

Water System Improvements

9

INTRODUCTION

This chapter presents proposed improvements to the City of Stanwood’s (City) water system that are necessary to resolve existing system deficiencies and accommodate the projected growth of water customers. The water system improvements were identified from an evaluation of the results of the water system analyses presented in **Chapter 7**. The water system improvements were sized to meet both the existing and future demand conditions of the system.

A Capital Improvement Program number, herein referred to as a CIP number, has been assigned to each improvement. Numbers assigned to the improvements start at the north end of the system and generally, increase incrementally to the south, as shown in **Figure 9-1**, a plan view of the improvements. The improvements are also illustrated in the hydraulic profile of the future water system shown in **Figure 9-2**. The improvements are organized and presented in this chapter according to the following categories.

- Improvements Since 2010
- Water Main Improvements
- Pressure Zone Improvements
- Pressure Reducing Station Improvements
- Facility Improvements
- Miscellaneous Improvements
- Developer Funded Improvements

The remainder of this chapter presents a brief description of each group of improvements, the prioritization criteria, the basis for the cost estimates, and the implementation schedule.

DESCRIPTION OF IMPROVEMENTS

This section provides a general description of each group of improvements and an overview of the deficiencies they will resolve. Most of the improvements are necessary to resolve existing system deficiencies. However, improvements have also been identified for some of the undeveloped areas to illustrate the major facilities that will be required when development occurs in those areas. The locations of improvements in the undeveloped areas are shown schematically in **Figure 9-1** and will most likely be altered to fit the layout of the future developments. The CIP numbers for these improvements have a “DF” prefix (example: DF1). The costs associated with these improvements shall be borne by the developers, rather than the existing water customers.

Water System Improvements Since the Last Water System Plan

The water system has undergone several changes since 2010, when the City last updated the *Water System Improvements* (i.e., Chapter 9) of its Comprehensive Water System Plan (WSP). The City has implemented a majority of the recommended projects as scheduled in the 2010 CIP, including the completion of the Cedarhome Reservoir, two significant pressure zone projects (PZ1 and PZ2), and drilling of the Bryant Well No. 2 replacement well. **Table 9-1** lists the CIP projects that have been completed, along with additional projects that have also been completed since the City’s last comprehensive plan. In addition to these major projects, the City has implemented many smaller projects, including water main replacements and extensions.

**Table 9-1
Major Improvements Completed Since 2010**

Project Description	2010 WSP CIP Project No.	Year	Construction Cost
Cedarhome Reservoir	In 2002 WSP	2009	\$2,500,000
Cedarhome Well Water Right Transfer	F4	2010	\$26,000
Hatt Slough Springs Collection Box Improvements	F9	2010	\$15,000
Water Main South of SR 532 from 102nd to 98th	WM3	2010	\$325,000
Water Main - 267th from Pioneer Highway to Port Susan Middle School	Portion of WM5	2011	\$260,000
297 to 365 Zone Conversion and Water Main	PZ1	2012	\$340,000
Distribution System Corrosion Study	M2	2012	\$7,500
Bailey Reservoir Altitude Valve	F8	2012	\$11,000
Bryant Well No. 2 Replacement - Well Drilling	F8	2013	\$140,000
125 and 242 to 245 Zone Conversion	PZ2	2014	\$840,000

The completed improvements are also crossed out on the 2010 WSP CIP, which is provided in **Table 9-2**. Projects that are ongoing are highlighted accordingly and projects that have been removed from the CIP prepared for this WSP are also noted. The removed projects are discussed in the individual improvement sections that follow. Projects that were not completed or removed are included in the CIP prepared for this WSP and provided at the end of the chapter.

CHAPTER 9

**Table 9-2
2010 CIP Status**

No.	Description	Estimated Cost (2009 \$)	20-Year Schedule of Improvements								
			Planned Year of Project and Estimated Cost in 2009 \$								
			2010	2011	2012	2013	2014	2015	2016-22	2023-30	2031+
Water Main Improvements											
WM1	Annual Water Main Replacement Program	\$48,403,000	\$50K	\$75K	\$75K	\$200K	\$200K	\$200K	\$1,200K	\$1,600K	\$44,803K
WM2	Corrosion Improvements in 100th, 272nd & 99th	\$401,000			\$134K	\$267K					
WM3	Water Main South of SR 532 from 102nd to 98th	\$305,000	\$305K								
WM4	Water Main South of SR 532 from 92nd to 84th	\$780,000							\$780K		
WM5	Water Main from Bryant Wells to 84th	\$2,230,000							\$2,230K		
WM6	Water Main from Hatt Slough Springs to 84th	\$4,615,000								\$4,615K	
Pressure Zone Improvements											
PZ1	297 to 365 Zone Conversion and Water Main	\$785,000	\$196K	\$589K							
PZ2	125 & 242 Zone to 245 Zone Conversion	\$551,000				\$184K	\$367K				
PZ3	Conversion of Northern 297 Zone to 365 Zone	\$351,000								\$351K	
PZ4	Conversion of Middle Press. Zones to 245 Zone	\$1,131,000						\$377K	\$754K		
PZ5	Conversion of Northern 125 Zone to 200 Zone	\$540,000			\$270K	\$270K					
Pressure Reducing Station Improvements											
PRV1	255 Zone PRV Replacement	\$100,000					\$100K				
PRV2	Additional 297/125 Zone PRV on Miller Rd	\$95,000								\$95K	
Facility Improvements											
F1	Knittle Reservoir No. 2 Recoating	\$338,000							\$338K		
F2	Cedarhome Well Study	\$60,000			\$60K						
F3	Cedarhome Well Improvements	\$100,000						\$100K			
F4	Cedarhome Well Water Right Transfer	\$27,000	\$27K								
F5	Bryant Well No. 2 Replacement	\$800,000				\$267K	\$533K				
F6	Bryant Well Field Treatment Facility Sewer	\$68,000			\$68K						
F7	Bailey Booster Pump Station Rehabilitation	\$1,013,000							\$1,013K		
F8	Bailey Reservoir Altitude Valve	\$103,000		\$103K							
F9	Hatt Slough Springs Collection Box Impr.	\$68,000	\$68K								
F10	Hatt Slough Springs Study	\$50,000			\$50K						
F11	Hatt Slough Springs Rehabilitation	\$1,350,000								\$1,350K	
F12	297 Zone Reservoir Site Acquisition	\$270,000						\$270K			
F13	297 Zone Reservoir Design & Construction	\$540,000							\$540K		
Miscellaneous Improvements											
M1	System-wide Flushing Program	\$100,000	\$5K	\$5K	\$5K	\$5K	\$5K	\$5K	\$30K	\$40K	
M2	Distribution System Corrosion Study & Impr.	\$10,000	\$10K								
M3	Water Use Efficiency Program	\$118,000	\$11K	\$11K	\$11K	\$5K	\$5K	\$5K	\$30K	\$40K	
M4	Cross-Connection Control Program	\$100,000	\$5K	\$5K	\$5K	\$5K	\$5K	\$5K	\$30K	\$40K	
M5	Wellhead Protection Program	\$300,000				\$75K	\$75K	\$10K	\$60K	\$80K	
M6	Comprehensive Water System Plan Update	\$360,000							\$120K	\$240K	
M7	Water Rate Study	\$40,000	\$40K								
Total Estimated Costs of City Funded Impr.		\$66,102,000	\$717K	\$788K	\$678K	\$1,278K	\$1,291K	\$972K	\$7,125K	\$8,451K	\$44,803K
Developer Funded Improvements											
DF1	365 Zone Transmission Main	\$1,025,000	Timing of Project Based on Timing of Future Developments								
DF2	200 Zone Fire Flow Pumps	\$270,000	Timing of Project Based on Timing of Future Developments								
Total Estimated Costs of Developer Funded Impr.		\$1,295,000									
Project = Project completed since previous WSP Project = Project removed since previous WSP Project = Ongoing Project											

Water Main Improvements

The following water main improvements were identified from the results of the distribution and transmission system analyses discussed in **Chapter 7**. Most of the water main improvements will replace existing distribution water main and are grouped in the “Annual Water Main Replacement Program” project (CIP WM1). The individual water main improvement projects within this group are numbered 1 through 115, as shown in **Figure 9-1**. The other water main improvements are mostly larger diameter water mains that function more like transmission mains than distribution mains and are identified as individual projects (CIP WM2 through WM6). The numbering for CIP WM2 through WM6 is the same as it was in the previous WSP. CIP WM3 was completed, as shown in **Tables 9-1** and **9-2**, and is not included in the following sections.

