Chapter 11 – Transmission and Distribution Infrastructure – Contents

Tables

11. Transmission and Distribution Infrastructure

Transmission and distribution projects help meet the Drinking Water Utility's Goal 4:

Improve, operate and maintain the infrastructure to ensure reliable delivery of high quality water to a growing population.

The strategy for 2009-2014 is to develop and maintain adequate storage, transmission and distribution infrastructure.

Other projects for improving the infrastructure are discussed in **Chapter 9** (Source Infrastructure) and **Chapter 10** (Storage Infrastructure). Water quality strategies are in **Chapter 12** and operations and maintenance strategies are in **Chapter 13.**

This chapter describes the existing transmission and distribution systems, evaluates their ability to meet current and projected needs, and identifies projects to be constructed in 2009-2014.

11.1 EXISTING TRANSMISSION/DISTRIBUTION SYSTEM

Olympia maintains an extensive system of piping, booster pump stations, and related facilities to convey water at sufficient pressures and appropriate flows to customers in seven pressure zones. **Figure 2.4** in **Chapter 2** shows the locations of key transmission and distribution system facilities. A hydraulic schematic of the system is provided in **Figure 2.5** in **Chapter 2**.

A series of tables follow, summarizing major transmission and distribution system components. **Table 11.1** is an inventory of distribution piping, by pressure zone, size, and material. **Table 11.2** is an inventory of equipment at each booster pump station, and **Table 11.3** is an inventory of pressure reducing valve (PRV) stations. Finally, **Table 11.4** is a listing of emergency interties the City maintains with neighboring utilities.

Additional detail regarding the existing transmission and distribution systems are provided in the sections following the tables.

Table 11.1. Transmission and Distribution Piping Inventory

Diameter (in)	Ductile Iron (ft)	PVC (ft)	Asbestos Cement (ft)	Concrete (ft)	Cast iron (ft)	Galvanized iron (ft)	Plastic (ft)	Steel (ft)	Poly (ft)	All Materials (ft)
1	1,206	0	0	0	45	0	0	0	0	1,251
2	3,064	13,126	3,514	0	578	7,216	0	0	0	27,498
2.5	426	289	0	0	0	0	0	0	0	715
3	0	303	110	0	0	0	0	0	0	413
4	3,785	13,071	28,749	0	5,184	0	13,083	273	1,083	65,228
6	32,933	97,050	221,611	0	43,452	475	0	0	0	395,521
8	65,290	264,862	123,127	0	27,034	0	0	0	172	480,485
10	12,859	48,087	58,181	0	27,321	0	0	0	0	146,448
12	88,775	72,493	72,871	0	16,289	0	0	0	0	250,428
14	8	761	0	0	0	0	0	0	0	769
16	23,356	0	0	0	7,550	0	0	0	0	30,906
24	252	0	0	0	0	0	0	0	0	252
36	3,908	0	0	24,985	0	0	0	12,889	0	41,782
All Diameters	235,862	510,042	508,163	24,985	127,453	7,691	13,083	13,162	1,255	1,441,696

Note: The piping breakdown by size and material was reflects piping in the hydraulic model as of February 2008, and does not include all small diameter piping.

