

Capital Improvement Plan

6-1. INTRODUCTION

This chapter presents proposed improvements to the City of Fife's (City) sewer system that are necessary to resolve existing system deficiencies and plan for the projected sewer customer growth. The sewer system improvements were identified by City staff and from the analyses presented in **Chapter 4**. The sewer system improvements were sized to meet the system's existing and future demand conditions.

A Capital Improvement Plan (CIP) number has been assigned to each improvement for gravity collection piping, pump stations, and force mains. The remainder of this chapter presents a brief description of each group of improvements, the criteria for prioritizing, the basis for the cost estimates, and the implementation schedule.

For planning purposes, the improvement projects described herein are based on one alternative route or conventional concept for providing the necessary improvement. Other methods of achieving the same result, such as obtaining flow capacity increases by adding one large gravity main versus using multiple gravity pipes, force main/gravity main combinations or multiple force mains, should be considered during predesign so that the most effective and lowest cost alternative design is selected.

6-2. DESCRIPTION OF IMPROVEMENTS

This section provides a general description of each group of improvements and an overview of the deficiencies they will resolve. Some of the improvements are necessary to resolve existing system deficiencies, while some improvements will be necessary to serve currently undeveloped areas in the Urban Growth Area (UGA) or City limits. The major pipe and facility improvements that will be required when development occurs in those areas are considered to be developer-funded projects. Additional developer-funded projects include localized on-site sewer main improvements that are not associated with the existing overall sewer collection/interceptor system, but will be necessary when the property served by the sewer system is redeveloped or expanded. The costs associated with all of these improvements shall be borne by the developers, rather than the existing sewer customers. The locations of improvements in the undeveloped areas are not shown as they will be designed in the future to fit the specific layout of the developments. The actual design parameters should be evaluated at the design phase of the project, using the hydraulic model or another accepted engineering procedure. Updated population and flow data should be used when available to ensure the proposed facilities are adequately sized to handle build-out flows.

Existing System Improvements

The following improvements were identified from the results of the system analyses as discussed in **Chapter 5** and by City staff. The improvements include the major pipeline and facility construction that are required to properly serve the existing sewer service area. The improvement costs shall be borne by the existing customers, unless over-sizing of the improvements provides a benefit to developers.

The existing improvements are based on existing flow rates; however, the proposed pipe diameters should be based on the flow projections for 2035. The existing system improvements are illustrated

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in **Figure 6-1**. A variety of alternatives are possible for improving CIP Nos. 10, 15, 17, and 18 and further evaluation should be performed.

CIP No. 1: PS-5 Relining Project

Estimated Cost: \$700,000

Proposed Year: 2014 (Completed in 2014)

Deficiency: The existing coating on the concrete walls and in PS-5 are failing, exposing the concrete surfaces to the corrosive atmosphere of the wetwell. This has led to a significant loss of concrete in some areas which could eventually lead to weakening of the concrete structure if not repaired and recoated. The existing polyurea coating in the wetwell has low adhesion strength and has peeled away from the concrete in numerous locations. The peeled coating poses a risk to the operation of the sewage pump station should the coating come off and plug the pumps.

Improvement: Remove and replace the existing coating on the concrete walls and in PS-5. Damaged portions of the concrete structure in PS-5 will be repaired prior to application of the new coating.

This project is part of the next phase of the City's Wetwell Coating Rehabilitation Project, which began in 2013 with the rehabilitation of the PS-1 and PS-13 wetwells.



CIP No. 2: PS-6 Relining Project

Estimated Cost: \$700,000

Proposed Year: 2014 (Completed in 2014)

Deficiency: The existing coating on the concrete walls and in PS-6 are failing, exposing the concrete surfaces to the corrosive atmosphere of the wetwell. This has led to a significant loss of concrete in some areas which could eventually lead to weakening of the concrete structure if not repaired and recoated. The existing polyurea coating in the wetwell has low adhesion strength and has peeled away from the concrete in numerous locations. The peeled coating poses a risk to the operation of the sewage pump station should the coating come off and plug the pumps.

Improvement: Remove and replace the existing coating on the concrete walls and in PS-6. Damaged portions of the concrete structure in PS-6 will be repaired prior to application of the new coating.

This project is part of the next phase of the City's Wetwell Coating Rehabilitation Project, which began in 2013 with the rehabilitation of the PS-1 and PS-13 wetwells.