CIP WM1: Annual Water Main Replacement Program

Deficiency: Most of the water main improvements shown in **Figure 9-1** are required to resolve existing system fire flow deficiencies caused primarily by undersized water mains. Many areas also contain non-standard water main materials or are known to have a high occurrence of water main leaks or breaks.

Improvement: Replace existing water main with new water main in accordance with the City’s construction standards. The individual water main improvements grouped under this project are numbered 1, 2, 3, etc., as shown in **Figure 9-1**. The selection of specific projects will be accomplished annually during the City’s budget development process and will be guided by the prioritization presented later in this chapter. This provides the City with the flexibility to coordinate these projects with other projects that may occur within the same area. An average allowance of \$50,000 - \$200,000 per year has been established for the annual replacement of water mains.

CIP WM2: Corrosion Improvements in 100th Avenue NW, 272nd Place NW, and 99th Avenue NW

Deficiency: The water main adjacent to the Josephine Sunset Home has historically had a high rate of leaks and breaks due to significant corrosion on steel parts of the buried appurtenances. Instead of replacing the water main since the previous WSP, the City has replaced appurtenances as necessary and installed a corrosion protection anode in the vicinity of the appurtenances, but water main replacement will eventually be necessary. The anode was installed at 102nd Avenue NW and 272nd Place NW and existing bolts and fittings were replaced with stainless steel parts on 100th Avenue NW. The improvements were completed in 2005 and 2010.

Improvement: Install new 12-inch water main in 100th Avenue NW from 274th Place NW to 272nd Place NW; in 272nd Place NW from 102nd Avenue NW to 99th Avenue NW; and in 99th Avenue NW from 272nd Place NW to 271st Street NW. Corrosivity testing shall be performed during the water main predesign phase and the new water main shall be installed with the proper coatings, materials, and corrosion control equipment, as recommended by the corrosivity testing results.

Coordinate with Josephine Sunset Home to ensure domestic water supply is available as necessary to the customer. This may require the customer to install a second metered connection if continuous water supply is needed throughout the duration of the project’s construction.

CIP WM4: Water Main South of SR 532 from 92nd Avenue NW to Pioneer Highway

Deficiency: The existing 12-inch and 8-inch asbestos cement mains from the 125 Zone storage and supply facilities are almost 50 years old. The existing 8-inch water main has a history of water main leaks and is an important transmission main for providing water supply to Twin City Foods and all of downtown Stanwood.

Improvement: Install new 16-inch ductile iron water main along the south side of State Route (SR) 532 from 92nd Avenue NW east to 84th Avenue NW. Install new 12-inch ductile iron water main along the south side of SR 532 from 84th Avenue NW to the Pioneer Highway.

CIP WM5: Water Main from Bryant Wells to 84th Drive NW South of SR 532

Deficiency: With the completion of the Bryant Well Field Treatment Facility in 2008, the Bryant Wells now provide supply directly to the 297 Zone instead of the 125 Zone. Transmission main in the 297 Zone is needed to convey supply from the wells to the 125 Zone via pressure reducing valve (PRV) stations.

Improvement: Install new 12-inch ductile iron water main along the south side of SR 532 from approximately the Bryant Wells to approximately the Port Susan Middle School Driveway.

CIP WM6: Water Main from Hatt Slough Springs to SR 532

Deficiency: Portions of the existing 8-inch asbestos cement main from Hatt Slough Springs are more than 65 years old and other portions are almost 50 years old. The main has a history of water main breaks. When Hatt Slough Springs is in service, the main is the only transmission from Hatt Slough Springs to the customers throughout the 125 Zone.

Improvement: If Hatt Slough Springs is rehabilitated, install new 12-inch ductile iron water main from Hatt Slough Springs in Marine Drive to the intersection of Marine Drive and SR 532. If the source is not rehabilitated, the length of replacement may be reduced to the length necessary to service existing customers.

CIP WM7: Pioneer Highway Water Main from 72nd to 64th (previously CIP 110)

Deficiency: The existing water main in Pioneer Highway from approximately 72nd Avenue NW to 64th Avenue NW is 3-inch asbestos cement water main. The water main has reached its design life.

Improvement: Install approximately 2,500 lineal feet of 12-inch water main along Pioneer Highway from approximately 72nd Avenue NW to 64th Avenue NW.

Future Water Main Extensions and Replacements

All new water main extensions and replacements shall be installed in accordance with the City's Water System Standards, which are included in **Appendix H**. All new water mains shall be sized by hydraulic analysis to ensure that all pressure, flow, and velocity requirements stated in **Chapter 5** are met. In general, new water mains that will carry fire flow in residential areas shall be a minimum of 8 inches in diameter and looped for multi-family residential developments. New water mains in

commercial, business park, industrial, and school areas shall be a minimum of 12 inches in diameter and looped.

Pressure Zone Improvements

The following pressure zone improvements will improve various low pressure problem areas throughout the water system. The improvements will also consolidate the many smaller pressure reduced zones to improve flow and reliability. A brief description of the existing deficiency and the improvement itself is provided in the following sections. The numbering of the pressure zone improvements is continued from the 2010 WSP. PZ1 and PZ2 were completed by the City, as shown in **Tables 9-1** and **9-2**. PZ3 was determined to be unnecessary, as shown in **Table 9-2**, based on a reevaluation of elevations in the area and changes in the adjacent land use. CIP PZ5 was also determined to be unnecessary, as shown in **Table 9-2**, due to the field pressure readings that allowed calibration of the model in this area.

CIP PZ4: Conversion of Middle Pressure Zones to 245 Zone

Deficiency: The existing system has four small pressure reduced zones served by five PRV stations. The independent zones do not provide adequate flow and reliability.

Improvement: After completion of CIP PRV1 and CIP 7, 20, 21, 22 and 23 water main improvements, consolidate the pressure reduced zones and convert them to the new 245 Zone. Extend new 12-inch ductile iron water main in Pioneer Highway from Larson Road to the existing 255 Zone water main. Install an 8-inch check valves in 86th Drive NW and a 12-inch check valve in 276th Place NW to provide supply to the lower elevations of the 297 Zone if pressures drop significantly. Abandon the 255 PRV station at the intersection of 280th Street NW and 83rd Drive NW and the 265 PRV station at the intersection of 276th Street NW and 80th Drive NW, which both have drainage issues and are not necessary for the pressure zone consolidation. Install zone valves at the intersection of Cedarhome Drive and Park Drive and the intersection of Cedarhome Drive and 83rd Drive NW to isolate the 297 and 245 Zones. Abandoning these PRVs, and installing the check valves and the zone valves will resolve the existing low pressure problems. Open the closed valves at the intersection of Cedarhome Drive and Pioneer Highway and at the intersection of Cedarhome Road and 274th Street NW.

Adjust the set points of the three 297/245 Zone PRVs to maintain a downstream hydraulic elevation of 245 feet. Construction of these improvements should coincide with CIP 67, 69, and 74.

Pressure Reducing Station Improvements

The following PRV station improvements were identified to resolve existing system deficiencies, but have been sized to accommodate the system's future demands.

CIP PRV1: 252 Zone PRV (288th and 89th) Replacement

Deficiency: The existing PRV station is undersized to provide adequate supply to the existing 252 Zone/future 245 Zone during a fire flow or other high demand event. The existing station also has problems with drainage and interference with tree roots.

Improvement: Replace the existing station with a new larger station at the intersection of 288th Street NW and 89th Avenue NW. The large PRV should be 6 inches, and the small valve

should be 2 inches. The station should also include a pressure relief valve, sized during the design, to relieve pressures in the 245 Zone in the event of a failure of one of the PRVs. The new station should be installed near the same time as the proposed 12-inch water main in 288th Street NW (CIP 7).

CIP PRV2: Additional 297/125 PRV on Miller Road

Deficiency: The 125 Zone south of SR 532 is currently served by one transmission main. There is also a long dead-end main on Miller Road.

Improvement: Install a PRV station at the intersection of Pioneer Highway and Miller Road. The large PRV should be 8 inches, and the small valve should be 3 inches. The station should also include a pressure relief valve, sized during design, to relieve pressures in the 125 Zone in the event of a failure of one of the pressure reducing valves. The new station should be installed after the replacement and extension of the 3-inch main in Pioneer Highway (CIP 110, DF2, and DF5) and concurrently with the replacement and extension of the 4-inch main in Miller Road (CIP 111). The feasibility of this project is dependent on Snohomish County repairing slide damage on Miller Road, which is currently closed.