Table 11.2. Booster Pump Station Inventory

Booster Pump Location	Pump Type	Pump Model	Pump Size (hp)	Installed Capacity (gpm)	Installed Capacity (Mgd)	Head (feet)	Install Date
Zone 417							
South Sound Booster Pump Station	Centrifugal	PACO 16-50707-140101-190	50	1,000	1.44	139	2000
	Centrifugal	PACO Impellar Dia. 6.9	50	1,000	1.44	139	2000
	Centrifugal	PACO	50	1,000	1.44	139	2000
Total					3.38		
Fones Road Booster Station	Centrifugal	PACO 16-50707-140101-190	50	1,000	1.44	139	1988
	Centrifugal	PACO Impellar Dia. 6.9	50	1,000	1.44	139	1988
	Centrifugal	PACO Motors: Magnetic Century	50	1,000	1.44	139	1988
Total					2.81		
Shana Park Corrosion	Variable Speed	Johnston – 96J90009	125	1,000	1.44	270	1996
Zone 347							
Eastside Booster Station	Centrifugal	PACO	50	1,000	1.44	135	1988
	Centrifugal	PACO	50	1,000	1.44	135	1988
	Centrifugal	PACO	50	1,000	1.44	135	1988
Total					2.88		
Zone 380							
West Bay Booster Station	Centrifugal	PACO	75	1,000	1.44	220	1997
	Centrifugal	PACO	75	1,000	1.44	220	1997
	Centrifugal	PACO	75	1,000	1.44	220	1997
Total					3.46		
Zone 380	Centrifugal	PACO	10	200	0.29	100	1977
Elliott Pump Station	Centrifugal	PACO	20	600	0.86	100	1977
	Centrifugal	PACO	50	1,000	1.44	100	1986
Total					2.59		
Goldcrest	Centrifugal	PACO	3	40	0.06	78	1994
	Centrifugal	PACO	5	90	0.13	78	1994
Total					0.19		
Zone 298							
Allison Corrosion Control	Variable Speed	Johnston – 96J5008	100	1,448	2.09	212	1996
		Johnston – 96J5007	50	700	1.01	212	1996
Total					3.10		

1 **Table 11.3. Pressure Reducing Valve Inventory**

Name	Type	Inlet Pressure	Discharge Pressure	Purpose
Corner of Boulevard Rd. & Yelm Hwy.	Clayton	Variable	60 psi	Allows supply from Zone 417 into the 338 Zone along Yelm Hwy at reduced pressure.
Danbury Court	Clayton	Variable	55 psi	Allows supply from Zone 417 into Zone 338 at reduced pressure. It is on a 4-inch line and, therefore, of limited capacity.
Plymouth St. & Harrison Ave.	Clay-Val	Variable	Variable	Allows supply from Zone 380 into Zone 298 at reduced pressure. Under normal conditions, the smaller 2-inch line supplies flow; the larger 8-inch line only opens during high-demand times.
Bowman Ave.	Clay-Val	Variable	Variable	Allows supply from Zone 380 into Zone 298 at reduced pressure. Under normal conditions, the smaller 2-inch line supplies flow; the larger 6-inch line only opens during high-demand times.
Elliot Ave.	Clay-Val	Variable	Variable	Allows supply from Zone 380 into Zone 298 at reduced pressure. Under normal conditions, the smaller 2-inch line supplies flow; the larger 8-inch line only opens during high-demand times.
26th Ave.	Clay-Val	Variable	Variable	Allows supply from Zone 380 into Zone 298 at reduced pressure. Under normal conditions, the smaller 2-inch line supplies flow; the larger 8-inch line only opens during high-demand times.
Cooper Point Rd.	Clay-Val	Variable	Variable	Allows supply from Zone 380 to feed water at reduced pressure (approximately the same as Zone 298) to the Evergreen State College and other developments north of 20th Avenue.
Cain Rd. & Wilson St.	Clay-Val	Variable	Variable	Allows supply from Zone 417 into Zone 338 at reduced pressure. Under normal conditions, the smaller 2-inch line supplies flow; the larger 6-inch line only opens during high-demand times.
59th Court	Clay-Val	Variable	Variable	Allows supply from Zone 417 into 59th Court at reduced pressure. Supply is through a 4-inch line. When maintenance is necessary, supply is through a 2-inch maintenance line.
60th Court	Clay-Val	Variable	Variable	Allows supply from Zone 417 into 60th Court at reduced pressure. Supply is through a 4-inch line. When maintenance is necessary, supply is through a 2-inch maintenance.
Capitol Way	Cla-Val	Variable	Variable	Allows supply from Zone 338 into Zone 264. Under normal conditions, the smaller 2-inch line supplies flow; the larger 6-inch line only opens during high-demand times.

