6. Capital Improvement Program

This chapter provides a summary of the City's water system capital improvement program (CIP). Planned improvement projects are described, as well as their associated cost estimates and anticipated implementation schedule.

6.1 Development of CIP

This CIP was prepared by first identifying projects that address water system needs or deficiencies, as documented in earlier chapters of the WCP. In addition, recurring or annual capital projects related to system maintenance (e.g., water main replacement programs) have also been included in the list of improvements.

A twenty-year implementation schedule of the projects was then developed. Generally, projects of higher priority (i.e., those that address current system needs) were scheduled for implementation within the six-year planning horizon (2010-2015). Projects that serve anticipated future needs associated with system growth, or are less critical to system operation, were scheduled for implementation between 2016 and 2029. Detailed scheduling of the higher priority projects was based primarily upon the City's existing forecast of project implementation timelines.

Planning-level (AACE[1] Class 4) cost estimates have been developed for each capital project included in the 2010-2029 CIP. Generally, each project cost includes the following components:

- **Base construction cost.** Includes all labor and material costs needed to construct a project. For pipeline projects, construction costs were estimated based upon unit construction costs derived from bid tabulations for recent City projects, prior cost estimates developed by the City, and bid results for recent similar projects throughout south Puget Sound.
- **Sales tax.** Calculated as 8.5 percent (the 2009 local tax rate) of the base construction cost.
- **Construction contingency.** Takes into account the uncertainties associated with estimating project costs at this planning level. Calculated as 30 percent of the total of base construction plus sales tax.
- **Design engineering.** Includes City and consultant design costs, and other related cost items, such as permitting and construction administration. For most projects, this is calculated as 25 percent of the base construction cost. However, a higher percentage of the base construction cost is used for projects with more complex design or permitting needs.

These elements are summed to determine the total project-level cost estimate for a project, as expressed in 2009 dollars.

To account for inflation and the increase of construction costs over time, the base project-level costs have been escalated to their anticipated year of construction. It is impossible to predict

[1] Association for the Advancement of Cost Engineering.

accurately the rate at which construction costs will increase over the 2010-2029 period; however, a conventional method to estimate such increases is to examine cost index trends of past years.

The most comprehensive set of historical construction cost data in the United States is reflected in the RS Means Historical Cost Indexes. The Olympia, Washington indexes indicate that construction costs have increased at an average rate of 4.9 percent per year over the past three years (2006-2009). This historic value is used to escalate construction project costs from base year (2009) dollars to costs in the anticipated year of construction.

Where applicable, design costs are scheduled one year in advance of construction costs, to reflect the phasing typically involved in larger projects.

6.2 Planned Projects

Table 6-1 presents the City's schedule of CIP projects planned for implementation between 2010 and 2029. Figure 6-1 provides the locations for the major planned improvements. Descriptions of each project are included below.

In total, the City's six-year CIP (for years 2010-2015) includes approximately $24.3 million in improvements (in inflation-adjusted dollars). The long-term CIP (2016-2029) includes approximately $68.0 million in additional improvements.

Table 6-1. Capital Improvement Program (2010-2029)

