

2015

# Highland City Sanitary Sewer Maintenance Plan



Highland City  
Public Works Department  
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## **Chapter 1 Maintenance Plan**

### ***I. Introduction***

The purpose of the Sanitary Sewer Maintenance Plan (Plan) is to prolong the life of the system infrastructure and transport waste without disruption or overflows, while meeting the needs of citizens in a cost-efficient manner. This plan identifies annual maintenance required for manholes, pipe and lift stations along with estimated costs for planning purposes.

### ***II. Background and O&M Program***

Highland City established in their 2014 Sanitary Sewer Management Plan (SSMP) a sanitary sewer system operations and maintenance (O&M) program to ensure proper system operations, to minimize any basement backups, and to provide for replacement, refurbishment, or repair of damaged or deteriorated piping systems. The combined maintenance program insures that the environment and health of the public are protected at a reasonable cost for the end users. To this end, the following areas were described and included in the O&M program:

- System Mapping
- System Cleaning
- System CCTV Inspection
- Pump Station/Pressure Lines Inspection
- Manhole Inspection
- Defect Reporting
- Damage Assessment

### ***III. Maintenance Plan Description***

To adequately plan for the maintenance of the collection system and lift stations the following are annual maintenance requirements.

#### ***a. System Flushing and Vacuuming***

Highland City currently utilizes Timpanogos Special Service District (TSSD) to flush and vacuum the sewer lines. TSSD provides a crew to TV, flush and vacuum portions of the sewer twice a month. The City's monthly fees, paid to TSSD, provide the funding. Highland City has established a goal to clean the entire system every four (4) years.

As a system ages it is necessary to clean, flush and TV the sewer system more often. The increased flushing and TV inspection is necessary to identify root intrusions, grease buildup, and piping problems to decrease the number of backups. Typical systems along the Wasatch Front TV, flush and inspect their

entire system every 18 months. For Highland to increase their operations a Vacuum Truck and camera would be required. The cost of a truck is approximately \$375,000 and a suitable camera is approximately \$30,000.

***b. Root Control***

A portion of the earliest sewer system found in Pheasant Hollow and Hidden Oaks was constructed of concrete pipe. Some of the pipe has roots that have grown through the pipe joints. In the past the City has used Chemical Root Control provided by a company that specialized in root removal. It is anticipated that the root removal will be required annually.

***c. Groundwater Infiltration Pipe Repair***

In areas of high groundwater and older pipe systems the City has experienced groundwater infiltration into the sewer system. As the system ages it will be necessary to repair the piping where infiltration is detected. Infiltration reduces the capacity of the pipeline and increases the cost to treat the additional water. TSSD bills the City for total sewer flows and by reducing infiltration the cost will decrease. A specialized Contractor is utilized to rehabilitate pipe that is allowing groundwater to infiltrate into the system. This item is not for full pipe rehabilitation, but is only intended for small spot treatments.

***d. Manhole Repair***

The SSMP requires inspection of every manhole yearly. As the system begins to age, minor repairs will be required at manholes. Repairs may include replacement of the ring cover and concrete collar, additional grouting to reduce infiltration and application of chemicals to reduce the decay of concrete due to the sewer gases. It was anticipated that only a few manholes will require repair each year.

***e. Lift Station Maintenance***

The typical design life of a sewage lift station is 40 years. The majority of the City's lift stations are 15 years old or less. The common maintenance items on the lift stations are replacement of the rotating assemblies in the pumps. After discussion with the pump supplier it is anticipated that the rotating assembly should be replaced every 5-8 years depending on use. City staff currently is capable of replacing and maintaining the rotating assemblies.

Generators to operate the lift stations, should the public power system shut down, also require annual attention. The generators, similar to any engine, require annual maintenance to change the oil and filters.

**IV. *10-Yr Annual Maintenance Cost Estimates***

Table 1 was prepared to provide the City with typical annual maintenance costs for budgeting purposes. Costs were provided by suppliers and from past annual projects within the City. The costs are in 2015 dollars and include a 4% inflation rate, but do not provide for major system repairs or lift station replacements.

**V. *Capital Operation Expenditures Descriptions***

The following are descriptions of the necessary capital operation expenditures for the sewer system. These items are necessary for replacement of the lift stations, improving the operation of the system to extend the life of the facilities, and sewer line rehabilitation.

**a. *Lift Station Grinders***

Operations staff are required to disassemble lift station pumps and valves to clean out wipes, rags, towels, and other items flushed into the system that clog the pumps and valves. These items cause additional wear on the pumping system and require staff time in disassembling the equipment. The staff are also placed in an unhealthy environment while dealing with the raw sewage. To assist with shredding the fibrous materials into smaller pieces, sewage grinders are placed in the sewage stream. It is recommended that the City plan to install grinders at all five lift stations.

**b. *Lift Station VFD's/Soft Starts***

For large motors that cycle on and off numerous times in a day Variable Frequency Drives (VFDs) or Soft Starts are utilized to slowly start the motor. These electrical components assist in providing a longer life for motors. It is recommended that these be placed on the larger motors and if sufficient funds are available all of the motors.

**c. *Replacement of Lift Station Components***

The typical useable life of a lift station is 40 years. The City's lift stations are 8-18 years old. A capital expenditure to replace the pumps, valving, electrical and ventilation equipment needs to be anticipated. Provided costs do not include replacement of the buildings or structures.

**d. *Replacement of Lift Station Generators***

Generators have a typical life of 20 years. Generators are a mandatory sewer system component when the system utilizes lift stations. Replacement of the existing generators should be scheduled.