Table 11.4. Existing Emergency Interties

Location	Pipe Size and Type	Intertie Utility, Size and Type
Sleater-Kinney Road NE and 6th Avenue NE	10-inch, AC	Lacey, 10-inch, PVC
Sleater-Kinney Road SE (near McDonald's)	12-inch, AC	Lacey, 12-inch, PVC
Crosby Boulevard SW and Mottman Road	12-inch, CI	Tumwater, 8-inch, DI
Carlyon Avenue and Capitol Boulevard	10-inch, AC	Tumwater, 4-inch, DI

AC = Asbestos Cement
CI = Cast Iron
DI = Ductile Iron

Transmission System

A 36-inch diameter steel transmission line conveys water from McAllister Springs to the Meridian Storage Tanks. The route extends 4,000 feet west from the springs underneath Pacific Highway Southeast and the Burlington Northern railroad tracks, before terminating at the storage tanks. The pipeline and many of the valves are original equipment, installed in 1949. Valving is limited to 36-inch electric gate valves at the McAllister Springs pump house and at the Meridian Storage Tanks.

Water is then conveyed from the Meridian Storage Tanks into the City's distribution system via a 36-inch reinforced-concrete pipeline extending 37,750 feet to its terminus at the Fir Street Storage Tanks. The majority of this transmission line consists of the original pipe installed in 1949. The capacity of this pipeline, when operating as a gravity line, is approximately 22.7 million gallons per day (Mgd).

There are numerous connections into the transmission line between the Meridian and Fir Street Storage Tanks. The largest connections are:

- One 12-inch intertie providing water to Lacey from the 36-inch main located at Pacific Avenue and Mountainaire Road, west of Marvin Road through the Lacey pump station.
- Two interties providing service to Thurston PUD No. 1 at the Tanglewilde and Thompson Place neighborhoods.
- Two 12-inch connections that feed the Fones Road and South Sound booster pump stations, which feed Zones 417 and 338.
- Two 10-inch connections along Pacific Avenue that can serve the South Sound Shopping Center commercial complex in an emergency.

Once passing into the Fir Street Storage Tanks, or through one of the connections mentioned above, water is then conveyed into the distribution system as described below.

Distribution System

Topography within the City's service area varies in elevation from sea level to 275 feet on the east side and 310 feet on the west side. As a result, seven major pressure zones have been

developed to maintain adequate pressures throughout the service area. A description of each pressure zone, including pumping, piping, and storage follows.

Zones 417 and 338

These pressure zones serve the eastern and southeastern portions of the City, covering a large area ranging from the Yelm Highway area on the south to 26th Avenue N.E. on the north. They are bordered on the east by the City limits and on the west by Zones 347, 264, and 226, all of which are at lower elevations.

Zone 417 is served by the Hoffman Storage Tank, and Zone 338 is served by the Boulevard Road Storage Tank. Ground elevations in Zone 417 vary from 150 to 277 feet, and in Zone 338 from 160 to 243 feet above sea level.

Supply to Zone 417 is through a 12-inch connection to the 36-inch transmission line at Pacific Avenue and Fones Road, and a 12-inch connection to the 36-inch main at Pacific Avenue and Weir Street. The Fones Road and South Sound Booster Pump Stations boost water into Zone 417 at these locations, respectively.

PRV stations at the intersection of Cain Road and Wilson Street, and at Danbury Court allow water to move from Zone 417 to Zone 338.

Zone 347

Zone 347 supplies water to the northeastern section of the City, most of which lies north of Interstate-5. The zone is bounded on the northwest by Budd Inlet, on the southwest by approximately Central Street, on the east by Boulevard Road and South Bay Road, and on the north by the service area boundary.

Water supplied to Zone 347 is normally pumped from Fir Street Storage Tank 1 (Zone 226) through the Eastside Booster Pump Station into the Eastside Storage Tank. In an emergency, water can also be supplied from the 36-inch transmission main immediately prior to entering the Fir Street Storage Tanks. Gravity flow from the Eastside Storage Tank serves the zone with maximum pressures within the system established by the overflow elevation of 347 feet. The ground surface in Zone 347 ranges from 110 to 204 feet in elevation.