CIP PRV3: Pressure Relief Valve in the 245 Zone

Deficiency: When the 297/245 Zone pressure reducing station was installed near 272nd Street NW and 81st Drive NW with the PZ2 improvements in 2014, the City did not have an ideal location for the pressure relief valve in the 245 Zone. A pressure relief valve is recommended in the 245 Zone to protect the system in the event that one of the PRVs malfunctions in the wide-open position, thereby exposing the 245 Zone to higher pressures from the upper pressure zones.

Improvement: Determine a few alternative pressure relief valve locations sites that have adequate property and drainage. Perform hydraulic analysis to verify that the location(s) protect the 245 Zone and establish the size and settings for the proposed pressure relief valve. Install the pressure relief valve in the chosen location.

Facility Improvements

The following water system facility improvements were identified from the results of the water system analyses that are discussed in **Chapter 7**. The improvements are primarily necessary to resolve existing system deficiencies, but have also been sized to accommodate projected growth. Projects that were identified in the 2010 WSP, but were not completed or identified in this CIP, as shown in **Table 9-2**, include the Bailey Booster Pump Station Rehabilitation (i.e., previous CIP F7) and Hatt Slough Springs Rehabilitation (i.e., previous CIP F11). The Bailey Booster Pump Station Rehabilitation is no longer necessary since the Bryant Wells supply the 297 Zone directly and the City does not currently have supply in the 125 Zone to pump to the 297 Zone. The Hatt Springs Rehabilitation is discussed within the proposed CIP F17. Although the Cedarhome Well Study (i.e., previous CIP F2) and Cedarhome Well Improvements (i.e., previous CIP F3) were scheduled within the previous 6-year CIP, the improvements have not been necessary due to a decrease in sand production. Also, the Bryant Well Field Treatment Facility Sewer (i.e., previous CIP F6) has not been possible because the associated lift station has not been constructed.

CIP F1: Knittle Reservoir No. 2 Recoating

Deficiency: The interior and exterior of Knittle Reservoir No. 2 needs to be recoated every 15 to 20 years, based on the typical life of coatings on steel tanks.

Improvement: Thoroughly inspect and sample the interior and exterior coatings of Knittle Reservoir No. 2 to determine the properties of the existing coating and the extent of the required recoating. Recoat the interior and exterior to prevent premature corrosion of the facilities.

CIP F2: Cedarhome Reservoir Recoating

Deficiency: The interior and exterior of steel portion of the Cedarhome Reservoir needs to be recoated every 15 to 20 years, based on the typical life of coatings on steel tanks.

Improvement: Thoroughly inspect and sample the interior and exterior coatings of the steel portion of the Cedarhome Reservoir to determine the properties of the existing coating and the extent of the required recoating. Recoat the interior and exterior to prevent premature corrosion of the facilities.

CIP F3: Cedarhome Well Study

Deficiency: The Cedarhome Well produces sand that may clog water treatment equipment, increase maintenance time and create excessive wear on pumping equipment over time. The City has installed a filter before the control valve, but improvements may be necessary in the future if sand production becomes more problematic.

Improvement: If sand production becomes more problematic, evaluate the Cedarhome Well to determine the cause of the excessive sand production. Identify improvements to resolve the deficiency in the well. Improvements that may be considered include the installation of a deep well pump control valve, replacement of the filter pack, and redevelopment or redrilling of the well.

CIP F4: Cedarhome Well Improvements

Deficiency: The Cedarhome Well produces sand that may clog water treatment equipment, increase maintenance time, and create excessive wear on pumping equipment over time. The City has installed a filter before the control valve, but improvements may be necessary in the future if sand production becomes more problematic.

Improvement: Based on the recommendations in the Cedarhome Well Study under CIP F3, construct improvements to resolve the deficiency in the well. Because the scope of these improvements are unknown at this time, the cost of this CIP item should be reevaluated following the completion of CIP F3.

CIP F5: Bryant Well Field Treatment Facility Sewer

Deficiency: The City currently hauls waste generated from the Bryant Well Field Treatment Facility in trucks to the Wastewater Treatment Plant.

Improvement: Construct approximately 375 lineal feet (LF) of 6-inch-diameter gravity sewer pipe from the Bryant Well Field Treatment Facility to the future Lift Station 8 to transport the waste. The gravity sewer pipe shall be installed in accordance with the City's construction standards.

CIP F6: Bryant Well Treatment Facility Pilot Study for Additional Flow

Deficiency: The Bryant Treatment Facility was designed based on the water quality at Bryant Well No. 1 and it was assumed that the water quality would be the same or similar at Bryant Well No. 3. Initial water quality results from Bryant Well No. 3 after drilling indicated that a higher chlorine dose and more contact time may be necessary when the well is online. In addition, the water right from the inactive Fure Well is being transferred to the Bryant Well field. The pump at Bryant Well No. 3 is sized to handle the additional 150 gallons per minute (gpm) water right transfer, but the Bryant Well Treatment Facility may need some modifications to handle flows above its 2,000 gpm capacity.

Improvement: Perform a full-scale pilot study at the 2,150 gpm flow rate to determine what modifications are necessary at the Bryant Well Treatment Facility to accommodate the Bryant Well No. 3 water quality and the additional flow from the Fure Well water right transfer. Prior to the test, replace the chlorine metering pumps in the Bryant Well Treatment Facility with larger pumps and obtain approval from Washington State Department of Health (DOH) for operating the treatment facility at the higher flow rate.

CIP F7: Bryant Well Treatment Facility Improvements for Additional Flow

Deficiency: The Bryant Well Treatment Facility may need some modifications based on the actual water quality from Bryant Well No. 3 and the additional flow from the Fure Well water right transfer per the pilot study in CIP F6.

Improvement: Modify the Bryant Well Treatment Facility per the recommendations in the pilot study identified in CIP F6. For planning purposes, it is assumed that a 360 LF extension of the existing 42-inch contact pipeline will be necessary.

CIP F8: Bryant Well No. 2 Monitoring Well Modifications

Deficiency: Bryant Well No. 2 is no longer used by the City, but is equipped with a pump and the structure surrounding the well is unstable. Bryant Well No. 2 will be utilized for water level measurements, but it is not equipped with level reading equipment.

Improvement: Remove the pump, valving, and electrical equipment from the Bryant Well No. 2 facility. Demolish the existing well building. Provide a metal plate to seal the well and equip the plate with a 2-inch threaded cap access port. Purchase a manual level reading device for regular monitoring of well levels at Bryant Well No. 2. Install a locking utility box over the wellhead that is bolted to the concrete slab. Well driller costs may be saved by completing this project in conjunction with CIP F9 and F19.

CIP F9: Decommission the Fure Well

Deficiency: Due to declining production and higher quality water from other City sources, the Fure Well has been reduced to an emergency source for a number of years. A water right change application on the associated water right is currently being processed, which requests to add the Bryant Well field and Cedarhome Well as additional points of withdrawal. The Fure Well should be properly decommissioned when the water right transfer is complete and the facility should be abandoned.

Improvement: Decommission the Fure Well. Remove the existing fence, piping, valves, and electrical equipment. Cap the existing water main connected to the facility. Demolish the existing well building. Hire a licensed well driller to properly decommission the well per Washington Administrative Code WAC 173-160-381 after the building is removed. Remove the pump and motor. Perforate the casing and pressure grout to fill inside the casing as well as any voids outside of the casing with sealing material. Demolish the existing concrete pad. Well driller costs may be saved by completing this project in conjunction with CIP F8 and F19.

CIP F10: Telemetry Improvements – PLC Upgrades

Deficiency: The programmable logic controller (PLC) main boards at each of the City’s six telemetry locations were installed between 2003 and 2008. The Rugid 9 PLC main boards have been found to age poorly due to issues with capacitors in the early 2000s. The control panels at the Bailey Reservoirs and Bryant Well No. 1 need an uninterruptible power supply (UPS) installed to prevent damage from power hits; the City’s other facilities are already equipped with the UPS systems.

Improvement: Replace the master PLC main board, the Knittle/Cedarhome PLC main board, the Cedarhome Booster Pump Station main board, the Cedarhome Well main board, and the Bailey Reservoir PLC main board. Install an online UPS back-up system at Bryant Well No. 1 and the Bailey Reservoirs.

CIP F11: Telemetry Improvements – Extend Life of Existing Telemetry System

Deficiency: The telemetry system’s Rugid 9 control panels will need spare parts to extend the system’s life.

Improvement: Purchase and install spare parts in the various Rugid 9 control panels throughout the water system.

CIP F12: Telemetry Improvements – Radio System Equipment

Deficiency: The City’s existing radio network is not standard transport protocol in the control industry.