Project No.	Description	Purpose of Project [2]	Financing Source [3]	Base Project Cost (2009 Dollars)	Schedule and Cost of Improvements (in thousands of dollars) [1]									
					2010	2011	2012	2013	2014	2015	6-yr CIP TOTAL	2016-2029 [4]		20-yr CIP TOTAL
Water System Projects														
Water Supply														
S-1	Water System Disinfection Facilities	Deficiency	OI/CF	2,479	2,600						2,600			2,600
S-2	Palermo Wellfield Improvements (1,147 gpm)	Deficiency	OI/CF	776	185	660					845			845
S-3	Water Rights Acquisition and Mitigation [5]	Deficiency	OI/CF	100	214	110	231	121	254	133	1,063	1,553	Annual	2,616
S-4	Brewery Wellfield - Source Approval and Long-Term Recommendations Report	Deficiency	OI/CF	40	42						42			42
S-5	Brewery Wellfield Infrastructure Development (2,000 gpm)	Deficiency	LT	1,601	158	715		969			1,842			1,842
S-6	Brewery Wellfield Treatment (2,000 gpm)	Deficiency	LT	5,272		1,470		4,766			6,236			6,236
S-7	Brewery Wellfield Abandonment of Existing Wells	Deficiency	LT	250			46	254			300			300
S-8	NE Wellfield Infrastructure Development (2,000 gpm)	Deficiency	LT	1,660							0	2,306	(2022)	2,306
S-9	NE Wellfield Treatment (2,000 gpm)	Deficiency	LT	5,272							0	9,703	(2022)	9,703
S-10	SW Wellfield - Mitigation Feasibility Study	Deficiency	OI/CF	25	26						26			26
S-11	SW Wellfield Property Acquisition	Deficiency	OI/CF	595	100	550					650			650
S-12	SW Wellfield Infrastructure Development (2,226 gpm)	Deficiency	LT	1,250							0	1,909	(2018)	1,909
S-13	SW Wellfield Treatment (2,226 gpm)	Deficiency	LT	5,799							0	8,814	(2018)	8,814
S-14	Wellhead Protection Area Update	Deficiency	OI/CF	33		36					36			36
S-15	Bush Wellfield Treatment Facility Modification (500 gpm)	Deficiency	OI/CF	20		22					22			22
Water Storage														
ST-1	New 2.5 MG Reservoir in 350 Zone (in SE portion of the system)	Deficiency	LT	5,030				61		999	1,060	5,912	(2016)	6,972
Water Pump Stations														
PS-1	454 Zone BPS Capacity Upgrade (1,500 gpm)	Deficiency	OI/CF	580					51	720	770			770
Water Distribution System														
D-1	Emerging Projects/Oversizing [5]	Growth	OI/CF	1,000	50	55	58	61	64	67	353	1,230	Annual	1,583
D-2	Annual Watermain Replacement [5]	O&M	OI/CF	4,500			289	303	318	333	1,242	6,150	Annual	7,392
D-3	Annual Reclaimed Water Distribution Piping [5]	Improve	OI/CF	1,400							0	2,460	Annual	2,460
D-4	Watermain Extension Underneath I-5 along 93rd Ave. (2,200 LF - 16")	Growth	OI/CF & Dev	412	275	165					440			440
D-5	Transmission Main to SW Wellfield (1,800 LF - 16")	Deficiency	OI/CF	1,625					64	100	163	2,307	(2018)	2,471
D-6	N-S Transmission - Tumwater Blvd. from Tyee Dr to 73rd Ave. (4,300 LF- 24")	Growth	Dev	1,085						753	753	559	(2016)	1,312
D-7	Littlerock - Tumwater Blvd. to Prine Rd (2,600 LF - 24")	Growth	Dev	980		165	958				1,123			1,123
D-8	Tumwater Blvd Extension - Bonniewood Dr to Silver Ridge Way (4,700 LF - 12")	Growth	Dev	1,750					330		330	2,292	(2018)	2,622
D-9	Henderson Blvd Extension - 65th Ave to Pioneer Park (2,700 LF - 16")	Growth	Dev	525						67	67	696	(2017)	763
D-10	Trosper Rd Main Extension (6,700 LF - 8")	Growth	OI/CF & Dev	1,670							0	2,676	(2019)	2,676
D-11	Linwood, Rural, and Sapp Rd (2,400 LF - 8")	Growth	OI/CF & Dev	430		33	462				495			495
D-12	Transmission Main from Brewery Well (500 LF - 12")	Deficiency	OI/CF	140			23	145			168			168
D-13	Custer Way Extension - Boston St to Capitol Blvd (1,000 LF - 12")	Improve	OI/CF	500				121	508		629			629
D-14	Transmission main from NE Well (800 LF - 10")	Deficiency	OI/CF & Dev	210							0	389	(2022)	389
D-15	Prine Rd - Littlerock Rd to Kimmie St (5,400 LF - 24")	Growth	Dev	2,010							0	4,501	(2025)	4,501
D-16	Transmission main - South Reservoir along Old Hwy 99 (8,500 LF - 16")	Growth	Dev/LT	3,110						626	626	3,690	(2016)	4,316
D-17	Transmission main - SW well to SE Reservoir Along 93rd Ave (15,000 LF - 16")	Growth	Dev/LT	5,480							0	9,661	(2020)	9,661
D-18	Increase 8" Main on Sapp Rd (3,000 LF - 12")	Deficiency	OI/CF	850			150	872			1,022			1,022
D-19	Replace 6" on C St and S 2nd Ave SW, from C St to Division St (1,800 LF - 10")	Improve	OI/CF	480							0	640	(2023)	640
Water Maintenance and Operations														
M-1	Telemetry System Upgrade	O&M	OI/CF	394	80	350					430			430
M-2	Palermo Wellfield - Automatic Emergency Generator	O&M	OI/CF	100		110					110			110
M-3	Palermo Wellfield - Fencing Enhancements	O&M	OI/CF	200		220					220			220
M-4	Bush Wellfield - Fiber Backbone (SCADA, security)	O&M	OI/CF	200			231				231			231
M-5	Virtual Private Network (VPN)	O&M	OI/CF	25						33	33			33
M-6	Real-time Pressure Monitoring	O&M	OI/CF	50						67	67			67
M-7	Data loggers for groundwater level monitoring and associated web link for data viewing	O&M	OI/CF	15				18			18			18
M-8	GIS-based water quality database recording system	O&M	OI/CF	20						27	27			27
M-9	Water System Plan Update	O&M	OI/CF	140	35					187	222	580	(2021, 2027)	801
Total Costs for Projects Funded from Operating Income and Connection Fees				17,649	3,470	2,213	1,212	1,641	1,258	1,666	11,459	16,452		27,910
Total Costs for Projects Funded/Contributed by Developers				7,711	138	264	1,189	0	330	819	2,740	9,581		12,321
Total Costs for Projects Funded from Long Term Debt				34,724	158	2,185	46	6,050	0	1,626	10,065	41,995		52,060
Total Costs of Water System Improvements				**60,084**	**3,765**	**4,662**	**2,447**	**7,690**	**1,588**	**4,111**	**24,264**	**68,027**		**92,291**