Zone 264

Zone 264 covers the South Capitol area of the City. Capitol Lake is the western border, with the south and east boundary formed by Interstate-5. This area lies just south of Olympia's central business zone, with the State's Capitol Campus on the north end, extending southward into residential areas.

The distribution system serving Zone 264 is composed of two distinct sectors, presently interconnected by a single, 10-inch diameter pipe. The smaller sector lies south and east of Interstate-5 and serves a low-density residential area adjacent to Watershed Park and the Olympia Public Works Department Maintenance Center. The larger sector is north of

Interstate-5 and supplies water to the Capitol Campus area. The ground surface in Zone 264 ranges from 16 to 165 feet in elevation.

The water supply to Zone 264 is withdrawn from the 36-inch transmission main at the point where it enters the Fir Street Storage Tanks (Zone 226). Water flows by gravity through a 16-inch line, reduced to a 10-inch line to enter the smaller sector of the distribution network.

The Stevens Field Storage Tank (Zone 264) is filled directly from the distribution system. Tank level is controlled by the Supervisory Control and Data Acquisition system (SCADA) and a control valve near the Fir Street Tanks.

The hydraulic grade of the water entering Zone 264 at the Fir Street valve chamber is determined by the grade in the 36-inch transmission line. It is typically 280 to 290 feet at current rates of demand. Consequently, the Stevens Field Storage Tank water is used primarily during high demands, when localized distribution-system pressures drop below the 264-foot overflow level.

Zone 226

The downtown central business area encompassed by Zone 226 has the lowest elevations within the entire system. This area is heavily commercial, with many businesses located near sea level along Budd Inlet and near the Port of Olympia. Numerous governmental and retail buildings are in this zone, as well as residential customers to the east and northeast. The elevation of the ground surface in Zone 226 varies from zero to 150 feet above sea level.

Water is delivered to this zone by gravity from the underground Fir Street Storage Tanks. The site also houses the reservoir and booster pumps for Zone 347, as well as the diversion valving for Zone 264.

Overflow elevations of 226 feet for both reservoirs control maximum static pressure for this zone. Discharges from the reservoirs flow through 16-inch and 12-inch mains down 8th Street into the distribution network. There are several closed connections between Zone 226 and the adjacent pressure zones. In every case, emergency use of these interties would allow only one-way flow of water into Zone 226.

Zones 298 and 380

Almost all of the City's service area west of Capitol Lake is within Zones 298 and 380. One exception is the portion of Zone 226 that rims the west side of Budd Inlet. There are residential and commercial customers in the two zones, with commercial water users concentrated along Harrison Avenue and between Harrison Avenue, Black Lake Boulevard and Cooper Point Road. The static hydraulic grade for Zone 298 is based on the 298-foot overflow elevation of the Bush and Elliott Storage Tanks. The Evergreen State College is the only west side contract customer served from a 12-inch main through a pressure reducing valve extended along Kaiser Road on the northern end of Zone 298.

Zones 298 and 380 underwent a major construction effort in 1994 that raised the maximum hydraulic grade line elevation to 380 feet. The work included constructing the new Elliott (209) Storage Tank on Elliott Avenue (also known as 20th Avenue) in 1994, constructing new pipelines in 1996, and upgrading the West Bay Booster Pump Station in 1997. These improvements created new pressure zone boundaries and connected the Elliott (298) and Bush Street (298) Storage Tanks to distribution lines in the lower elevations. Zone 380 is now served by the West Bay Booster Pump Station and the Elliott (380) Storage Tank. Zone 298 is served by Kaiser Well 1 and Allison Springs Wells 13 and 19; PRVs from Zone 380; and the Elliott (298) and Bush (298) Storage Tanks.

Since the new facilities were installed, there is sufficient pressure from the Elliott (380) Storage Tank to serve the higher elevated areas of the west side. The only exception is several of the higher homes in Goldcrest, which continue to be served from the existing Elliott Booster Pump Station.

