CHAPTER 8

Sewer System Improvements

Introduction

This chapter presents the proposed improvements to the City of Bonney Lake's (City) sewer system that are necessary to resolve existing system deficiencies and accommodate the projected growth of sewer customers. The sewer system improvements were based on the evaluation of the existing sewer system.

A Capital Improvement Program (CIP) was developed and included as part of this update. The CIP is needed to order the progression of sewerage extensions and improvements, including wastewater treatment costs, at an affordable rate and to still meet the needs of the City.

As new developments occur within the City's sewer service area, they will be responsible for making improvements necessary to maintain an adequate level of service within the sewer system. Developers will be required to construct the facilities necessary to adequately serve their new

developments. They will then donate them to the City or contribute their share of the project cost to the City. Sometimes, it is prudent to require that the developer provide facilities beyond what is necessary for a specific development in order to provide extensions beyond the development, or to plan for future growth. The City can then reimburse the developer for the cost of the additional facilities through direct outlay, cost recovery charges, or other reimbursement agreements.

A CIP number has been assigned to each improvement. The improvements are organized and presented in this chapter according to the following categories:

- General and Planning (G)
- Facility, including Treatment and Buildings (F)
- Lift Station (LS)
- Collection System (C)
- Annual Program (A)
- Replacement Program (RR)

Description of Improvements

This section provides a general description of each group of improvements and an overview of the deficiencies that they will resolve. Most of the improvements are necessary to upgrade the system and improve reliability, including treatment, LS, and collection system. The CIP list is shown in **Table 8-1 – *Proposed Improvements Implementation Schedule (6-year CIP)***. A 10-year CIP is included in **Table 8-2 – *Proposed Improvements Implementation Schedule (10-year CIP)*** for calculation of the capital facilities charge. Another 10 years of CIP is also included to complete a 20-year CIP in **Table 8-3 – *Proposed Improvements Implementation Schedule (20-year CIP)*** for budget-planning purposes.

Table 8-1
Proposed Improvements Implementation Schedule (6-year CIP)

Year	No	CIP	Description	Type	Estimated $	Total by Year
2018	1	F-01	SCADA Telemetry System Upgrade	Facility	$ 398,000	
	2	F-02	Public Works Center	Facility	$ 525,000	
	3	F-03	WWTP Equipment Upgrade	Facility	$ 55,000	
	4	F-04	Emergency Power Generator Replacements	Facility	$ 100,000	
	5	F-05	Vehicle from Interfund Transfer Balance	Facility	$ 137,000	
	6	C-01	Flume Trestle Rehabilitations	Collection	$ 250,000	
	7	C-02	SR 410 Sewer Main Improvements (East of LS-17)	Collection	$ 285,000	**$ 1,750,000**
2019	8	F-01	SCADA Telemetry System Upgrade	Facility	$ 240,000	
	9	F-03	WWTP Equipment Upgrade	Facility	$ 600,000	
	10	F-04	Emergency Power Generator Replacements	Facility	$ 150,000	
	11	C-02	SR 410 Sewer Main Improvements (East of LS-17)	Collection	$ 655,000	
	12	G-01	Sewer I&I Analysis	General	$ 100,000	
	13	G-02	LS-17 Upgrade Analysis Study and Interceptor Evaluation	General	$ 150,000	
	14	LS-01	LS-18 Reconstruction - Design	Lift Station	$ 400,000	**$ 2,295,000**

Table 8-1
Proposed Improvements Implementation Schedule (6-year CIP) Continued

Year	No	CIP	Description	Type	Estimated $	Total by Year
2020	15	F-01	SCADA Telemetry System Upgrade	Facility	$ 300,000	
	16	F-03	WWTP Equipment Upgrade	Facility	$ 200,000	
	17	F-04	Emergency Power Generator Replacements	Facility	$ 140,000	
	18	C-02	SR 410 Sewer Main Improvements (East of LS-17)	Collection	$ 522,000	
	19	C-03	Mt. Creek Force Main Replacement	Collection	$ 120,000	
	20	LS-01	LS-18 Reconstruction - Construction	Lift Station	$ 1,500,000	
	21	LS-02	LS-17 Replacement Design	Lift Station	$ 450,000	**$ 3,232,000**
2021	22	F-03	WWTP Equipment Upgrade	Facility	$ 374,000	
	23	F-04	Emergency Power Generator Replacements	Facility	$ 100,000	
	24	C-03	Mt. Creek Force Main Replacement	Collection	$ 750,000	
	25	LS-03	LS-20 Repairs	Lift Station	$ 225,000	**$ 1,449,000**
2022	26	F-03	WWTP Equipment Upgrade	Facility	$ 5,500	
	27	F-04	Emergency Power Generator Replacements	Facility	$ 100,000	**$ 105,500**
2023	28	F-03	WWTP Equipment Upgrade	Facility	$ 217,250	
	29	G-03	Sewer Plan Update	General	$ 184,000	**$ 401,250**
			Grand Total (6-Year CIP)	**$**	**9,232,750**	