Notes:

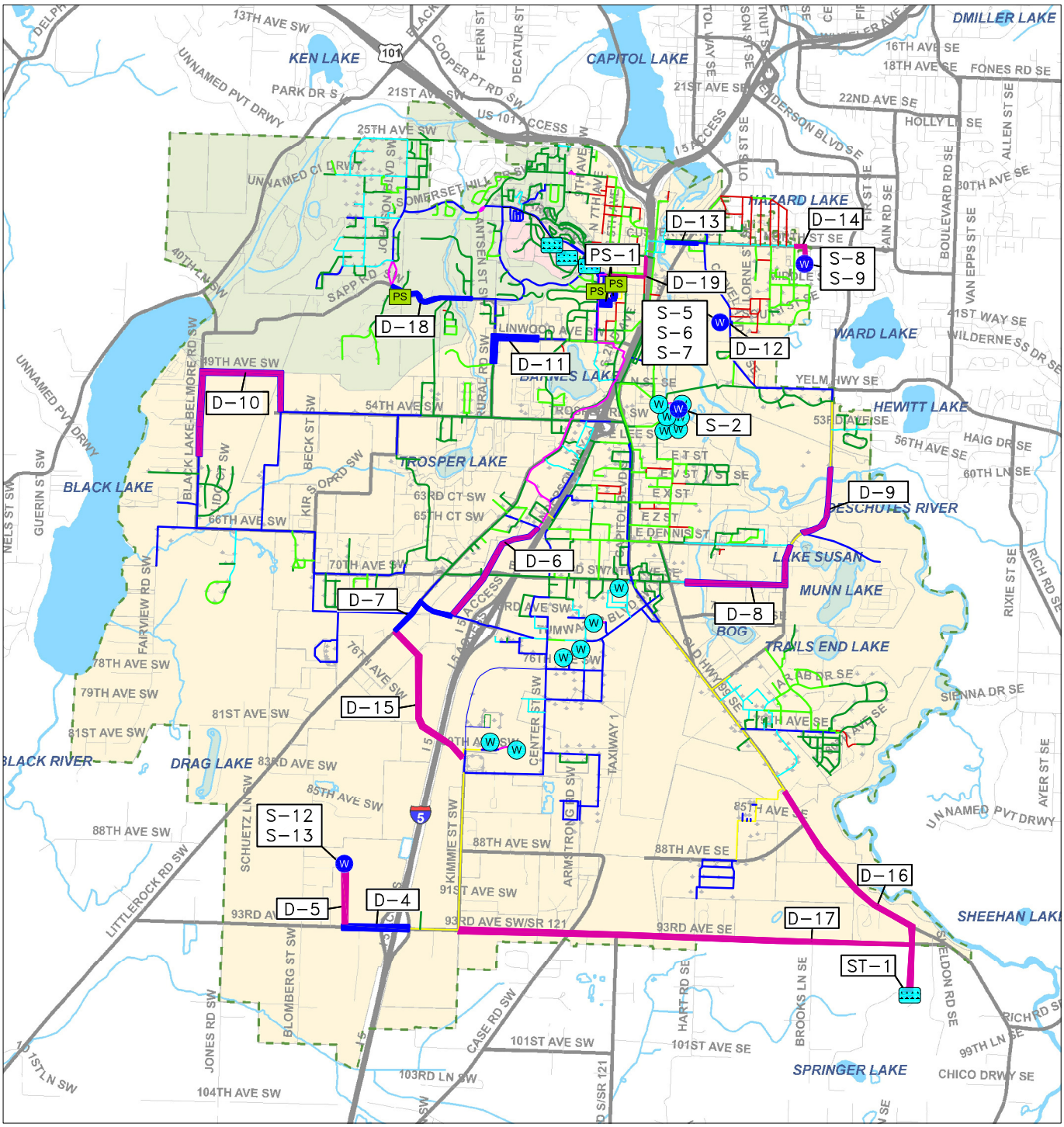
(1) Costs are escalated from Base Project Cost (2009 dollars) to stated year of construction, assuming a 4.9% annual increase in costs.