Improvement: Upgrade the radio system to a 450 Mhz Ethernet based system.

CIP F13: Long-term Water Supply Study

Deficiency: Chapter 6 identifies several potential alternatives for future water supply from neighboring water systems. The City plans to continue or begin discussions with the potential partners identified in Chapter 6. The discussions will determine if the other systems are interested in contracting to provide water to the City. Other next steps include identifying fatal flaws, preparing planning-level cost estimates, formulating an ownership and operation model for new pipelines, determining the optimal alternative, and developing a CIP to fund the design and construction of the transmission main.

Improvement: Proceed with additional long-term water supply discussions and studies. The City will reevaluate each of the options every 3 years and plan for a larger study beyond the initial 6-year planning period.

CIP F14: Cedarhome Booster Pump Station Generator

Deficiency: The 365 Zone is supplied by the Cedarhome Reservoir and the Cedarhome and Knittle Booster Pump Stations. Neither booster pump station is equipped with an emergency generator. An emergency generator at the Cedarhome Booster Pump Station will allow the City to fill the Cedarhome Reservoir during a power outage.

Improvement: Install an emergency generator and automatic transfer switch at the Cedarhome Booster Pump Station. The installation should include an outdoor rated generator with sub-base fuel tank on a concrete pad within close proximity to the building, bollards for vehicle protection of the generator and fuel tank, an outdoor-rated automatic transfer switch, and the associated conduit and conductors for integrating the generator and transfer switch into the existing electrical and control system. The preliminary size of the generator is 100 kW.

CIP F15: Knittle Booster Pump Station Generator

Deficiency: The 365 Zone is supplied by the Cedarhome Reservoir and the Cedarhome and Knittle Booster Pump Stations. Neither booster pump station is equipped with an emergency generator. An emergency generator at the Knittle Booster Pump Station will allow the City to fill the Cedarhome Reservoir during a power outage. If development occurs in the 365 Zone with a fire flow requirement greater than 1,500 gpm for 2 hours, the emergency generator will be necessary for the existing fire flow pump.

Improvement: Install an emergency generator and automatic transfer switch at the Knittle Booster Pump Station. The installation should include an outdoor-rated generator with sub-base fuel tank on a concrete pad within close proximity to the building, bollards for vehicle protection of the generator and fuel tank, an outdoor-rated automatic transfer switch and replacement of the existing manual transfer switch, and the associated conduit and conductors for integrating the generator and transfer switch into the existing electrical and control system. The preliminary size of the generator is 125 kW.

CIP F16: Knittle Booster Pump Station Improvements

Deficiency: The Knittle Booster Pump Station is approximately 16 years old and the facility has issues with a rusting steel floor and piping. The City also has concerns with pump efficiency.

Improvement: Perform efficiency testing on the existing pumps to determine if replacement is necessary. Replace the existing structure with a new concrete masonry unit (CMU) block building with a concrete floor. Install adequate ventilation for this back-up facility (i.e., account for condensation from stagnant water in pipes). Replace the existing piping and flow meter. Replace pumps, if necessary.

CIP F17: Hatt Slough Springs Rehabilitation

Deficiency: Hatt Slough Springs is an aging facility. The building is a wood-frame structure with a steel roof and chicken wire covered windows. The facility is dimly lit and generally in poor condition. The pumps and interior piping are also aging and in need of replacement. The facility is not equipped with an engine generator set to allow backup power supply in the event of a power outage. The existing collection system does not have the capacity to fully utilize the water right for

the spring source. The DOH has recommended a sampling of the source water to rule out any surface water influence on the spring. The access road to the facility is currently impassable and unsafe. The City investigated transferring the water right to a new well source in the river valley or on the Tulalip Plateau, but the cost-benefit analysis has determined that the improvements are currently not cost effective.

Improvement: In 6 years the City will reevaluate the need for the Hatt Slough Springs water right to meet existing and projected system demands. The cost-benefit analysis for upgrading the existing facility or replacing the facility with a new facility will be reevaluated.

CIP F18: 297 Zone Reservoir Design and Construction

Deficiency: The storage analysis in **Chapter 7** indicates that the system will have insufficient capacity to meet the projected future storage requirements of the system.

Improvement: Demolish the existing 0.2-million-gallon (MG) 297 Zone concrete reservoir. Construct a reservoir at the location of the existing 0.2 MG reservoir in the 297 Zone with a minimum useful storage capacity of 0.6 MG to meet the projected needs of the system through the 20-year planning period. During the predesign effort, finalize the size and location of the tank on the existing site. Relocate on-site utilities as necessary.

CIP F19: Decommission Sill Well

Deficiency: The Sill Well was a City source of supply more than 20 years ago. The well is not equipped with a pump or connected to the water system. The well needs to be properly decommissioned and the property sold to the surrounding property owner.

Improvement: Decommission the Sill Well. Remove any existing fencing, structures, piping, and electrical equipment. Hire a licensed well driller to properly decommission the well per WAC 173-160-381. Perforate the casing and pressure grout to fill inside the casing as well as any voids outside of the casing with sealing material. Demolish the existing concrete pad. Well driller costs may be saved by doing this project in conjunction with CIP F8 and F9.

CIP F20: Bryant Well No. 3

Deficiency: In 2013, the City drilled Bryant Well No. 3 adjacent to the Bryant Well Treatment Facility. Bryant Well No. 3 is the replacement well for Bryant Well No. 2. The improvements for equipping Bryant Well No. 3 were designed in 2014. Project construction is outstanding.

Improvement: Equip Bryant Well No. 3 with a submersible turbine pump and motor; install piping systems to connect the well to the existing Bryant Well Treatment Plant; and complete associated treatment plant and site improvements associated with the well facility.

Miscellaneous Improvements

The following miscellaneous improvements are planning efforts and program elements that are required to comply with various State of Washington water regulations.

CIP M1: Update Water System Standards

Deficiency: The City's existing Water System Standards do not reflect the recommendations identified in the City's October 29, 2012, Soil Corrosivity Testing and Data Analysis letter report prepared by Northwest Corrosion Engineering. Miscellaneous other water system standard updates are also necessary.

Improvement: Update the City's Water System Standards regarding soil corrosivity testing, pipe material, and anode installation per the 2012 corrosion study. Update other sections in the Water System Standards as necessary.

CIP M2: Miscellaneous Corrosion Improvements

Deficiency: The steel parts on buried water main appurtenances in the downtown area of Stanwood have a high rate of corrosion. Significant corrosion has caused leaks in some areas where water main is less than 10 years old. The City completed a corrosion study in 2012 with various recommendations, including the installation of individual anodes on ductile iron piping whenever it is exposed for repair or replacement.

Improvement: When water mains are repaired or replaced, install individual anodes on the ductile iron pipe in accordance with the City's October 29, 2012, Soil Corrosivity Testing and Data Analysis letter report prepared by Northwest Corrosion Engineering.

CIP M3: Water Use Efficiency Program

Deficiency: The existing water system most likely has leaks, based on an average 3-year rolling average distribution system leakage of 14 percent. Several water use efficiency measures must be carried out on an ongoing basis to comply with state requirements.

Improvement: The City will continue its water main replacement program to reduce the amount of older and potentially leaking water mains. The City will also implement a comprehensive leak detection/water main repair program to further reduce the amount of distribution system leakage. A detailed program to establish standard methods for tracking non-revenue authorized consumption will be implemented. The City will perform other ongoing water use efficiency measures, including public education programs, as outlined in the Water Use Efficiency Program included in **Appendix F**.

CIP M4: Cross-Connection Control Program

Deficiency: The City's cross-connection control plan is an on-going program that needs additional development to improve the protection of the water system from backflow contamination.

Improvement: The City will strive to be 100 percent compliant for high hazard backflow devices will contact residential customers to determine if additional backflow devices are necessary. The City will carry out other cross-connection control program requirements as outlined in **Appendix G**.

CIP M5: Wellhead Protection Program

Deficiency: The City does not have a wellhead protection ordinance and program that meets current state requirements.

Improvement: The City will perform a more accurate delineation of the wellhead protection area boundaries utilizing a combined analytical and hydrogeological approach. The City also will also conduct a detailed inventory of potential sources of groundwater contamination and notify the required owners/operators. The City will develop and adopt an improved wellhead protection ordinance that addresses restricted uses in one-year time of travel zones. In addition, the City will carry out other wellhead protection program requirements as outlined in the Wellhead Protection Program included in **Appendix K**.