Table 8-2
Proposed Improvements Implementation Schedule (10-Year CIP)

Year	No	CIP	Description	Type	Estimated $	Total by Year
2024	1	F-03	WWTP Equipment Upgrade	Facility	$ 143,000	
	2	LS-04	LS-17 Replacement - Construction	Lift Station	$ 2,000,000	**$ 2,143,000**
2025	3	F-03	WWTP Equipment Upgrade	Facility	$ 217,250	
	4	C-04	I&I Reduction Program	Collection	$ 2,000,000	**$ 2,217,250**
2026	5	F-03	WWTP Equipment Upgrade	Facility	$ 68,750	
	6	C-04	I&I Reduction Program	Collection	$ 2,000,000	
	7	C-05	192nd Corridor Sewer Improvement Design	Collection	$ 150,000	**$ 2,218,750**
2027	8	C-05	192nd Corridor Sewer Improvement Construction	Collection	$ 1,330,000	**$ 1,330,000**
			Total (Next 4-Year CIP)	**$**	**7,909,000**	
			Grand Total (10-Year CIP)	**$**	**17,141,750**	

Table 8-3
Proposed Improvements Implementation Schedule (20-Year CIP)

Year	No	CIP	Description	Type	Estimated $	Total by Year
2028	1	RR	Replacement Program	Replacement	$ 1,500,000	**$ 1,500,000**
2029	2	RR	Replacement Program	Replacement	$ 1,500,000	**$ 1,500,000**
2030	3	RR	Replacement Program	Replacement	$ 1,500,000	
	4	F-06	Sumner WWTP Expansion	Facility	$ 5,000,000	**$ 6,500,000**
2031	5	RR	Replacement Program	Replacement	$ 1,500,000	**$ 1,500,000**
2032	6	RR	Replacement Program	Replacement	$ 1,500,000	**$ 1,500,000**
2033	7	RR	Replacement Program	Replacement	$ 1,500,000	**$ 1,500,000**
2034	8	RR	Replacement Program	Replacement	$ 1,500,000	**$ 1,500,000**
2035	9	RR	Replacement Program	Replacement	$ 1,500,000	**$ 1,500,000**
2036	10	RR	Replacement Program	Replacement	$ 1,500,000	**$ 1,500,000**
2037	11	RR	Replacement Program	Replacement	$ 1,500,000	**$ 1,500,000**
			Total (Next 10-Year CIP)	**$**	**20,000,000**	
			Grand Total (20-Year CIP)	**$**	**37,141,750**	

Sewer Main Improvements

The following sewer main improvements were identified from the results of the system evaluation and discussions with Operations and Maintenance (O&M) and Public Works staff. Most of the sewer main improvements in the CIP address interceptors that are the backbone of the City's system.

CIP C-01: Flume Trestle Rehabilitation

Deficiency: The existing flume is showing signs of wear and tear.

Improvement: Rehabilitate the existing flume to improve the capacity and extend the useful life.

CIP C-02: SR 410 Sewer Main Improvements (East of LS 17)

Deficiency: Growth along the SR 410 corridor will increase flow in this interceptor beyond its design capacity.

Improvement: Analyses will be conducted to determine when this capacity will become critical, and if and how new developments should participate in the upsizing of the sewer mains along SR 410 between 214th Street and LS 17. This project is scheduled during the 6th year of the CIP for this plan, but may be brought forward in the CIP if required by increases in flows. This project could also be completed as a developer-extension project, as necessary, to accommodate upstream developments.

CIP C-03: Mt. Creek Force Main Replacement

Deficiency: When the Mt. Creek area was developed, it was determined that existing capacity in the sewer mains along SR 410 were needed to serve the commercial areas. Therefore, this development was routed to the Church Lake interceptor (via the Spring Haven Lift Station) where excess capacity existed. The existing force main is over 13,000 LF and over time will be expensive to operate and maintain. The City plans to increase capacity along SR 410, which will enable flows from the Mt. Creek development to be rerouted along a much shorter alignment to LS 24.

Improvement: Replace the force main from the Mt. Creek lift station gravity main to the proposed gravity main along 96th Street East. The proposed lift station for the Eastown Neighborhood will need to have enough capacity to accommodate flows from the Mt. Creek area. It is estimated that up to 5,000 LF of force main may be required.