(2) Purpose of Project: Deficiency = Addresses deficiencies identified in the Water System Plan; Improve = Does not address a deficiency, but improves overall system operation; Growth = Required to address growth/expansion of the distribution system; O&M = Necessary for proper system maintenance.

(3) Source of Funding: OI/CF = Operating Income and Connection Fees; Dev = Developer Funded/Contributed; LT = Long Term Debt. Any project listed as OI/CF & Dev is assumed to be funded 50/50 by these two sources.

(4) Total costs associated with projects implemented in 2016 through 2029. Specific years of project implementation are noted where applicable.

(5) Includes annually budgeted amount to cover unspecified project costs. These costs are escalated per Note 1 to account for construction cost increases.
For Project S-3, the annual cost alternates between being $200,000 and $100,000 for 2010-2015, and then is held at $100,000 for future years.



Legend

- 4 Inch
- 6 Inch
- 8 Inch
- 10 inch
- 12 Inch
- 16 Inch
- 24 Inch
- Existing Well
- Planned Well
- Tank
- Booster Pump Station
- 350 Zone
- 454 Zone
- 549 Zone
- 6 Year CIP
- 20 Year CIP
- D-X CIP No.
- Tumwater UGA

FIGURE 6.1
CAPITAL IMPROVEMENT PROGRAM
CITY OF TUMWATER
WATER SYSTEM PLAN

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0 1250 2500 5000 Feet

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6.2.1 Water Supply and Treatment Projects

The following projects involve water supply, treatment, and source protection related improvements.