CIP M6: Emergency Response Plan Update

Deficiency: The City's Emergency Response Plan was last updated in 2006. The plan does not reflect the current City staff and facilities. The e-coli response plan also needs to be reviewed and updated per current DOH recommendations.

Improvement: The City will update the existing Emergency Response Plan to reflect current staff members and incident responders. Facility descriptions and isolation plans will be updated to reflect water system modifications since the 2006 plan. The City's e-coli response plan will also be reviewed and updated as necessary.

CIP M7: Comprehensive Water System Plan Update

Deficiency: WAC 246-290-100 requires that the City's WSP be updated every 6 years and submitted to the DOH for review and approval. Proposed changes to the WAC may extend the update requirement to 10 years.

Improvement: The City will update and submit its WSP every 6 years to comply with state requirements, or 10 years if the state standard is modified. The next WSP update will include hydraulic model calibration.

CIP M8: Machinery and Equipment

Deficiency: New machinery and equipment is necessary for the water department to properly operate and maintain the water system.

Improvement: The City will purchase water system machinery and equipment as necessary.

Developer Funded Improvements

The following water system facility improvements have been identified for the undeveloped areas of the City's existing service area to illustrate the major facilities that will be required to properly serve that area. The locations of the facilities are shown schematically in **Figure 9-1**. The costs associated with these improvements shall be borne by the developers, rather than the existing water customers, unless over-sizing the improvements provides benefit to existing customers.

CIP DF1: Central 365 Zone Water Main

Deficiency: Development that occurs in the higher elevations of the 365 Zone in the Cedarhome area will require new water mains to convey supply and storage.

Improvement: Install new 16-inch ductile iron water main from the Knittle Reservoir site north to 284th Street NW and from the existing dead-end 16-inch water main at 281st Place NW and 73rd Avenue NW west to the new 16-inch water main from the Knittle Reservoirs. Also install new 12-inch ductile iron water main in approximately 281st Place NW from approximately 78th Avenue NW east to the new 16-inch water main from the Knittle Reservoirs, and install new 8-inch ductile iron water main in 284th Street NW from 80th Avenue NW to the new 16-inch water main at approximately 76th Avenue NW.

CIP DF2: Southeast 297 Zone Water Main (UGA Addition 2)

Deficiency: Development that occurs in the southeast corner of the 297 Zone in Urban Growth Area (UGA) Addition 2 will require new water mains to convey supply and storage.

Improvement: Install new 12-inch ductile iron water main in 64th Avenue NW from SR 532 to Pioneer Highway. Install new 12-inch ductile iron water main in Pioneer Highway from 64th Avenue NW to approximately 63rd Avenue NW.

CIP DF3: Schenk Packing Area 297 Zone Water Main

Deficiency: Development or redevelopment that occurs in the vicinity of Schenk Packing will require new water mains to provide adequate fire flow.

Improvement: Install new 12-inch ductile iron water main in a loop around the Schenk Packing building on 288th Street NW, and extending north and east to the intersection of 80th Avenue NW and 292nd Street NW.

CIP DF4: Northwest 365 Zone Water Main

Deficiency: Development that occurs in the northwest part of the 365 Zone will require new water mains to convey supply and storage.

Improvement: Install new 12-inch ductile iron water main in approximately 286th Place NW from 75th Drive NW to 80th Avenue NW. Install new 12-inch ductile iron water main in 80th Avenue NW from approximately 286th Place NW to approximately 282nd Street NW.

CIP DF5: Maple Court Apartment Expansion Water Main

Deficiency: Development that occurs east of the existing Maple Court Apartments will require new water mains to convey supply and storage.

Improvement: Install new 12-inch ductile iron water main loop northeast of the intersection of Lindstrom Road and Pioneer Highway. Install new 12-inch ductile iron water main in Pioneer Highway from Lindstrom Road to approximately 70th Avenue NW.

CIP DF6: 297 Zone Water Main for UGA Addition 1

Deficiency: Development that occurs east of 68th Avenue NW, north of Jensen Road, and south of 284th Street NW in UGA Addition 1 will require new 297 Zone water mains to convey supply and storage.

Improvement: Install new 12-inch ductile iron 297 Zone water main in 284th Street NW from 68th Avenue NW to approximately 65th Avenue NW. Install new 12-inch ductile iron water main in approximately 65th Avenue NW from 284th Street NW to Jensen Road.

CIP DF7: 365 Zone Water Main for UGA Addition 1

Deficiency: Development that occurs east of 68th Avenue NW and between 288th Street NW and 284th Street NW will require new water mains to convey supply and storage.

Improvement: Install new 12-inch ductile iron water main in approximately 286th Street NW from 68th Avenue NW to approximately 65th Avenue NW. Install new 12-inch ductile iron water main in approximately 65th Avenue NW from approximately 286th Street NW to 284th Street NW.

ESTIMATING COSTS OF IMPROVEMENTS

Project costs for the proposed improvements were estimated based on costs of similar, recently constructed water projects in the City and around the Puget Sound area, and are presented in 2014 dollars. The total cost estimates include the estimated construction cost of the improvement and indirect costs estimated at 35 percent of the construction cost for engineering preliminary design, final design and construction management services, permitting, legal, and administrative services. The construction cost estimates include a 10-percent contingency and sales tax of 8.8 percent.

Construction cost estimates for water main projects were determined from the water main unit costs (i.e., cost per foot length) shown in **Table 9-3** and the proposed diameter and approximate length of each improvement.

**Table 9-3
Water Main Unit Costs**

Water Main Diameter (inches)	Construction Cost Per Foot Length (2014 \$/LF)
8	\$180
12	\$198
16	\$218

The unit costs for each water main size are based on estimates of all construction-related improvements, such as materials and labor for the water main installation, water services, fire hydrants, fittings, valves, connections to the existing system, trench restoration, asphalt surface restoration, other work necessary for a complete installation, contingency, and sales tax. Additional costs were added to some water main improvements to cover anticipated, increased costs related to the project location and degree of difficulty. Indirect costs are estimated at 35 percent of the water

main construction cost utilizing the construction cost per foot and the additional project related costs and are included in the total cost for each water main project.

PRIORITIZING IMPROVEMENTS

The water system improvements were prioritized from established criteria to formulate a schedule that identifies projects with the most deficiencies and greatest need for improvement to be completed prior to projects with fewer deficiencies. A description of the criteria and method for prioritizing each category of improvements is provided in the following sections.

Water Main Improvements

Table 9-4 lists criteria that were established for prioritizing the water main improvements. The criteria are based on the underlying deficiencies of the existing water main that will be replaced by the proposed water main improvements. The criteria are arranged in six different categories with a weight factor assigned to each category. The criterion given the most weight is the Existing Water Main Fire Flow Capability and the Existing Water Main Maintenance/Breaks categories.

The Existing Water Main Fire Flow Capability category ranks the water main improvements based on the ability of the existing water mains to provide the required fire flow, as determined from the results of the hydraulic analyses in **Chapter 7**. The Existing Water Main Maintenance/Breaks category ranks the water main improvements based on the number of reported leaks or breaks that the City currently has on record. The Coordination with Other Projects in Same Area category ranks the water main improvements based on other City projects scheduled for the same area. The Existing Water Main Year of Installation category ranks the water main improvements based on the age of the existing water mains. The Existing Water Main Material category ranks the water main improvements based on the material of the existing water main. The Existing Water Main Benefit Area category ranks the water main improvements based on the size of the area that will benefit from the replacement.

**Table 9-4
Water Main Improvements Priority Ranking Criteria**

Points	Category	Weight Factor	Weighted Points
Existing Water Main Maintenance/Breaks			
3	High Maintenance Requirements/High Frequency of Breaks	4	12
2	Annual Maintenance/Low Frequency of Breaks	4	8
1	No Maintenance and No History of Problems	4	4
Existing Water Main Fire Flow Capability			
3	Available Fire Flow is 69% or Less of Required Fire Flow	4	12
2	Available Fire Flow is 70-89% of Required Fire Flow	4	8
1	Available Fire Flow is 90-100% or More of Required Fire Flow	4	4
Coordination with Other Projects in Same Area			
3	Other Project Scheduled within 2 Years	3	9
2	Other Project Scheduled within 6 Years	3	6
1	Other Project Scheduled Beyond 6 Years or Not Scheduled	3	3
Existing Water Main Year of Installation			
3	Before 1965	3	9
2	1965 - 1980	3	6
1	After 1980	3	3
Existing Water Main Material			
3	Asbestos Cement	2	6
2	Galvanized Iron, Steel, or Cast Iron	2	4
1	Ductile Iron or PVC	2	2
Existing Water Main Benefit Area			
3	Large Benefit Area (i.e. transmission main)	2	6
2	Medium Benefit Area	2	4
1	Small Benefit Area (i.e. localized area)	2	2

The water main priority ranking criteria were applied to the annual water main replacement projects, which are grouped under CIP WM1. CIP 1 through 114, as shown in **Figure 9-1**, are presented in **Table 9-5** with their priority ranking.