CIP C-04: Inflow and Infiltration (I&I) Reduction Program

Deficiency: Mains, manholes, and sewer lines collect stormwater and groundwater.

Improvement: The City will evaluate and prioritize areas of the City where the most I&I is being discharged into the City's system. The City will repair, replace, or upgrade areas based upon the I&I analysis through the service area.

CIP C-05: 192nd Sewer Main Extension

Deficiency: Neighborhoods along 192nd Avenue East south of SR 410 and north of Rhodes Lake Road do not have gravity sewer service. The City does plan to do road improvements throughout this area. Prior to the roadway work, the City intends to install or replace all major utilities so as not to disturb the new pavement in the future.

Improvement: Extend the sewer main from SR 410, based on the extents of the proposed roadway improvements. It is estimated that approximately 2,200 linear feet (LF) of sewer main will be required.

Lift Station Improvements

Lift stations require the most attention from the City's O&M staff due to their complexity and mechanical equipment. The following projects address the reliability and capacity of several of the City's major lift stations:

CIP LS-01: LS 18 Improvements

Deficiency: Evaluation of the lift station has indicated that there is a capacity issue.

Improvement: The City will make reliability and capacity upgrades to this lift station.

CIP LS-02: LS 17 Improvements

Deficiency: Growth throughout the City's collection system, especially along the SR 410 corridor and in areas that are pumped to LS 17, such as Angeline Valley, will require capacity upgrades at this lift station and future replacement.

Improvement: The City will make both reliability and wet well capacity improvements to this lift station to increase its ability to safely handle increased peak flow rates. These improvements may be short-term until the City upgrades or replaces LS-17 in the future.

CIP LS-03: LS 20 Repairs

Deficiency: Evaluation of the lift station has indicated that there is a capacity issue.

Improvement: The City will make reliability and capacity upgrades to this lift station.

CIP LS-04: LS 17 Improvements

Deficiency: LS 17 is aging and projected to have capacity issues in the future.

Improvement: Based on evaluations and capacity studies, the City will make improvements to, or replace, the lift station.

Facility Improvements

The City has outgrown the effective use of its O&M yard and Public Works offices. Expansion of the existing wastewater treatment plant (WWTP) in the City of Sumner (Sumner) will be needed to increase capacity to accommodate growth.

CIP F-01: SCADA – Telemetry System Upgrade

Deficiency: The City's telemetry system is outdated.

Improvement: Upgrade the City's supervisory control and data acquisition (SCADA) system.

CIP F-02: Public Works Complex (PWC)

Deficiency: The City's O&M yard is undersized and out-of-date, which will interfere with the City's ability to efficiently run the sewer system and other utilities. In addition, staff from the O&M and Public Works departments are spread apart at two locations in the City.

Improvement: The City will expand the O&M yard, and consolidate O&M and Public Works into one area (currently proposed at the City's Peaking Storage site and adjacent site).

- **217th Street Site Improvements**: This will require connection to the gravity sewer manhole in 96th Street by an extension of a pressure force main on the Peaking Storage site and installation of an on-site grinder pump.
- **225th Street Site Improvements**: This will require construction of an 8-inch gravity sewer main through the Public Works Yard (PWY) from 96th Street to State Route (SR) 410.
- **SR 410 BORE Improvements**: A boring will be required to extend the 8-inch gravity sewer main from the PWY to the south side of SR 410.
- **96th Street Improvements**: The 8-inch gravity sewer main from the PWY will need to be extended along 96th Street to connect to the existing sewer manhole providing service to LS 23.

CIP F-03: WWTP Equipment Upgrade

Deficiency: Operation, maintenance, repair, replacement, and upgrades of equipment are required at the WWTP.

Improvement: The City participates jointly with Sumner in the funding of this project. The project is managed by Sumner.

CIP F-04: Emergency Power Generator Replacements

Deficiency: The City's existing generators need to be replaced as they reach the end of their useful life expectancy.

Improvement: Upgrade the City's existing generators with new energy efficient replacements.

CIP F-05: Vehicle from Interfund Transfer Balance

Deficiency: The City's existing vehicles need to be replaced as they reach the end of their useful life expectancy.

Improvement: Upgrade the City's vehicles with replacements.

CIP F-06: Sumner WWTP Expansion

Deficiency: Improve effluent quality and increase treatment capacity.

Improvement: The City participates jointly with Sumner in the funding of this project. The project is managed by Sumner.