11.2 CAPACITY ANALYSIS

The ability of the existing transmission and distribution system to meet pressure and flow requirements under current and future demand conditions was evaluated for this Plan. This section presents the design criteria upon which the analysis was based, followed by a description of the hydraulic model calibration and a discussion of the evaluation results.

Design Criteria

Following are the key design criteria for the transmission and distribution system:

- Minimum residual pressure in the system during peak hour demand, where all equalizing storage is depleted and all sources are operating, is 30 pounds per square inch (psi), as required by the Washington State Department of Health (DOH).
- Minimum pressure at the site of a fire flow during maximum day demand where the volume of water used for fire suppression and equalizing storage has been depleted, is 20 psi. In addition, the zone-wide minimum for residual pressure during a fire flow event is also 20 psi, as required by DOH.
- Maximum head loss in any pipe is 10 feet per 1,000 feet of pipe, with the potential for this being exceeded during transient (e.g., fire flow) conditions.
- A maximum of 20 homes may be connected to a looped (connected at both ends to the water system grid) 2-inch main; a maximum of 10 homes may be connected to a dead-end 2-inch main where the length of pipe is less than 400 feet and there is no requirement for fire hydrants.
- The minimum pipe diameter is 6 inches for looped and 8 inches for dead-end lines where fire hydrants are required.

- Valve spacing distance is a maximum 600 feet, and hydrant spacing is a maximum of 600 feet for single family and duplex homes and 300 feet elsewhere, in conformance with City of Olympia Development Guidelines.
- The minimum fire flow goal is 1000 gallons per minute (gpm) for residential areas during maximum daily demand. Fire flow goals vary depending on the type of construction, and are building-specific in areas other than residential.

Hydraulic Model Calibration

The City has developed a hydraulic model using Bentley Systems' WaterCAD water system modeling software. First prepared in the mid-1990s, the model has been routinely used for system analysis and is formally calibrated during each update to the Water System Plan. An extensive calibration was performed in 2004, with additional calibration conducted in late 2007 for this 2009 Plan. In addition, the accuracy of the model is checked periodically during its use between times of formal calibration.

The 2007 calibration effort consisted of obtaining field fire flow test data from nine test sites, at least one in each pressure zone. During the field fire flow tests, static and residual pressure readings were taken from just upstream of the flowing hydrant and pressure readings were monitored at strategic locations within the tested zone. The telemetry system was used to identify key system parameters during the time of testing (e.g., booster pump operational status, reservoir levels), for input into the hydraulic model.

Field results were then compared with modeled results to determine model accuracy. Results of the model calibration indicated that modeled static and residual pressures were within five psi of the observed pressures in all pressure zones, except for Zone 347. The model did not match the field conditions in this case. Upon further inspection, it was determined that the model had not been updated to reflect a recent improvement by a private development with a piping loop. Once the model was updated to include this improvement, the modeled pressures were in agreement with observed conditions. **Table 11.5** summarizes the results of the model calibration.

Table 11.5. Model Calibration Data Summary

Location	Pressure Zone	Observed (Field) Data [1]			Model (Simulated) Data [2]		
		Static Pressure (psi)	Residual Pressure (psi)	Flow (gpm) [3]	Static Pressure (psi)	Residual Pressure (psi)	Flow (gpm)
11th and Columbia	264	76	71	1,280	71	66	1,280
11th NW and Arcadia NW	298	50	44	1,090	53	46	1,090
27th NW and Calais NW	298	74	63	1,060	53	58	1,060
Cooper Crest Place and Cooper Crest Drive	380	78	67	1,175	79	71	1,175
18th and Miexner	347	62	39	1,010	67	24 [4]	1,010
Fairview and Preswick	417	94	85	1,395	94	79	1,395
Lister and 22nd	417	101	88	1,395	102	80	1,395
4th Hydrant from Yelm Highway on Briggs Drive	338	59	49	1,125	56	46	1,125

1. As measured during field fire flow tests conducted on December 17 and 18, 2007.
2. Hydrant flows and system parameters (pump operations and storage tank levels) were input to match field conditions. Simulated pressures are based on modeling current (2008) maximum day demands throughout the distribution system.
3. As calculated based on pitot pressure gauge readings.
4. Initial result, prior to updating model to reflect recent pipe looping project.