**Table 9-5
Annual Water Main Replacement Projects**

No.	Priority		Estimated Cost	Size		Description		
	Rank	Points		Length (ft)	Diam (in)	In	From	To
1	M	28	\$3,242,000	7,590	12	Old Pacific Hwy	286th St NW	Pioneer Hwy NW
2	M	30	\$1,518,000	3,160	12	Old Pacific Hwy	286th St NW	276th St NW
3	L	18	\$441,000	1,650	12	~286th St NW	Old Pacific Hwy	Dead-end
4	L	27	\$308,000	1,160	12	Pioneer Hwy NW	~Myrtle Rd NW	Dead-end
5	L	24	\$391,000	1,620	8	88th Ave NW	288th St NW	Dead-end
6	L	25	\$338,000	810	12	80th Ave NW	Larson Rd	~292nd St NW
				510	8	~292nd St NW	80th Ave NW	Dead-end
7	H	40	\$1,036,000	3,880	12	Larson Rd	Pioneer Hwy NW	80th Ave NW
8	L	18	\$490,000	2,020	8	292nd St NW	Cedarhome Rd	Dead-end
9	L	27	\$144,000	540	12	Cedarhome Rd	290th St NW	292nd St NW
10	L	18	\$319,000	1,320	8	64th Ave NW	292nd St NW	288th St NW
11	L	18	\$497,000	2,050	8	288th St NW	Cedarhome Rd	64th Ave NW
12	L	25	\$1,446,000	3,390	12	80th Ave NW	Larson Rd	279th PI NW
13	L	25	\$1,410,000	3,260	12	89th Ave NW	Larson Rd	283rd St NW
14	L	23	\$127,000	530	8	286th PI NW	Pioneer Hwy NW	89th Ave NW
15	L	26	\$332,000	1,370	8	261st St NE	64th Ave NW	Dead-end
16	L	18	\$731,000	1,840	8	284th St NW	64th Ave NW	~60th Ave NW
				1,080	12	284th St NW	68th Ave NW	64th Ave NW
17	L	18	\$237,000	570	12	~281st PI NW	80th Ave NW	~78th Ave NW
				350	8	~78th Ave NW	~281st PI NW	Dead-end
18	M	28	\$439,000	400	16	280th St NW	68th Ave NW	Cedarhome Elem.
				1,210	12	Cedarhome Elem.	Loop	Loop
19	M	32	\$666,000	2,500	12	Pioneer Hwy NW	~Myrtle Rd NW	276th PI NW
20	H	42	\$261,000	350	8	280th St NW	86th Dr NW	85th Dr NW
				730	8	86th Dr NW	Pioneer Hwy NW	280th St NW
21	M	33	\$307,000	1,270	8	85th Dr NW	276th PI NW	280th St NW
22	M	33	\$254,000	640	8	84th Ave NW	280th St NW	278th St NW
				410	8	278th St NW	85th Dr NW	84th Ave NW
23	M	35	\$293,000	570	8	84th Dr NW	278th St NW	276th PI NW
				580	12	276th PI NW	84th Dr NW	Pioneer Hwy NW
24	M	32	\$302,000	1,130	12	80th Ave NW	279th PI NW	276th PI NW
25	L	23	\$94,000	390	8	278th St NW	80th Ave NW	Dead-end
26	L	26	\$762,000	3,140	8	Boe Rd	Marine Dr	Dead-end
27	M	29	\$148,000	620	8	~75th Ave NW	276th St NW	~278th Ave NW
28	M	28	\$939,000	3,290	12	276th St NW	102nd Ave NW	Lane Rd
				260	8	96th Ave NW	276th St NW	Heritage Park
29	M	28	\$587,000	1,870	12	276th St NW	92nd Ave NW	~BNRR
				330	12	~BNRR	276th St NW	Cedar St
30	M	30	\$865,000	1,980	12	102nd Ave NW	270th St NW	276th St NW
31	M	31	\$473,000	1,770	12	92nd Ave NW	271st St NW	276th St NW
32	M	31	\$63,000	270	8	274th PI NW	101st Ave NW	100th Ave NW
33	L	24	\$312,000	1,080	12	Josephine Home Loop	100th Ave NW	272nd PI NW
				100	8	Josephine Home Loop	~98th Ave NW	Hydrant
34	H	44	\$478,000	840	8	103rd Dr NW	273rd PI NW	271st St NW
				530	12	103rd Dr NW	271st St NW	SR 532
35	M	34	\$539,000	1,520	12	102nd Dr NW	~274th Ave NW	SR 532

* Priority: H = High, M = Medium, L = Low

1 = A portion of this project was completed in 2014. 8-inch PVC water main was installed in 101st Ave NW between 271st St NW and 272nd St NW.

**Table 9-5
Annual Water Main Replacement Projects (continued)**

No.	Priority		Estimated Cost	Size		Description		
	Rank	Points		Length (ft)	Diam (in)	In	From	To
36 ¹	M	31	\$369,000	730	8	101st Ave NW	274th PI NW	272nd PI NW
				730	12	101st Ave NW	272nd PI NW	270th St NW
37	L	20	\$199,000	750	12	96th Ave NW	271st St NW	272nd PI NW
38	L	24	\$233,000	880	12	273rd Ave NW	104th Dr NW	102nd Ave NW
39	M	32	\$70,000	270	12	273rd Ave NW	101st Ave NW	100th Ave NW
40	M	28	\$249,000	940	12	272nd PI NW	99th Ave NW	96th Ave NW
41	H	36	\$142,000	590	8	272nd St NW	101st Ave NW	99th Ave NW
42	M	28	\$366,000	1,370	12	Stanwood Middle Sch.	271st St NW	271st St NW
43	M	28	\$190,000	720	12	272nd St NW	92nd Ave NW	90th Ave NW
44	M	34	\$244,000	920	12	90th Ave NW	272nd St NW	~279th St NW
45	M	28	\$172,000	650	12	~BNRR	88th Ave NW	272nd St NW
46	M	35	\$115,000	440	12	~272nd St NW	88th Ave NW	~89th Ave NW
47	M	35	\$78,000	290	12	~89th Ave NW	271st St NW	~272nd St NW
48	H	39	\$718,000	2,690	12	271st St NW	102nd Dr NW	94th Dr NW
49	M	28	\$258,000	970	12	1 block north of Main St.	101st Ave NW	Camano Dr
50	H	51	\$632,000	1,860	12	270th St NW	102nd Dr NW	271st St NW
51	M	35	\$96,000	370	12	Camano St	270th St NW	SR 532
52	H	36	\$110,000	420	12	98th Dr NW	270th St NW	SR 532
53	M	30	\$300,000	290	12	~97th Dr NW	271st St NW	~270th St NW
54	L	26	\$950,000	840	12	~270th St NW	~97th Dr NW	~94th Dr NW
				1,220	12	SR 532	~109th Ave NW	103rd Dr NW
55	L	22	\$777,000	320	12	~109th Ave NW	SR 532	Saratoga Dr
				620	12	Saratoga Dr	~109th Ave NW	~105th Ave NW
56	H	36	\$229,000	280	12	Twin City Foods	Saratoga Dr	Dead-end
				300	12	104th Dr NW	SR 532	Saratoga Dr
57	H	36	\$193,000	60	12	105th Dr NW	~270th St NW	~270th St NW
				730	12	South of SR 532	Ex. 12" in SR 532	98th Dr NW
58	L	26	\$260,000	980	12	North of SR 532	~94th Dr NW	~92nd Dr NW
59	M	28	\$114,000	430	12	94th Dr NW	SR 532	270th St NW
60	M	28	\$132,000	500	12	271st St NW	88th Ave NW	Florence Rd
61	H	38	\$163,000	610	12	88th Ave NW	271st St NW	South of Viking Wy
62	H	40	\$176,000	660	12	270th St NW	88th Ave NW	Florence Rd
63	L	22	\$245,000	920	12	Florence Rd	271st St NW	SR 532
64	H	38	\$516,000	1,930	12	Viking Wy	~91st Ave NW	Florence Rd
65	M	28	\$323,000	1,210	12	North of SR 532	92nd Ave NW	90th Ave NW
66	M	31	\$322,000	1,330	8	Hennings Dr	276th PI NW	Cedarhome Dr
67	M	34	\$286,000	1,070	12	Street East of Pioneer	277th PI NW	Cedarhome Dr
68	M	34	\$128,000	530	8	Park Dr	Street East of Pioneer	Cedarhome Dr
69	H	44	\$143,000	160	12	Cedarhome Dr	Pioneer Hwy NW	Street East of Pioneer
				420	8	Cedarhome Dr	Street East of Pioneer	Park Dr
70	H	50	\$298,000	1,230	8	Cedarhome Dr	Park Dr	276th St NW
71	H	49	\$311,000	1,280	8	80th Dr NW	274th St NW	276th St NW
72	L	24	\$140,000	580	8	~82nd Dr NW	Cedarhome Dr	Cedarhome Rd
73	M	32	\$72,000	300	8	83rd Dr NW	Cedarhome Dr	Cedarhome Rd
74	H	51	\$346,000	1,430	8	Cedarhome Rd	Pioneer Hwy NW	80th Dr NW
75	H	40	\$258,000	970	12	Pioneer Hwy NW	Cedarhome Dr	~270th St NW
76	H	36	\$236,000	890	12	East of BNRR	Cedarhome Dr	~269th St NW

