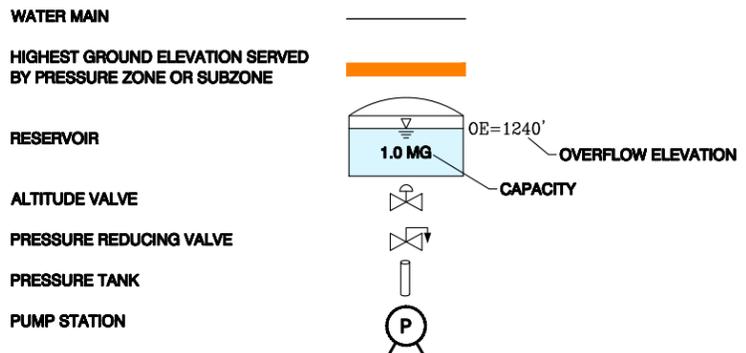
Projects that benefit future water system customers by providing capacity for growth may be funded through system development charges (SDCs). SDCs are sources of funding generated through development and water system growth and are determined as part of a financial evaluation based in part on a utility's current CIP. To facilitate a financial evaluation a preliminary percentage of the cost of each project which benefits future water system growth is allocated in the CIP table.

Many CIP projects are considered water system performance improvements which benefit all customers. The estimated costs of these improvements are allocated 52 percent to future growth based on the ratio of current to projected future system-wide MDD at saturation development.

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LEGEND



ABBREVIATIONS

EL	ELEVATION
GPM	GALLONS PER MINUTE
HP	HORSEPOWER
MG	MILLION GALLONS
OE	OVERFLOW ELEVATION
PRV	PRESSURE REDUCING VALVE
PS	PUMP STATION
PT	PRESSURE TANK
PZ	PRESSURE ZONE
TDH	TOTAL DYNAMIC HEAD
VFD	VARIABLE FREQUENCY (SPEED) DRIVE

DATA SOURCE: JASON CANADY - CITY OF GRANTS PASS WATER TREATMENT PLANT SUPERVISOR, MARCH 2015.

