2015

Highland City Pressurized Irrigation Maintenance Plan

Highland City
Public Works Department
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Chapter 1 Maintenance Plan

I. Introduction

The purpose of the Pressurized Irrigation Maintenance Plan (Plan) is to prolong the life of the existing infrastructure and provide reliable irrigation water to residents of Highland City. Construction of the pressurized irrigation system was begun in 1997 and has been expanded to include new areas as development has occurred within the City. The system utilizes both groundwater and surface water sources for irrigation purposes.

This plan identifies annual maintenance and capital expenditures required for wells, pump stations, storage ponds, and the piping system. Estimated costs for planning purposes are provided.

It is anticipated that an annual summary will be prepared by Staff to outline the year's accomplishments, expenditures and any updates or adjustments to costs.

II. Maintenance Plan

Highland City Public Works performs routine preventative maintenance to ensure the system functions properly. Appropriate preventative maintenance ensures that more expensive replacement projects are deferred to the future. The City's maintenance program intends to preserve the system at a reasonable cost for the Citizens of Highland. To this end, the following areas are further described and included in the Plan:

- System Inspection
- Storage Pond Maintenance
- Pump Station Maintenance
- Well Maintenance
- Distribution System Maintenance
- SCADA System Maintenance

III. Maintenance Plan Description

To adequately plan resources for the maintenance of the pressurized irrigation system the following are annual requirements.

a. System Inspections

System operators provide a comprehensive inspection of the system bi-annually, during April and October. The inspection process coincides with the loading and draining of the pipelines for the irrigation season. The bi-annual inspections are provided at the storage reservoirs, distribution system,

valves and turnouts. Wells are inspected when pumps have been removed. Pumps are inspected on a daily basis through visual and SCADA data.

b. Warranty of Equipment

When a piece of equipment is found to be in need of replacement, warranty periods should be reviewed to determine if funds may be recovered. Information of all warranted equipment shall be provided in a central filing area.

c. Storage Pond Maintenance

i. Concrete Ponds

The City currently has two concrete storage ponds. The largest pond is at the mouth of the canyon and due to its size is operated within the State of Utah's Dam Safety Program. The smaller pond is found within the Cantebury Subdivision adjacent to the Murdock Canal, but is not currently in service. The ponds were constructed over 15 years ago. The concrete construction requires very little maintenance. Typical annual maintenance is the cleaning of debris and silts that have deposited in the bottom.

Due to the age of the ponds it has been identified that the crack sealant, provided during the original construction, has begun to separate from the concrete. The sealant is necessary to keep water from leaking out of cracks in the floor and walls of the pond. Excess water could cause settlement issues and require extensive repairs. It is proposed that the sealant be replaced over the next five years for the ponds.

ii. Earthen Pond

The City's earthen pond is located above Beacon Hills and provides storage for the northwest portion of the City. The pond was not constructed of concrete but instead an earth dam with a rock face. Maintenance includes minor removal of sediment/debris that collects in the pond.

d. Pump Station Maintenance

The typical design life of a pump station is approximately 45-50 years. The majority of the City's pump stations are 17 years old or less. The common maintenance items on the pumps stations are replacement of the seals in the pumps every five years. City staff are capable of replacing and maintaining the seal kits. A well maintained pump will not need to be replaced for approximately 25 years.

e. Well Maintenance

The secondary wells have all recently been inspected, pumps and motors replaced or refurbished and electrical equipment updated as needed. It is recommended that at a maximum well pumps be removed and the well inspected by camera every 15 years. The high quality groundwater has not required a lot of rehab of the actual well casings in the past. It is recommended that each year the specific capacity of the well be evaluated to identify potential problems.

f. Distribution System Maintenance

Distribution system maintenance costs typically consist of replacement of valves identified during inspections. It is also necessary to maintain the PRV's that reduce pressure between the different zones. Staff identified the need to replace 10 valve stems a year on the larger valves. The smaller drain valves at low points in the system require replacement as they are more susceptible to weather conditions not being buried. PRV's require yearly maintenance to remain affective and trouble free.

g. SCADA System Maintenance

The City SCADA System was installed in 2008. The SCADA System, remotely through radios, provides real time data at the pump stations, wells and storage ponds. The SCADA also alerts the operators when pumps have failed or high/low pressures occur at pump stations. SCADA also reports high/low levels in the ponds. SCADA is often responsible for reporting issues after hours. Annual maintenance for the SCADA includes replacing radios, and other electrical components that do not operate correctly.