Planning and General Improvements

The following are planning efforts and operational program elements that are required to comply with various state water regulations and improve the system's operations:

CIP G-01: Inflow and Infiltration (I&I) Reduction Program

Deficiency: Mains, manholes, and sewer lines collect stormwater and groundwater.

Improvement: The City will evaluate and prioritize areas of the City where the most I&I is being discharged into the City's system.

CIP G-02: Lift Station 17 Upgrade Analysis Study and Interceptor Evaluation

Deficiency: Preliminary evaluation of available Lift Station 17 pumping records indicated that several lift stations may have capacity issues associated with I&I and projected sewer flows. The City interceptor is also reaching capacity.

Improvement: Based on the evaluation of I&I and growth-related capacity issues, the City should either increase the holding capacity or the pumping capacity of the Lift Station 17 to address the deficiencies and increase the capacity of the system, and/or increase interceptor capacity.

CIP G-03: Sewer System Plan Update

Deficiency: The City's existing Sewer System Plan (Plan) should be updated every 6 years concurrently with the City's Water System Plan and the City's Land Use Comprehensive Plan, as required by the Growth Management Act (GMA).

Improvement: The City will update its Plan every 6 years. In addition, the City will perform a check of the Plan at the 3-year mark and adjust the projections, as necessary.

CIP RR: Replacement Program

Deficiency: The City's existing collection sewer system is reaching the end of its useful life.

Improvement: The City will replace the existing collection sewer system.

Annual Programs

The following programs will be performed on an annual basis:

CIP A-01: Lift Station Improvements

Deficiency: Lift station equipment needs to be replaced before it wears out and creates a system failure.

Improvement: The City will replace equipment as it begins to cause concerns or problems in the operation of the lift stations. The City budgets $16,000 per year for this program and is included in the operating budget.

CIP A-02: Equipment Upgrades

Deficiency: Rolling stock and other sewer system equipment needs to be replaced before it wears out and is no longer available for O&M of the City's sewer system.

Improvement: The City will replace equipment as it begins to cause concerns or problems. The City budgets $20,000 per year for this program and is included in the operating budget.

CIP A-03: Manhole Repair and Replacement

Deficiency: Many manholes throughout the sewer system need to be regrouted to reduce seepages into the system and maintain the structural integrity of the structures. Manholes in high groundwater areas, or in areas more susceptible to hydrogen sulfide deterioration, will be targeted first.

Improvement: The City will hire a firm that specializes in the refurbishment of manholes to address 25 to 50 manholes per year. The City budgets $75,000 per year for this program and is included in the operating budget.

CIP A-04: SCADA Telemetry System Maintenance and Repair

Deficiency: The SCADA telemetry system will continue to be maintained.

Improvement: The City will maintain and repair the SCADA system with an estimated budget from $20,000 in 2016 to $23,900 in 2021 and is included in the operating budget.

CIP A-05: Replacement and Unscheduled Projects

Deficiency: Unforeseen issues with the sewer system will arise over the life of this CIP.

Improvement: Based on needs assessed by the City, sections of the sewer system will be replaced, expanded, or extended to better serve the City customers. The City budgets $55,000 per year for this program and is included in the operating budget.

CIP A-06: Falling Water LOSS (Large On-site Septic System) Repairs

Deficiency: Existing collection and distribution systems have continual O&M requirements.

Improvement: The City will improve the collection and distribution systems on a yearly basis and the cost is included in the operating budget.

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 2016 U.S. dollars. The cost estimates include the estimated construction cost of the improvements, as well as indirect costs. The unit costs for each sewer main size are based on estimates of all construction-related improvements, such as materials and labor for the sewer main installation, side sewers, manholes, trench restoration, asphalt surface restoration, and other work for a complete installation, and are based on an average trench depth of 10 feet. Additional costs were added to some sewer main improvements to cover anticipated, increased costs related to the project location and degree of difficulty. The construction cost estimates include a 10-percent contingency and sales tax of 8.8 percent. The indirect costs were estimated at 35 percent of the construction cost and include engineering preliminary design, final design, and construction management services, permitting, legal, and administrative services.

Construction cost estimates for sewer main projects were determined from the sewer main unit costs (i.e., cost per foot length) shown in **Table 8-4 – *Sewer Main Unit Costs*** and the proposed diameter and approximate length of each improvement. Unit costs for certain projects were adjusted based on project-specific conditions that would impact the standard unit cost approach (e.g., not pavement restoration required, borings, and right-of-way issues).

Table 8-4
Sewer Main Unit Costs

Sewer Main (type)	Diameter (inches)	Unit Cost (2016 dollars per foot)
Gravity	8	$330/lf
Gravity	12	$475/lf
Force Main	4	$110/lf
Force Main	8	$190/lf