FIGURE ES-1

CITY OF GRANTS PASS

Water Distribution System Master Plan

Existing Water System Schematic

April 2016

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15-1634

**Table ES-2
Capital Improvement Program (CIP) Summary**

Improvement Category	CIP No.	Project Description	CIP Schedule and Project Cost Summary				Preliminary Cost % to Growth
			5-year	10-year	20-year	Estimated Project Cost	
			thru 2021	2022-2026	2027-2036		
Storage Reservoirs	R-13	0.7 MG Ausland Reservoir - Zone 4 Reservoir No. 13 replacement	\$ 2,100,000			\$ 2,100,000	40%
	R-14	0.5 MG Laurel Ridge Reservoir			\$ 1,500,000	\$ 1,500,000	40%
	R-16	1.3 MG Meadow Wood Reservoir		\$ 3,900,000		\$ 3,900,000	69%
	R-17	1.2 MG New Hope (Cathedral Hills) Reservoir		\$ 3,600,000		\$ 3,600,000	42%
	R-19	1.2 MG Pearce Park Reservoir - Zone 2 Spalding Industrial Park			\$ 3,600,000	\$ 3,600,000	100%
		Capital Maintenance	\$ 75,000			\$ 75,000	52%
		<i>Subtotal</i>	\$ 2,175,000	\$ 7,500,000	\$ 5,100,000	\$ 14,775,000	\$ 9,282,000
Pump Stations	P-1	Meadow Wood P.S. high (Zone 3MW) - fire flow capacity upgrade	\$ 250,000			\$ 250,000	52%
	P-2	Panoramic P.S. - fire flow capacity upgrade	\$ 400,000			\$ 400,000	52%
	P-3	Ausland P.S. supplying proposed Ausland Reservoir (R-13)	\$ 500,000			\$ 500,000	52%
	P-4	Zone 4N P.S. - constant pressure			\$ 1,200,000	\$ 1,200,000	100%
	P-5	North Valley P.S. replacement		\$ 1,000,000		\$ 1,000,000	79%
		Capital Maintenance	\$ 125,000			\$ 125,000	52%
		<i>Subtotal</i>	\$ 1,275,000	\$ 1,000,000	\$ 1,200,000	\$ 3,475,000	\$ 2,654,145
PRVs	V-1	Spalding Industrial Area - Ament Rd PRV			\$ 150,000	\$ 150,000	100%
	V-2	Zone 4N Highland Ave PRV			\$ 150,000	\$ 150,000	100%
	V-3	Blue Gulch PRV			\$ 150,000	\$ 150,000	100%
	V-4	Overland PRV			\$ 150,000	\$ 150,000	100%
	V-5	10th Street PRV	\$ 150,000			\$ 150,000	52%
	V-6	NW B Street PRV			\$ 150,000	\$ 150,000	100%
	V-7	Zone 2A PRV replacements (Capital Maintenance)	\$ 250,000			\$ 250,000	52%
		<i>Subtotal</i>	\$ 400,000	\$ -	\$ 750,000	\$ 1,150,000	\$ 958,000
Distribution Mains	M-1, 2, 3, 9, 10	Piping improvements for fire flow	\$ 683,000			\$ 683,000	52%
	M-4 to 8	Zone 2A - Hwy 99, Savage, Manzanita Loop	\$ 758,000			\$ 758,000	52%
	M-11, 12	Proposed Zone 2H - connect Harbeck and Hilltop			\$ 532,000	\$ 532,000	100%
	M-13 to 22	Spalding Industrial Area - Zone 2 expansion			\$ 3,181,000	\$ 3,181,000	100%
	M-24, 25, 26	Zone 3 Granite Hill to Scoville Loop			\$ 1,415,000	\$ 1,415,000	100%
	M-27 to 30	Zone 3 Scoville to Spring Mountain Loop			\$ 1,107,000	\$ 1,107,000	100%
	M-31 to 33, 42	Zone 3 I-5 crossing at Cedar Loop, Spring Mountain to Hillcrest Loop			\$ 1,396,000	\$ 1,396,000	100%
	M-34 to 41, 52	Proposed Ausland P.S. (P-3) and Reservoir (R-13) mains	\$ 2,897,000			\$ 2,897,000	52%
	M-43, 44	Zone 3 I-5 crossing at Humane Society			\$ 570,000	\$ 570,000	100%
	M-45, 46	Zone 3 Vine Street Loop - Highland to Hawthorne			\$ 996,000	\$ 996,000	52%
	M-47 to 51	Zone 4N mains			\$ 1,996,000	\$ 1,996,000	100%
	M-53 to M-57	Zone 1 Spalding Industrial Area loop			\$ 1,362,000	\$ 1,362,000	100%
	M-58 to 62	Meadow Wood future mains		\$ 1,173,000		\$ 1,173,000	100%
	M-63 to 68	New Hope future mains		\$ 2,532,000		\$ 2,532,000	100%
	M-69 to 75	Laurel Ridge and Blue Gulch future mains			\$ 1,870,000	\$ 1,870,000	100%
	M-76, 77, 81, 82, 83	Zone 1 Fruitdale future mains			\$ 2,087,000	\$ 2,087,000	100%
	M-78, 79, 80	Zone 1 Looping- Cloverlawn & Grandview		\$ 639,000		\$ 639,000	52%
	M-84 to 87	Existing system looping		\$ 955,000		\$ 955,000	52%
	M-88 to M-102	2-inch main replacement for fire flow	\$ 696,000	\$ 770,000	\$ 420,000	\$ 1,886,000	52%
		Routine Main Replacement Program (Capital Maint.)	\$ 7,800,000	\$ 7,800,000	\$ 15,600,000	\$ 31,200,000	52%
		<i>Subtotal</i>	\$12,834,000	\$13,869,000	\$ 32,532,000	\$ 59,235,000	\$ 40,028,280
Planning		Seismic Resilience Study	\$ 100,000			\$ 100,000	52%
		Water Management & Conservation Plan update		\$ 50,000		\$ 50,000	52%
		Water Distribution System Master Plan update			\$ 150,000	\$ 150,000	52%
		Unidirectional Flushing (UDF) Program Development	\$ 80,000			\$ 80,000	52%
		Distribution Piping Corrosion Study	\$ 100,000			\$ 100,000	52%
		<i>Subtotal</i>	\$ 280,000	\$ 50,000	\$ 150,000	\$ 480,000	\$ 249,600
Capital Improvement Program (CIP) Total			\$16,964,000	\$22,419,000	\$ 39,732,000	\$ 79,115,000	\$ 53,172,025
			Annual Average CIP Cost				
			\$3,392,800	\$3,938,300	\$3,955,750		
			5-year	10-year	20-year		