CIP No. 3: Holt Property Acquisition

Estimated Cost: \$400,000

Proposed Year: 2014 (Completed in 2014)

Improvement: The City will acquire the 8.3-acre Holt property located near Valley Avenue East and Freeman Road. The site includes a 1,000-foot-deep groundwater well that could be used to provide water supply to the City if water rights can be secured. This property could be used by the Parks, Recreation, and Community Services (PRCS), as well as for other purposes.



CIP No. 4: EG Control Upgrade for PS-1, PS-5, and PS-6

Estimated Cost: \$30,000

Proposed Year: 2014

Deficiency: The existing emergency back-up power systems at PS-1, PS-5, and PS-6 do not function properly. During a power outage, the emergency generators start but the pumps do not turn on. City staff must visit the pump station and manually turn on the pumps. The time it takes for staff to get to the pump station is often too long and the wetwells overflow.



Improvement: Revise the control systems at PS-1, PS-5, and PS-6 so that both the emergency power generators and pumps start automatically during a power failure event.

CIP No. 5: PS-10 Relining and Upgrade Project

Estimated Cost: \$760,000

Proposed Year: 2014 (Completed in 2015)

Deficiency: PS-10 is an antiquated pump station. Improvements are required to upgrade the pump station.

Improvement: Rehabilitation of PS-10 consists of upgrades and improvements to the existing aged pump station. This project includes the replacing pumps and control panel, making electrical improvements, installing new valves, installing a weather cover structure to protect electrical equipment, installing new aluminum hatches and concrete slabs over the wetwell and valve vault, and sealing the wetwell.





CIP No. 6: Mixer Systems for PS-1, PS-5, and PS-6

Estimated Cost: \$150,000

Proposed Year: 2015 (Completed in 2015)

Deficiency: Odor control is just one of the concerns that arises from the City's long force mains; another is corrosive gases. The City has been working to reline its pump stations and this is the next step to protect the sewer system. There are several products on the market and approaches used by purveyors to address the three common issues of sewer facilities: odor, corrosive environment, and fat, grease (FOG) build up.

Improvement: The City is already using the aerator/mixers (Little John Grease Digester™) system at a few of their sewage pump stations with success. The Little John system is a relatively low cost option for addressing odor issues. Little Johns should be installed at PS-1, PS-5, and PS-6 to address FOG.

CIP No. 7: Brookville Gardens Sewer System

Estimated Cost: \$100,000

Proposed Year: 2016

Deficiency: The City is in the process of making improvements at its Brookville Gardens site and restroom will be constructed for the area.

Improvement: A force main and grinder pump is required to serve the Brookville Gardens restroom. The pump and force main will be installed on a new pedestrian bridge.



CIP No. 8: Upgrade Telemetry at PS-6 and PS-13

Estimated Cost: \$30,000

Proposed Year: 2016

Deficiency: The existing telemetry systems at PS-6 and PS-13 are not set up to record or transmit status and alarm data.

Improvement: Install the equipment necessary to upgrade the system to provide this function, including modems, phone lines, and a master computer at the Public Works Department to monitor and store data from these pump stations, as well as PS-1, PS-5, and PS-12.

CIP No. 9: PS-12 Emergency Power Generator

Estimated Cost: \$150,000

Proposed Year: 2016

Deficiency: The existing PS-12 serves the City’s largest residential sewer area. The existing pump station lacks emergency back-up power.

Improvement: An emergency power generator and automatic transfer switch should be installed to ensure that the station continues to function during a power failure to improve this sewage pump station’s reliability.



CIP No. 10: PS-12 Flood Protection

Estimated Cost: \$400,000

Proposed Year: 2016

Deficiency: The existing PS-12 serves the City’s largest residential sewer area. Based on redefined Federal Emergency Management Agency (FEMA) floodways and berm projects in this area, the City has identified that the top of the existing sewer pump station is located too low and could potentially be submerged and inaccessible in certain flooding conditions.

Improvement: Raising the sewage pump station and its associated power and control panels will be necessary to address this potential flooding issue and improve this station’s reliability.