* Priority: H = High, M = Medium, L = Low
 1 = A portion of this project was completed in 2014. 8-inch PVC water main was installed in 101st Ave NW between 271st St NW and 272nd St NW.

**Table 9-5
Annual Water Main Replacement Projects (continued)**

No.	Priority		Estimated Cost	Size		Description		
	Rank	Points		Length (ft)	Diam (in)	In	From	To
77	M	31	\$151,000	630	8	Stauffer Rd	276th St NW	Dead-end
78	L	18	\$112,000	460	8	77th Dr NW	274th St NW	~275th St NW
79	H	42	\$369,000	1,380	12	76th Dr NW	276th St NW	272nd St NW
80	M	32	\$325,000	1,220	12	276th St NW	~73rd Dr NW	70th Ave NW
81	L	22	\$225,000	220	12	County PI NW	276th St NW	Church Creek Lp NW
				690	8	County PI NW	Church Creek Lp NW	Church Creek Lp NW
82	M	32	\$457,000	1,890	8	Church Creek Lp NW	County PI NW	Church Creek Crl NW
83	M	32	\$96,000	360	12	Church Creek Ct NW	Church Creek Lp NW	Dead-end
84	L	22	\$140,000	580	8	Village PI NW	Church Creek Lp NW	Church Creek Lp NW
85	L	22	\$163,000	670	8	Manor PI NW	Church Creek Lp NW	Church Creek Lp NW
86	L	22	\$84,000	320	12	Tyler PI NW	72nd Ave NW	Hydrant
87	H	38	\$241,000	910	12	72nd Ave NW	Tyler PI NW	272nd St NW
88	L	23	\$1,836,000	2,620	12	Woodland Rd	4" @ 68th Ave NW	64th Ave NW
				1,210	12	64th Ave NW	Woodland Rd	268th St NW
				1,030	12	268th St NW	64th Ave NW	Bryant Wells
89	M	35	\$111,000	420	12	Stanwood High Sch.	272nd St NW	Athl. Field Dead-end
90	H	36	\$726,000	1,550	16	78th Ave NW	272nd St NW	267th PI NW
91	H	37	\$589,000	2,210	12	272nd St NW	78th Dr NW	72nd Ave NW
92	M	35	\$223,000	840	12	Stanwood High Sch.	Main Campus Loop	Main Campus Loop
93	M	29	\$72,000	300	8	Cecilia Wy	78th Ave NW	Dead-end
94	M	28	\$198,000	740	12	267th St NW	~73rd Ave NW	Lindstrom Rd
95	M	30	\$353,000	1,330	12	Pt Susan Middle Sch. Rd	267th PI NW	77th Ave NW
96	M	28	\$332,000	1,250	12	Pt Susan Middle Sch. Rd	Main Campus Loop	Main Campus Loop
97	M	30	\$486,000	1,820	12	72nd Ave NW	267th PI NW	262nd St NW
98	L	22	\$470,000	1,760	12	Camano Village Loop	72nd Ave NW	72rd Ave NW
99	L	22	\$234,000	880	12	~69th Ave NW	Camano Village	Cinema
100	L	26	\$537,000	2,010	12	Cinema Loop	265th St NW	265th St NW
101	L	22	\$122,000	460	12	~263rd PI NW	72nd Ave NW	~69th Ave NW
102	M	28	\$664,000	2,490	12	Merrill Gardens	72nd Ave NW	Pt Susan Middle Sch.
103	L	22	\$257,000	970	12	Maple Court Apts. Loop	72nd Ave NW	72nd Ave NW
104	H	38	\$679,000	1,510	16	West of WWTP	Irvine Slough	264th St NW
				880	12	264th St NW	~98th Ave NW	95th Ave NW
105	H	42	\$294,000	1,210	8	98th Ave NW	West of WWTP	264th St NW
106	H	46	\$909,000	3,410	12	Leque Rd	264th St NW	Thomle Rd
107	M	32	\$388,000	1,600	8	95th PI NW	Leque Rd	Dead-end
108	L	26	\$2,757,000	10,320	12	Thomle Rd	~104th Dr NW	Marine Dr
109	L	26	\$162,000	670	8	~95th Ave NW	Thomle Rd	Dead-end
110	L	26	\$978,000	4,030	8	Valde Rd	Norman Rd	244th St NW
111	L	22	\$3,116,000	7,870	12	Miller Road	Pioneer Hwy NW	Norman Rd
112	L	21	\$521,000	2,150	8	Florence Rd	Marine Dr	Marine Dr
113	L	27	\$2,392,000	6,930	12	Norman Rd	Marine Dr	Dead-end
114	L	21	\$262,000	1,080	8	70th Ave NW	Norman Rd	Dead-end
Total			\$53,979,000					

* Priority: H = High, M = Medium, L = Low
 1 = A portion of this project was completed in 2014. 8-inch PVC water main was installed in 101st Ave NW between 271st St NW and 272nd St NW.

Water System Improvements

A number of water main projects are higher-priority than others. The water main replacement projects which were listed with an “H” (High) ranking in **Table 9-5** are listed in **Table 9-6**, starting with the highest priority.

Table 9-6
High Priority Annual Water Main Replacement Projects

No.	Priority		Estimated Cost	Size		Description		
	Rank	Points		Length (ft)	Diam (in)	In	From	To
50	H	51	\$632,000	1,860	12	270th St NW	102nd Dr NW	271st St NW
74	H	51	\$346,000	1,430	8	Cedarhome Rd	Pioneer Hwy NW	80th Dr NW
70	H	50	\$298,000	1,230	8	Cedarhome Dr	Park Dr	276th St NW
71	H	49	\$311,000	1,280	8	80th Dr NW	274th St NW	276th St NW
106	H	46	\$909,000	3,410	12	Leque Rd	264th St NW	Thomle Rd
34	H	44	\$478,000	840	8	103rd Dr NW	273rd Pl NW	271st St NW
				530	12	103rd Dr NW	271st St NW	SR 532
69	H	44	\$143,000	160	12	Cedarhome Dr	Pioneer Hwy NW	Street East of Pioneer
				420	8	Cedarhome Dr	Street East of Pioneer	Park Dr
20	H	42	\$261,000	350	8	280th St NW	86th Dr NW	85th Dr NW
				730	8	86th Dr NW	Pioneer Hwy NW	280th St NW
79	H	42	\$369,000	1,380	12	76th Dr NW	276th St NW	272nd St NW
105	H	42	\$294,000	1,210	8	98th Ave NW	West of WWTP	264th St NW
7	H	40	\$1,036,000	3,880	12	Larson Rd	Pioneer Hwy NW	80th Ave NW
62	H	40	\$176,000	660	12	270th St NW	88th Ave NW	Florence Rd
75	H	40	\$258,000	970	12	Pioneer Hwy NW	Cedarhome Dr	~270th St NW
48	H	39	\$718,000	2,690	12	271st St NW	102nd Dr NW	94th Dr NW
61	H	38	\$163,000	610	12	88th Ave NW	271st St NW	South of Viking Wy
64	H	38	\$516,000	1,930	12	Viking Wy	~91st Ave NW	Florence Rd
87	H	38	\$241,000	910	12	72nd Ave NW	Tyler Pl NW	272nd St NW
104	H	38	\$679,000	1,510	16	West of WWTP	Irvine Slough	264th St NW
				880	12	264th St NW	~98th Ave NW	95th Ave NW
91	H	37	\$589,000	2,210	12	272nd St NW	78th Dr NW	72nd Ave NW
41	H	36	\$142,000	590	8	272nd St NW	101st Ave NW	99th Ave NW
52	H	36	\$110,000	420	12	98th Dr NW	270th St NW	SR 532
56	H	36	\$229,000	300	12	104th Dr NW	SR 532	Saratoga Dr
				60	12	105th Dr NW	~270th St NW	~270th St NW
57	H	36	\$193,000	730	12	South of SR 532	Ex. 12" in SR 532	98th Dr NW
76	H	36	\$236,000	890	12	East of BNRR	Cedarhome Dr	~269th St NW
90	H	36	\$726,000	1,550	16	78th Ave NW	272nd St NW	267th Pl NW
Total			\$10,053,000					

Other Improvements

The additional water main, pressure zone, PRV station, and facility improvements were prioritized based on existing deficiencies, safety concerns, and maintenance and capacity requirements. The miscellaneous improvements were prioritized based on regulatory requirements, funding availability, and an assessment of other water system needs. The priority order of these improvements is reflected in the schedule of improvements presented in the next section.