- **S-1: Water System Disinfection Facilities.** This project refers to the permanent disinfection program the City is implementing to provide and maintain a chlorine residual in the range 0.05 to 0.30 mg/L as Cl_2 throughout its distribution system. The project involves the construction of sodium hypochlorite solution storage and chemical feed systems at each system entry-point, as well as at the co-located C Street Booster Pump Station and Booster Station No. 4. As part of this project, water from Well 10 will be piped directly to the facility for Well 9 for combined chlorination prior to distribution. This project is required for voluntary compliance with a DOH Bilateral Compliance Agreement established in 2006.
- **S-2: Palermo Wellfield Improvements.** The City plans to construct additional well(s) at the Palermo Wellfield to increase the overall capacity of this source by approximately 1,150 gpm, in order to maximize use of the water rights and treatment facility capacities at this location.
- **S-3: Water Rights Acquisition and Mitigation.** This program includes funding for the purchase of existing water rights, water right change application processing, and/or mitigation activities that may be required for obtaining new water rights (e.g., development of facilities to support the use of reclaimed water in the mitigation of streamflow impacts associated with new groundwater withdrawals).
- **S-4: Brewery Wellfield – Source Approval and Long-Term Recommendations Report.** The City, along with its partners (the cities of Olympia and Lacey) on this regional water resource development effort, plans to develop a new source of supply at the former Olympia Brewery site. Water rights have been secured, and now it is necessary to further evaluate the wellfield's yield and water quality, and related implications in terms of infrastructure development. This analysis will address the hydrogeological and water quality bases for source approval and water quality treatment design. This effort will lead to recommendations regarding the feasibility of rehabilitating and continuing the use of existing Brewery wells, versus the development of new wells on the site. The cost estimate represents the City's share (one third) of the total project cost. This project may be funded by monies set aside for infrastructure development at the Brewery site.
- **S-5: Brewery Wellfield - Infrastructure Development.** The three cities' approach to development of the Brewery source of supply is undetermined. However, for planning purposes, this CIP assumes that the City develops its share (one third) of the Brewery water rights independently and that a new well is determined to be the most feasible and cost-effective strategy for source development. The assumed capacity of a new well is 2,000 gpm, which is approximately the City's share of the Brewery instantaneous water right.
- **S-6: Brewery Wellfield – Treatment.** This project involves development of treatment facilities associated with the planned Brewery well. The results of Project S-4 will determine the treatment needs of the new source. At a minimum, disinfection facilities will be required, in keeping with the City's permanent disinfection program. For planning purposes, it is assumed that corrosion control will also be required. Further analysis of aquifer water quality is required to determine with confidence if

this will be needed. For the purposes of this CIP, air stripping technology is assumed for implementation, similar to what the City utilizes at its two existing treatment facilities.

A review of limited water quality data associated with the former Brewery wells indicates that high levels of iron and manganese are present in many of the existing wells in concentrations that may require significant investment in treatment (i.e., filtration). However, there is evidence that some existing wells have low levels of these metals. Therefore, treatment needs related to iron/manganese are uncertain. For planning purposes, it is assumed that an existing or new well can be utilized that does not require iron/manganese removal. This assumption will be revisited by the City pending the outcome of Project S-4.

- **S-7: Brewery Wellfield – Abandonment of Existing Wells.** Assuming new wells will be developed to utilize the Brewery water rights, nine existing wells at the site will be decommissioned, in accordance with WAC 173-160-381. The cost estimate for this project will be revisited once Project S-4 is completed and existing well characteristics are better understood. The estimate represents Tumwater's share (one third) of the total project cost.
- **S-8: NE Wellfield - Infrastructure Development.** As discussed in Chapter 5, the City is pursuing development of a new source of supply in the northeast portion of the City, located south of North Avenue. This project involves the construction of a well, with an approximate depth of 500 feet and a capacity of 2,000 gpm.
- **S-9: NE Wellfield – Treatment.** This project involves construction of treatment facilities at the NE Wellfield. Similar to Project S-6, this is assumed to include disinfection and corrosion control (via air stripping) facilities.
- **S-10: SW Wellfield – Mitigation Feasibility Study.** This project involves hydrogeological modeling in support of evaluating mitigation options associated with development of a new source of supply in the southwestern portion of the City. This project may be funded by monies set aside for water rights acquisition and mitigation related to development of the SW Wellfield.
- **S-11: SW Wellfield - Property Acquisition.** Property acquisition for the planned future wellfield in the southwest portion of the City. These funds may also be used to support property acquisition for the NE Wellfield, and/or could be used for acquisition of easements or protective covenants in cooperation with private land owners.
- **S-12: SW Wellfield - Infrastructure Development.** As discussed in Chapter 5, the City is pursuing development of a new source of supply in the southwest portion of the City, located west of I-5 and north of 93rd Avenue, adjacent to the soccer fields located in this area. This project involves the construction of a well, with an approximate depth of 100-200 feet and a capacity of 2,226 gpm, which is equal to the water rights amount requested in a pending water rights application.
- **S-13: SW Wellfield – Treatment.** This project involves construction of treatment facilities at the SW Wellfield. Similar to Project S-6, this is assumed to include disinfection and corrosion control (via air stripping) facilities.
- **S-14: Wellhead Protection Area Updates.** This project involves updating the City's wellhead protection area (WHPA) delineations, including development of WHPAs for the planned new sources of supply.