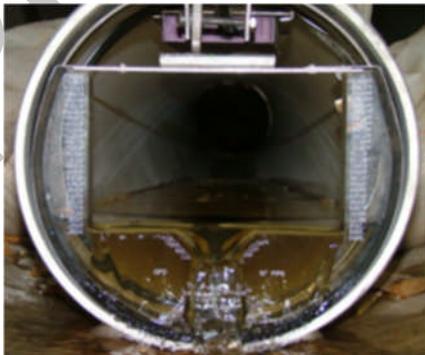
CIP No. 11: Infiltration and Inflow (I/I) Study

Estimated Cost: \$50,000

Proposed Year: 2016

Deficiency: The City’s system has a high potential for infiltration issues due to the regions high groundwater table. Collection of seasonal data will assist in the determination of the magnitude and location of infiltration and inflow (I/I) issues.

Improvement: Flow monitoring should be conducted to evaluate and prepare an I/I reduction plan for the City. The installation of flow monitoring equipment at key points in the City’s collection system will allow seasonal data to be collected and analyzed to determine the magnitude and location of I/I issues. Cost-effective sewer rehabilitation measures to remove excessive inflow should be determined during predesign efforts.



CIP No. 12: Pump Station Capacity Analysis

Estimated Cost: \$75,000

Proposed Year: 2016

Deficiency: As a next step in the City's sewer system planning effort, a pump capacity analysis should be conducted to evaluate the existing capacity of the sewage pump stations.

Improvement: Draw-down testing will be conducted to compare the actual pumping capacity of each station to its intended design capacity. This information will be used to schedule pump replacements and confirm that adequate capacity continues to handle existing upstream flows.

CIP No. 13: Holt Property Site Improvements

Estimated Cost: \$300,000

Proposed Year: 2016

Improvement: The City will construct frontage and site improvements at the 8.3-acre Holt property located near Valley Avenue East and Freeman Road. The site includes a 1,000-foot-deep groundwater well that could be used to provide water supply to the City if water rights can be secured. This property could be used by PRCS as well as for other purposes.

CIP No. 14: Telemetry System Upgrades

Estimated Cost: \$150,000

Proposed Year: 2017

Deficiency: Telemetry and control systems are critical components of the City's sewer system. These systems collect data, monitor the function and security of facilities, and have the potential to control the operation of the system. They can be very expensive and do not have a very long design life.

Improvement: Not all of the City's sewage pump stations have telemetry and control systems and the ones that do are approaching their intended design life. This project will evaluate and make improvements to the City's telemetry and control system to provide the level of service and reliability appropriate for this utility.



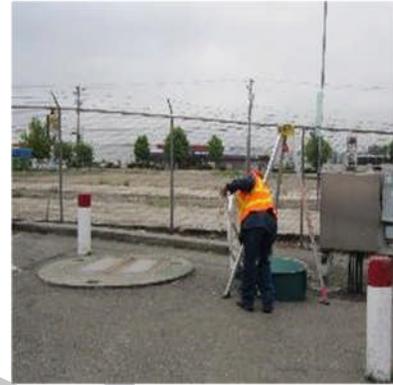
CIP No. 15: PS-2, PS-3 and PS-7 Consolidation

Estimated Cost: \$750,000

Proposed Year: 2017

Deficiency: There are three small sewage pump stations (PS-2, PS-3, and PS-7) located in the area north of Pacific Highway and west of Alexander Avenue that serve Sewage Drainage Basins No. 2, 3, and 7. All three of these stations are approaching the end of their design lives and serve relatively small areas.

Improvement: This project will evaluate the potential to consolidate these sewage drainage basins to be served by only one station. Operation and maintenance costs would reduce by the elimination of one or two sewage pump stations. A cost analysis would be done to compare the cost of upgrading the existing stations to the cost of constructing deeper sewer mains to connect the system to one central sewage pump station.



CIP No. 16: Holt Property Building Improvements

Estimated Cost: \$350,000

Proposed Year: 2018

Improvement: The City will construct building improvements at the 8.3-acre Holt property located near Valley Avenue East and Freeman Road. The site includes a 1,000-foot-deep groundwater well that could be used to provide water supply to the City if water rights can be secured. This property could be used by the PRCS, as well as for other purposes.

CIP No. 17: Puyallup Bridge Force Mains

Estimated Cost: \$5,000,000

Proposed Year: 2020

Deficiency: As part of planned pier replacements, the City of Tacoma is planning to replace the Puyallup Bridge. The force mains from PS-1 and PS-5 are suspended from the Puyallup Bridge. During construction of the new bridge, the existing bridge, along with Fife's existing two force mains, will be removed.