***e. Concrete Pipe Rehabilitation***

Previous to the 1980's concrete and clay pipe was utilized for sanitary sewers. The City system has concrete pipe within the Pheasant Hollow and Hidden Oaks Subdivisions. Concrete pipe degrades much quicker than PVC Pipe and after approximately 40 years often requires rehabilitation. Without rehabilitating the pipe, root intrusion or pipe failure will cause blockage in the pipe leading to home sewage backups. The subdivisions with the concrete pipe have already had a pipe failure and problems with roots growing into the pipes.

For small pipes in residential areas with narrow streets, a cured in place pipe (CIPP) rehabilitation process is preferred. The technology utilizes the insertion of a resin and fabric tube into the existing pipe. The tube is enlarged to the full diameter of the pipe and the resin then cures in place. The process does not require the streets and sewer to be excavated and is less expensive than a pipe replacement. The alternative to full rehabilitation is frequent inspection, root removal and spot treatments to reduce infiltration.

***VI. Capital Operation Expenditures Cost Estimates***

Table 2 was prepared to provide the City with typical capital operation expenditure costs for budgeting purposes. Costs were provided by suppliers and from past projects within the City. The costs are in 2015 dollars.

**TABLE 1  
ANNUAL MAINTENANCE COST ESTIMATE**

<b>REPAIR TYPE</b>	<b>2015 COST</b>	<b>2016 COST</b>	<b>2017 COST</b>	<b>2018 COST</b>	<b>2019 COST</b>	<b>2020 COST</b>	<b>2021 COST</b>	<b>2022 COST</b>	<b>2023 COST</b>	<b>2024 COST</b>	<b>2025 COST</b>
System Flusing & Vacuuming	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Root Control	\$ 2,200	\$ 2,288	\$ 2,380	\$ 2,475	\$ 2,574	\$ 4,000	\$ 4,160	\$ 4,326	\$ 4,499	\$ 4,679	\$ 4,867
Groundwater Infiltration Pipe Repair	\$ 2,500	\$ 2,600	\$ 2,704	\$ 2,812	\$ 2,925	\$ 3,042	\$ 3,163	\$ 3,290	\$ 3,421	\$ 3,558	\$ 3,701
Manhole Repair	\$ 2,500	\$ 2,600	\$ 2,704	\$ 2,812	\$ 2,925	\$ 3,042	\$ 3,163	\$ 3,290	\$ 3,421	\$ 3,558	\$ 3,701
Dry Creek Lift Station Pump Maintenance	\$ 2,200	\$ 2,288	\$ 2,380	\$ 2,475	\$ 2,574	\$ 2,677	\$ 2,784	\$ 2,895	\$ 3,011	\$ 3,131	\$ 3,257
Highland Hollow Lift Station Pump Maintenance	\$ 750	\$ 780	\$ 811	\$ 844	\$ 877	\$ 912	\$ 949	\$ 987	\$ 1,026	\$ 1,067	\$ 1,110
AF River Lift Station Pump Maintenance	\$ 1,200	\$ 1,248	\$ 1,298	\$ 1,350	\$ 1,404	\$ 1,460	\$ 1,518	\$ 1,579	\$ 1,642	\$ 1,708	\$ 1,776
Greens on Highlands Lift Station Pump Maintenance	\$ 750	\$ 780	\$ 811	\$ 844	\$ 877	\$ 912	\$ 949	\$ 987	\$ 1,026	\$ 1,067	\$ 1,110
Victor's View Lift Station Pump Maintenance	\$ 750	\$ 780	\$ 811	\$ 844	\$ 877	\$ 912	\$ 949	\$ 987	\$ 1,026	\$ 1,067	\$ 1,110
Generator Maintenance	\$ 800	\$ 800	\$ 800	\$ 800	\$ 800	\$ 800	\$ 800	\$ 800	\$ 800	\$ 800	\$ 800
<b>Total</b>	<b>\$ 12,850</b>	<b>\$ 13,364</b>	<b>\$ 13,899</b>	<b>\$ 14,455</b>	<b>\$ 15,033</b>	<b>\$ 16,957</b>	<b>\$ 17,636</b>	<b>\$ 18,341</b>	<b>\$ 19,075</b>	<b>\$ 19,838</b>	<b>\$ 20,631</b>

**TABLE 2  
OPERATION CAPITAL EXPENDITURE COST ESTIMATE**

<b>EXPENDITURE</b>	<b>NUMBER/TYPE</b>	<b>YEAR ANTICIPATED</b>	<b>COST PER UNIT</b>	<b>TOTAL COST</b>
Lift Station Grinders	5 (1 for each Lift Station)	1 Each Year over 5 Years	\$35,000	\$175,000
Lift Station VFD's/Soft Starts	Each of the 5 Lift Stations	1 Each Year starting in 2016	\$15,000	\$75,000
Dry Creek Lift Station Replacement	Valves, Pumps, Electrical & HVAC	2047	\$50,000	\$50,000
Highland Hollow Lift Station Replacement	Valves, Pumps, Electrical & HVAC	2049	\$30,000	\$30,000
AF River Lift Station Replacement	Valves, Pumps, Electrical & HVAC	2044	\$30,000	\$30,000
Greens on Highlands Lift Station Replacement	Valves, Pumps, Electrical & HVAC	2044	\$40,000	\$40,000
Victor's View Lift Station Replacement	Valves, Pumps, Electrical & HVAC	2038	\$25,000	\$25,000
Highland Hollow Lift Station Generator Replacement	1	2029	\$21,500	\$21,500
AF River Lift Station Generator Replacement	1	2024	\$21,500	\$21,500
Greens on Highlands Lift Station Gen Replacement	1	2024	\$18,600	\$18,600
Victor's View Lift Station Generator Replacement	1	2018	\$19,700	\$19,700
Pheasant Hollow and Hidden Oaks Concrete Pipe Rehab	16,500 Feet of 8-inch Pipe	2016-2026	\$80	\$1,320,000