- **S-15: Bush Wellfield Treatment Facility Modification.** Wells 12 and 14, along with their associated water rights, can support combined production of approximately 3,000 gpm. However, the treatment facility is hydraulically limited to a total production capacity of approximately 2,500 gpm, due to the lack of an overflow in the treatment facility clearwell. This project involves the construction of an overflow and other improvements as may be necessary to increase production capacity at this facility to approximately 3,000 gpm, representing an increase in source capacity of 500 gpm.

6.2.2 Water Storage Projects

- **ST-1: SE Reservoir.** As discussed in Chapter 4, it is anticipated that the City will require additional storage capacity to meet future needs. This project involves construction of a new 2.5 million gallon reservoir to satisfy storage needs through the twenty-year planning period. Preliminary analysis indicates that a potentially suitable location for the reservoir is southeast of the City's service area, where ground elevation is conducive for the reservoir to be connected to the City's 350 Zone. A reservoir located in this area, far from the other reservoirs and sources of supply, also improves the hydraulics and reliability of the system. The cost estimate includes a provision for property acquisition of a 5-acre site.

6.2.3 Booster Pump Station Projects

- **PS-1: 454 Zone Booster Pump Station Capacity Upgrade.** As discussed in Chapter 4, the 454 Zone Booster Pump Station (BPS) is deficient in its ability to meet current and future maximum day demands. This project involves increasing the capacity of the BPS by 1,500 gpm by replacing and/or adding pumps.

6.2.4 Water Distribution Piping Projects

The following projects consist of water distribution system piping improvements. Unless otherwise noted, the projects represent improvements the City had identified prior to this WCP update, and are projects that serve to accommodate growth (through main extensions into currently unserved portions of the service area) or increase system reliability (through looping).

- **D-1: Emerging Projects/Oversizing.** These funds will be utilized to respond to development projects by providing for such items as completing loops to increase flows and system redundancy. This may include City investments related to main oversizing costs.

- **D-2: Annual Watermain Replacement.** These funds will be utilized to replace aging watermains in the system, including regular removal and replacement of AC piping.

- **D-3: Annual Reclaimed Water Distribution Piping.** These funds will be utilized for currently unspecified reclaimed water distribution projects throughout the system. Funding is allocated for the 7-20 year planning period.

- **D-4: 93rd Avenue Watermain Extension at Interstate 5.** This project would extend a 16-inch water main on 93rd Avenue from the east side of Interstate 5 toward

Blomberg Road (i.e., to the beginning of Project D-5), for a total project length of 2,200 lineal feet (LF).

- **D-5: Transmission Main to SW Wellfield.** This project would provide a 16-inch transmission main from the terminus of Project D-4 to the planned SW Wellfield. The estimated cost is based on an extension from 93rd Avenue approximately 1,800 feet.

- **D-6: N-S Transmission Main.** This project would continue the construction of the 24-inch transmission main on Tyee Drive from the end of the existing main near the pedestrian overcrossing, approximately 4,300 feet to the south to 73rd Avenue.

- **D-7: Littlerock Extension.** This project would continue the construction of the 24-inch transmission main along Littlerock Road from Tumwater Boulevard to Prine Road. The approximate length of the project is 2,600 LF.

- **D-8: Tumwater Blvd Extension.** This project will extend a 12-inch watermain along Tumwater Boulevard from Bonniewood Drive to Silver Ridge Way. The extension is approximately 4,700 feet in length.

- **D-9: Henderson Blvd Extension.** This project would extend a 16-inch water line 2,700 LF from 65th Avenue North along Henderson Boulevard to Pioneer Park. The extension would complete a loop through the easterly area of the city.

- **D-10: Trosper Rd Extension.** This project will extend an 8-inch water line 6,400 LF from the railroad tracks near the BPA sub-station to Black Lake Belmore, then south on Black Lake Belmore to the existing water line near Black Lake Elementary. This would complete the loop for this part of the service area.