Improvement: These facilities are critical and new force mains must be constructed before the bridge and existing force mains are removed. Options include directional drilling under the river, a new pipe bridge, or hanging the force mains on one of several existing bridges.



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CIP No. 18: PS-4 Relocation

Estimated Cost: \$750,000

Proposed Year: 2021

Deficiency: As part of the proposed development of the Port of Tacoma parcel 14, the roadway and intersection at 54th Avenue East and 8th Street East will need to be widened to accommodate more traffic and the required turning radius for large trucks.

Improvement: The existing sewage pump station will need to be relocated to accommodate this project and a temporary sewage bypass plan will be necessary.



CIP No. 19: PS-8 Upgrades

Estimated Cost: \$750,000

Proposed Year: 2021

Deficiency: The City's existing PS-8 will be upgraded to address deficiencies and capacity concerns.

Improvement: This project will upgrade and improve the existing sewage pump station by replacing the pumps and control panel, making electrical and telemetry improvements, installing new valves, concrete slabs and aluminum hatches.

CIP No. 20: I/I Program (Phase 1)

Estimated Cost: \$750,000

Proposed Year: 2023

Deficiency: Based on results of the City's I/I study (CIP No. 11) conducted over several seasons of wet weather, it is anticipated that specific sewer alignments will be targeted for rehabilitation to reduce I/I.

Improvement: This program will systematically repair or replace sewer mains and side sewers to address identified deficiencies. Typical projects include either slip-lining, pipe bursting, or conventional sewer main replacement.



CIP No. 21: I/I Program (Phase 2)

Estimated Cost: \$750,000

Proposed Year: 2024

Deficiency: Based on results of the City's I/I study (CIP No. 11) conducted over several seasons of wet weather, it is anticipated that specific sewer alignments will be targeted for rehabilitation to reduce I/I.

Improvement: This program will systematically repair or replace sewer mains and side sewers to address identified deficiencies. Typical projects include either slip-lining, pipe bursting, or conventional sewer main replacement.

CIP No. 22: Benthien Loop Sewer Extension

Estimated Cost: \$1,500,000

Proposed Year: 2025

Deficiency: This area was recently annexed into the City and the City would like to connect the area to the municipal sewer system.

Improvement: This project will extend gravity sewer to serve all of Benthien Loop neighborhood. This project may require revisiting the City’s interlocal agreement with Pierce County for capacity as this area would ideally connect to the County existing system.



CIP No. 23: Firwood Area (48th Street E) Sewer Extension

Estimated Cost: \$8,100,000

Proposed Year: 2025

Deficiency: The City desires to connect the area to the municipal sewer system. Extending the sewer will allow existing customers to connect to the sewer system as septic systems fail and will help facilitate development and redevelopment of parcels in this area.

Improvement: This is the next step of the 48th Street East LID08-02 that extended sewer, water, and storm into the Firwood area.

This project will also extend water main to a proposed emergency intertie with the City of Puyallup on Freeman Road East. Working with the developer and current land owners will be critical to successfully planning service to this area.

CIP No. 24: I/I Program (Phase 3)

Estimated Cost: \$750,000

Proposed Year: 2025

Deficiency: Based on results of the City’s I/I study conducted over several seasons of wet weather, it is anticipated that specific sewer alignments will be targeted for rehabilitation to reduce I/I.

Improvement: This program will systematically repair or replace sewer mains and side sewers to address identified deficiencies. Typical projects include either slip-lining, pipe bursting, or conventional sewer main replacement.

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CIP A: Annual Programs

Estimated Cost: \$160,000 per year

Proposed Year: 2015 through 2024

Annual Programs	Annual Cost
Lift Station Improvements	\$ 30,000
Unscheduled Projects	\$ 50,000
Equipment Upgrades	\$ 30,000
Manhole Rehabilitation	\$ 30,000
Sewer Main Videoing Program	\$ 20,000
Annual Total	\$ 160,000

6-3. ESTIMATING COSTS OF IMPROVEMENTS

Project costs for the proposed improvements were estimated based on costs of similar, recently constructed sewer projects in the City and around the Puget Sound area and are presented in 2014 dollars. The 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, construction management services, permitting, and legal and administrative services. The construction cost estimates include a 10 percent contingency and sales tax of 9.4 percent.