SCHEDULE OF IMPROVEMENTS

The improvement prioritization results were used to assist in establishing an implementation schedule that can be used by the City for preparing its 6-year CIP and yearly water budget. The implementation schedule for the proposed improvements is shown in **Table 9-7**. An allowance of approximately \$50,000 per year has been established for the annual replacement of smaller water mains in the early years of the improvement plan. The annual allowance increases to \$200,000 per year in 2022. The City will identify and schedule the replacement of these smaller water mains during its annual budget process. This provides the City with the flexibility to coordinate these projects with road or other projects in the same areas. The developer funded improvement projects and their associated cost estimates are shown near the bottom of the table. However, the implementation dates for these improvements is not shown due to the uncertainty of the timing of the future developments that will be responsible for these improvements.

Future Project Cost Adjustments

All cost estimates shown in the tables are presented in year 2014 dollars. It is recommended that future costs be adjusted to account for the effects of inflation and changing construction market conditions at the actual time of project implementation. Future costs can be estimated using the Engineering News Record (ENR) Construction Cost Index for the Seattle area or by applying an estimated rate of inflation that reflects the current and anticipated future market conditions.

**Table 9-7
Proposed Improvements Implementation Schedule**

No.	Description	Estimated Cost (2014 \$)	20-Year Schedule of Improvements													
			Planned Year of Project and Estimated Cost in 2014 \$													
			2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026-2035	2036+	
Water Main Improvements																
WM1	Annual Water Main Replacement Program	\$53,979,000	\$50K	\$50K	\$50K	\$50K	\$50K	\$50K	\$50K	\$200K	\$200K	\$200K	\$200K	\$2,000K	\$50,829K	
WM2	Corrosion Improvements in 100th, 272nd & 99th	\$466,000						\$155K	\$311K							
WM4	Water Main South of SR 532 from 92nd to 84th	\$1,461,000									\$365K	\$1,096K				
WM5	Water Main from Bryant Wells to 84th	\$1,614,000											\$404K	\$1,211K		
WM6	Water Main from Hatt Slough Springs to SR 532	\$5,637,000												\$5,637K		
WM7	Pioneer Highway Water Main from 72nd to 64th	\$600,000	\$600K													
Pressure Zone Improvements																
PZ4	Conversion of Middle Press. Zones to 245 Zone	\$1,350,000							\$340K	\$1,010K						
Pressure Reducing Station Improvements																
PRV1	252 Zone PRV Replacement	\$100,000					\$100K									
PRV2	Additional 297/125 Zone PRV on Miller Rd	\$95,000												\$95K		
PRV3	Pressure Relief Valve in the 245 Zone	\$55,000		\$55K												
Facility Improvements																
F1	Knittle Reservoir No. 2 Recoating	\$540,000		\$540K												
F2	Cedarhome Reservoir Recoating	\$380,000												\$380K		
F3	Cedarhome Well Study	\$60,000												\$60K		
F4	Cedarhome Well Improvements	\$100,000												\$100K		
F5	Bryant Well Field Treatment Facility Sewer	\$99,000											\$99K			
F6	Bryant Well Treatment Facility Pilot Study for Additional Flow	\$30,000		\$30K												
F7	Bryant Well Treatment Facility Improvements for Additional Flow	\$405,000			\$405K											
F8	Bryant Well No. 2 Monitoring Well Modifications	\$23,000			\$23K											
F9	Decommission Fure Well	\$30,000	\$30K													
F10	Telemetry Improvements - PLC Upgrades	\$10,000	\$10K													
F11	Telemetry Improvements - Extend Life of Existing Telemetry System	\$16,000							\$16K							
F12	Telemetry Improvements - Radio System Equipment	\$33,000					\$33K									
F13	Long-term Water Supply Study	\$100,000			\$20K			\$20K			\$60K					
F14	Cedarhome Booster Pump Station Generator	\$250,000		\$250K												
F15	Knittle Booster Pump Station Generator	\$260,000						\$260K								
F16	Knittle Booster Pump Station Improvements	\$945,000					\$236K	\$709K								
F17	Hatt Slough Springs Evaluation	\$25,000						\$25K								
F18	297 Zone Reservoir Design & Construction	\$2,000,000					\$500K	\$1,500K								
F19	Decommission Sill Well	\$15,000	\$15K													
F20	Bryant Well No. 3 (completion of 2014 project)	\$550,000	\$550K													
Miscellaneous Improvements																
M1	Update Water System Standards	\$4,000	\$2										\$2K			
M2	Miscellaneous Corrosion Improvements	\$21,000	\$1K	\$1K	\$1K	\$1K	\$1K	\$1K	\$1K	\$1K	\$1K	\$1K	\$1K	\$10K		
M3	Water Use Efficiency Program	\$50,000			\$5K	\$5K	\$5K	\$5K	\$5K	\$5K	\$5K	\$5K	\$5K	\$25K		
M4	Cross-Connection Control Program	\$42,000	\$2K	\$2K	\$2K	\$2K	\$2K	\$2K	\$2K	\$2K	\$2K	\$2K	\$2K	\$20K		
M5	Wellhead Protection Program	\$50,000	\$10K					\$10K				\$10K		\$20K		
M6	Emergency Response Plan Update	\$10,000	\$10K													
M7	Comprehensive Water System Plan Update	\$310,000	\$10K									\$150K		\$150K		
M8	Machinery and Equipment	\$525,000	\$25K	\$25K	\$25K	\$25K	\$25K	\$25K	\$25K	\$25K	\$25K	\$25K	\$25K	\$250K		
Total Estimated Costs of City Funded Impr.			\$72,240,000	\$1,315K	\$953K	\$531K	\$78K	\$952K	\$2,757K	\$750K	\$1,238K	\$658K	\$1,484K	\$738K	\$9,958K	\$50,829K
Developer Funded Improvements																
DF1	Central 365 Zone Water Main	\$1,220,000													Timing of Project Based on Timing of Future Developments	
DF2	Southeast 297 Zone Water Main (UGA Addition 2)	\$1,954,000													Timing of Project Based on Timing of Future Developments	
DF3	Schenk Packing Area Water Main	\$812,000													Timing of Project Based on Timing of Future Developments	
DF4	Northwest 365 Zone Water Main	\$806,000													Timing of Project Based on Timing of Future Developments	
DF5	Maple Court Apartment Expansion Water Main	\$522,000													Timing of Project Based on Timing of Future Developments	
DF6	297 Zone Water Main for UGA Addition 1	\$522,000													Timing of Project Based on Timing of Future Developments	
DF7	365 Zone Water Main for UGA Addition 1	\$470,000													Timing of Project Based on Timing of Future Developments	
Total Estimated Costs of Developer Funded Impr.		\$6,306,000														

CHAPTER 9

C H A P T E R 9 1
 Water System Improvements 1
INTRODUCTION 1
DESCRIPTION OF IMPROVEMENTS 1
 Water System Improvements Since the Last Water System Plan 2
 Water Main Improvements 2
 Pressure Zone Improvements 5
 Pressure Reducing Station Improvements 5
 Facility Improvements 6
 Miscellaneous Improvements 11
 Developer Funded Improvements 13
ESTIMATING COSTS OF IMPROVEMENTS 15
PRIORITIZING IMPROVEMENTS 16
 Water Main Improvements 16
 Other Improvements 21
SCHEDULE OF IMPROVEMENTS 22
 Future Project Cost Adjustments 22