Evaluation of Transmission/Distribution Capacity

For the purpose of transmission and distribution system capacity evaluation, two types of analyses were conducted using the City's computer-based hydraulic model:

- Peak hour demand conditions were analyzed, to determine if the 30 psi requirement is met throughout the system.
- Fire flow simulations were performed under maximum daily demand conditions, to determine the quantity of flow available at a single point while maintaining a 20 psi minimum residual pressure zone-wide.

Both types of analyses were conducted at current (2008) and 20-year (2028) demand levels, based on the water demand forecast in **Chapter 3**.

Peak Hour Demand Conditions

In general, the distribution system is capable of maintaining pressures greater than 30 psi during peak hour demand, under both current and future demand conditions.

The only exception is a small portion of Zone 298 located just west of Ken Lake in the Park Drive area. Here pressures drop to between 15 and 20 psi during peak hour demand. Water system improvements (a pump station and reservoir) have been identified that would address this deficiency. These improvements will be implemented by private development during construction of the planned Kaiser Heights subdivision.

Pressures along East Bay Drive, at the boundary of Zones 347 and 226, are currently at approximately 100 psi during peak hour demand conditions. The planned installation of two pressure reducing valve (PRV) stations along East Bay Drive will allow for water to pass from Zone 347 to Zone 226, and will alleviate these high pressure situations.

Fire Flow Conditions

In general, the distribution system is capable of providing required fire flows while maintaining residual zone pressures greater than 20 psi during maximum daily demand, under both current and future demand conditions. Of a total of approximately 2,800 nodes in the hydraulic model, less than five percent (137 nodes), are unable to provide sufficient fire flows while maintaining pressures greater than 20 psi. The majority of these nodes are located in areas where fire hydrants are not present, i.e., on small (less than 4-inch diameter) mains or along the 36-inch transmission main where there are no services.

The only exceptions to this are discreet areas within the western portion of Zone 264, where available fire flows are lower than required. This is a result of a hydraulic "bottleneck" in the transmission piping that conveys water from the 36-inch main into this pressure zone. An improvement has been identified to install a new 16-inch main roughly parallel to a 10-inch diameter portion of this water main, which removes the limitation and results in sufficient flows to Zone 264.

While available fire flows are sufficient along West Bay Drive, they will likely decrease as development occurs along a 12-inch dead end main that serves this area. To ensure sufficient fire flows are maintained in the future, a PRV station is planned for installation in Raft Avenue near West Bay Drive. This will allow for water to flow from Zone 298 to Zone 226, thus supporting fire flows in this area.

11.3 2009-2014 TRANSMISSION/DISTRIBUTION PROJECTS

The transmission and distribution infrastructure projects planned for 2009-2014 will help meet the Drinking Water Utility's Goal 4:

> **Improve, operate and maintain the infrastructure to ensure reliable delivery of high quality water to a growing population.**

These projects will implement the strategy to develop and maintain adequate storage, transmission and distribution infrastructure.

Planned projects identified during the capacity evaluation described above are:

- **Maintenance Center Transmission Main.** This new 16-inch main will roughly parallel the existing 10-inch pipe that presents a current bottleneck in the distribution system in Zone 264. The new main will connect to an existing 16-inch main at Eastside Street (where it originates as a connection to the 36-inch transmission main near the Fir Street Storage Tanks). The new line will then extend approximately 3,500 feet through the City's Maintenance Center property and across Plum Street and extend to the south along Henderson Boulevard, terminating at an existing 12-inch main that feeds the portion of Zone 264 west of Henderson. A high priority is placed on installation of this new main in order to increase fire flow and pressures in the westerly portion of Zone 264 during high demand days. The existing 10-inch main that crosses Moxlie Creek will be replaced in the vicinity of the creek.
- **Kaiser Road Pump Station and Storage Tank.** This future pump station and storage tank will be constructed as part of a development project planned for the area south of Highway 101 on Kaiser Road. While these facilities will primarily serve future development, they will also address current deficiencies in the distribution system's ability to provide adequate pressures during peak hourly conditions to a small area of Zone 298. The schedule for these improvements will be determined by the timing of the development.
- **PRV in Raft Avenue (Zones 298/226).** This PRV station will allow for water flow from Zone 298 to Zone 226, ensuring sufficient fire flow in the future for development along West Bay Drive.
- **PRVs in East Bay Drive (Zones 347/226).** These PRV stations will allow for water flow from Zone 347 to Zone 226, thereby alleviating high-pressure situations along East Bay Drive.

Additional non-capacity related transmission and distribution system projects have been identified during development of this Plan. The following projects represent transmission or distribution needs associated with source or storage projects, as well as water system projects whose timing is linked with other public works improvements, such as street upgrades. Many projects involve replacement of aging asbestos cement (AC) piping, which is brittle and more prone to failure than other types of pipe material.

- **Distribution System Oversizing.** This involves oversizing of distribution pipeline projects associated with specific development-related improvements, such that additional capacity is provided to anticipate future needs that may be greater than those existing at the time of development.
- **McAllister Wellfield Transmission Main.** A new 36-inch diameter main, approximately 5,400 feet in length, to connect the planned McAllister Wellfield to the existing 36-inch main that currently conveys water from McAllister Springs to the Meridian Storage Tanks.
- **Yelm Highway Water Main Replacement.** Replacement of an existing 12-inch AC pipeline located in Yelm Highway, between Rich Road and Henderson Boulevard. This project will be implemented in conjunction with Thurston County's planned reconstruction and rerouting of this roadway.
- **Martin Way AC Pipe Replacement.** Replacement of 2,000 feet of AC water main along Martin Way, from approximately Ensign Road to Pattison Street. This section of piping failed four times in a two-year period (2006-2007), and is not providing reliable service.
- **Fones Road Water Main Replacement.** Replacement of existing AC water main in Fones Road, from Pacific Avenue to 18th Avenue. This project will be coordinated with the City's planned reconstruction of this roadway.
- **Fones Road Booster Pump Station Rehabilitation.** Upgrade of booster pump station, to address current deficiencies in the electrical system, confined space entry, ventilation and aging pumps.
- **Hoffman Extension.** Installation of a new 12-inch water main to connect the planned new Zone 417 Storage Tank with existing distribution piping in Morse-Merryman Road.
- **Kaiser Road**. North to Evergreen Parkway. Installation of a 12-inch water main from the LOTT lift station to Evergreen Parkway, to complete a piping loop to the north end of Zone 298. Currently, this area only has one feed through a PRV at Cooper Point Road.
- **Boulevard Road Roundabout (Log Cabin) AC Pipe Replacement.** Replacement of existing AC water main at the time of construction of a roundabout in Boulevard Road, at the intersection of Log Cabin Road.
- **Boulevard Road Roundabout (Morse-Merryman) AC Pipe Replacement.** Replacement of existing AC water main at the time of construction of a roundabout in Boulevard Road, at the intersection of Morse-Merryman Road.

- **Boulevard Road Roundabout (22nd Avenue) AC Pipe Replacement.** Replacement of existing AC water main at the time of construction of a roundabout in Boulevard Road, at the intersection of 22nd Avenue.

These projects are included in the complete capital improvement program (CIP) presented in **Chapter 14**. Project-level cost estimates have been prepared for each project. These costs, and the anticipated implementation schedule for each project, are presented in **Table 14-2.**

All projects will be designed based on the City's Engineering Design and Development Standards, available online at:
http://www.olympiawa.gov/cityservices/permit/Engineering+Design+and+Development+Standards.htm