The costs are based on estimates of all construction-related improvements, such as materials and labor for installation, services, manholes, connections to the existing system, trench restoration, asphalt surface restoration, and other work for a complete installation. The costs also include a contingency and sales tax. Additional costs were added to some improvements to cover anticipated increased costs related to the project location and degree of difficulty.

6-4. PRIORITIZING IMPROVEMENTS

The existing system improvements were prioritized by the City based on the perceived need for the improvement to be completed prior to projects with fewer deficiencies or less risk of damage due to failure of the system.

Future projects that are not identified as part of the City's CIP may become necessary. Such projects may be required in order to remedy an emergency situation or to address unforeseen problems. Due to budgetary constraints, the completion of such projects may require modifications to the recommended CIP. The City retains the flexibility to reschedule, expand, or reduce the projects included in the CIP and to add new projects to the CIP, to be determined by City Council, when new information becomes available for review and analysis.

6-5. SCHEDULE OF IMPROVEMENTS

The improvements were prioritized to establish an implementation schedule that can be used by the City for preparing its 10-year CIP. The implementation schedule for the proposed improvements is shown in **Table 6-1**. The City will identify and schedule the repair/replacement projects during the annual budget process. This provides the City with the flexibility to coordinate these projects with road or other projects within the same area.

Future Project Cost Adjustments

All cost estimates shown in the tables are presented in 2014 dollars. Therefore, it is recommended that future costs be adjusted to account for the effects of inflation and changing construction market

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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 6-1
Proposed 10-Year Capital Improvements Plan Implementation Schedule**

10-Year Capital Improvement Plan						
Year	CIP No.	Description	Type	Estimated 2014 Cost	Year	Total by Year
0	1	PS-5 Relining Project	Replacement	\$700,000	2015	\$2,590,000
	2	PS-6 Relining Project	Replacement	\$700,000	2015	
	3	Holt Property Acquisition	Expansion	\$400,000	2015	
	4	EG Control Upgrade for PS-1 ,PS-5, & PS-6	System Upgrade	\$30,000	2015	
	5	PS-10 Relining and Upgrade Project	System Upgrade	\$760,000	2015	
	6	Mixer Systems for PS-1, PS-5, & PS-6	System Upgrade	\$150,000	2015	
1	7	Brookville Gardens Sewer System	Increase Capacity	\$100,000	2016	\$1,265,000
	8	Upgrade Telemetry at PS-6 & PS-13	System Upgrade	\$30,000	2016	
	9	PS-12 Emergency Power Generator	System Upgrade	\$150,000	2016	
	10	PS-12 Flood Protection	System Upgrade	\$400,000	2016	
	11	I&I Study	General	\$50,000	2016	
	12	Pump Station Capacity Analysis	General	\$75,000	2016	
	13	Holt Property Site Improvements	Expansion	\$300,000	2016	
	A*	Annual Programs		\$160,000	2016	
2	14	Telemetry System Upgrades	General	\$150,000	2017	\$1,060,000
	15	PS-2, PS-3 & PS-7 Consolidation	Replacement	\$750,000	2017	
	A*	Annual Programs		\$160,000	2017	
3	16	Holt Property Building Improvements	Expansion	\$350,000	2018	\$510,000
	A*	Annual Programs		\$160,000	2018	
4	A*	Annual Programs		\$160,000	2019	\$160,000
5	17	Puyallup Bridge Force Mains	Replacement	\$5,000,000	2020	\$5,160,000
	A*	Annual Programs		\$160,000	2020	
6	18	PS-4 Relocation	Replacement/Expansion	\$750,000	2021	\$1,660,000
	19	PS-8 Upgrades	Replacement/Expansion	\$750,000	2021	
	A*	Annual Programs		\$160,000	2021	
7	A*	Annual Programs		\$160,000	2022	\$160,000
8	20	I&I Program (Phase 1)	Replacement/Expansion	\$750,000	2023	\$910,000
	A*	Annual Programs		\$160,000	2023	
9	21	I&I Program (Phase 2)	Replacement/Expansion	\$750,000	2024	\$910,000
	A*	Annual Programs		\$160,000	2024	
10	22	Benthien Loop Sewer Extension	Increase Capacity	\$1,500,000	2025	\$10,510,000
	23	Firwood Area (48th St E) Sewer Extension	Increase Capacity	\$8,100,000	2025	
	24	I&I Program (Phase 3)	Replacement/Expansion	\$750,000	2025	
	A*	Annual Programs		\$160,000	2025	
TOTAL						\$24,895,000

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