- **D-11: Linwood/Sapp/Rural Extension.** This project involves extension of a 12-inch water line a total of 2,400 LF on Linwood, Rural, and Sapp Roads to complete a loop for this area.

- **D-12: Transmission from Brewery Wellfield.** This project will provide a 12-inch transmission line to the Brewery Wellfield. This will connect to an existing 12-inch water line along Cleveland Avenue. The total length of the project depends on the final location of the Brewery Wellfield, but is assumed here to be 500 LF.

- **D-13: Custer Way Extension.** This project will extend the 12-inch diameter waterline that was previously constructed across the Boston Bridge to east of Capitol Boulevard where it will connect into an existing 12-inch pipeline. This work was originally planned to be done simultaneously with the prior sewer work completed in this area, but due to the amount of roadway reconstruction required (including removal and reconstruction of concrete slabs within the existing roadway), it will likely be done in concert with future roadway improvements in this area.

- **D-14: Transmission from NE Wellfield.** This project will provide a 12-inch transmission main approximately 800 LF from the NE Wellfield to an existing 12-inch main along North Avenue.

- **D-15: Prine Rd Extension.** This project will continue the 24-inch transmission main approximately 5,400 LF along Prine Road from Littlerock Road to Kimmie Street.

- **D-16: Transmission from SE Reservoir.** This project will provide a 16-inch transmission main from the new SE Reservoir. The project cost is based on an estimated 8,500 LF of transmission main to connect to the existing 16-inch waterline along Old Hwy 99 SE.

- **D-17: Transmission main along 93rd Ave.** This project will provide a 16-inch transmission main to connect the SE Reservoir and the SW Wellfield along 93rd Avenue. The approximate length of the project is 15,000 LF between Kimmie Street and Springer Hills Lane.

- **D-18: Replace 8-inch Main on Sapp Road with 12-inch Main.** This project involves replacing approximately 3,000 LF of 8-inch piping along Sapp Road with 12-inch piping, in order to address fire flow deficiencies projected to occur in the future in the Mottman Industrial Area, as discussed in Chapter 3.

- **D-19: Replace 6-inch Main on C Street with 10-inch Main.** This project involves replacing approximately 1,800 LF of 6-inch piping along C Street and South 2nd Avenue SW, from C Street to Division Street with 10-inch piping, in order to decrease headloss in the conveyance of water from new sources of supply planned for on the east side of the City to storage facilities located west of I-5.

6.2.5 Water System Operations and Maintenance Projects

The following projects consist of water system operations and maintenance projects.

- **M-1: Telemetry System Upgrade.** This project involves a complete upgrade to the telemetry system that serves both the water and sewer systems. The cost estimate associated with this project relates to the water utility funded portion of the project.

- **M-2: Palermo Wellfield Automatic Generator.** This project involves an automatic generator to power the well pumps that are currently not connected to auxiliary power (i.e., Wells 2, 4, 5, and any new wells developed as part of Project S-2).

- **M-3: Palermo Wellfield Fencing Enhancements.** This project includes upgrade of an existing fence at the Palermo Wellfield site.

- **M-4: Bush Wellfield Fiber Backbone.** This project would involve extending a new fiber optic line from the City's existing fiber system to the Bush Wellfield to support SCADA and security systems.

- **M-5: Virtual Private Network.** This project involves an information technology systems upgrade, providing a secure extension of the City's network into the Internet, in order to make system operations more efficient. In addition to modernizing operations, this network will provide secure in-field accessibility to databases, improve complaint/problem response time and improve data management and communication. The cost estimate associated with this project relates to the water utility funded portion of the project.

- **M-6: Real-time Pressure Monitoring.** This project involves installation of pressure sensors at key locations throughout the distribution system, to support real-time

monitoring of pressure. The budget is predicated on sensors being installed at locations already equipped with connection to the SCADA system (e.g., pump stations and reservoirs), such that costs are only associated with the pressure devices themselves.

- **M-7: Data Loggers for Groundwater Level Monitoring.** This project involves installation of approximately six data loggers at select well sites to monitor groundwater levels. Also included is a web-based link for data viewing.

- **M-8: Water Quality Database Recording System.** This project involves development of a GIS-based database to manage water quality data.

- **M-9: Water System Plan Update.** This refers to the update to the WCP required every six years.