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 though past budgets and from past projects within the City. The costs are in 2015 dollars and include a 3% inflation rate, but do not provide for major system repairs.

V. Capital Operation Expenditures Descriptions

The following are descriptions of the necessary capital operation expenditures for the pressurized irrigation system. These items are necessary for replacement of the pump station pumps and projects to improve the operation of the system.

a. Replacement of Pump Station Interior Components

The typical useable life of a pump station is 45-50 years. The City's stations are 8-18 years old. A capital expenditure to replace the pumps, worn valving, electrical and ventilation equipment needs to be anticipated. Provided costs do not include replacement of the structures.

b. Replacement of VFD's in Pump Stations

Variable Frequency Drives (VFD's) are another electrical component that requires replacement after 10-15 years. These components assist in providing a longer life for motors.

c. Meter Replacement in the Upper Pump Station

Meters in the Upper Pump Station require replacement. The meters assist in the determination of water use for the upper zone.

d. Replacement of SCADA System

Along with annual maintenance on the SCADA, it should be anticipated after 25 years, that the system will need to be replaced. As advances in electronics and radios continues the existing systems devices become obsolete and will be more costly to maintain that upgrade.

e. Gantry Crane

A Gantry Crane is a portable device that allows for the lifting of heavy objects in a restricted space. The Crane is necessary when the operators rebuild the pumps in the pump stations.

f. Well Upgrades & Inspection

It is recommended that every 15 years the well pumps and motors are pulled from the wells. Inspection of the well may be completed at this time. At this time as necessary the motor and pump can be replaced or refurbished along with any well maintenance that may be necessary.

g. CUP #1 Filter Station Upgrade

The high flowrates being carried through the CUP#1 turnout requires the filter station be upgraded. The filters trap debris and sediment from entering the City's system.

h. 11800 Pressure Zone Modification

Pressures to the north of 11800 North are above 120 psi. The Master Plan identified construction of a short transmission line and a PRV to lower the overall pressure in the area. A portion of the transmission line has already been installed. Lowering the pressure will reduce water consumption and decrease the wear on City and residential connections, valves and sprinklers.

i. Northwest Area Source Supply

The well at 11800 North was primarily constructed to provide a water source to the Beacon Hills development. The remainder of the existing Northwest Area receives its source from transmission lines in 6000 West. Should additional properties annex into the City, not identified in the Pressurized Irrigation Master Plan, it is recommended that a source evaluation be provided. Depending on the water rights/shares of the development, another source of water may be required.

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

REPAIR TYPE	2015 COST	2016 COST	2017 COST	2018 COST	2019 COST	2020 COST	2021 COST	2022 COST	2023 COST	2024 COST	2025 COST
Concrete Irrigation Pond Crack Sealing Replacement	$ 2,500	$ 2,575	$ 2,652	$ 2,732	$ 2,814						
Northwest Irrigation Pond Maintenance	$ 1,500	$ 1,545	$ 1,591	$ 1,639	$ 1,688	$ 1,739	$ 1,791	$ 1,845	$ 1,900	$ 1,957	$ 2,016
Upper Zone Station Pump Maintenance	$ 2,000	$ 2,060	$ 2,122	$ 2,185	$ 2,251	$ 2,319	$ 2,388	$ 2,460	$ 2,534	$ 2,610	$ 2,688
11800 Station Pump Maintenance	$ 2,000	$ 2,060	$ 2,122	$ 2,185	$ 2,251	$ 2,319	$ 2,388	$ 2,460	$ 2,534	$ 2,610	$ 2,688
Hogs Hollow Pump Maintenance	$ 2,000	$ 2,060	$ 2,122	$ 2,185	$ 2,251	$ 2,319	$ 2,388	$ 2,460	$ 2,534	$ 2,610	$ 2,688
Lower Pond Pump Maintenance	$ 2,000	$ 2,060	$ 2,122	$ 2,185	$ 2,251	$ 2,319	$ 2,388	$ 2,460	$ 2,534	$ 2,610	$ 2,688
General Well Maintenance	$ 2,000	$ 2,060	$ 2,122	$ 2,185	$ 2,251	$ 2,319	$ 2,388	$ 2,460	$ 2,534	$ 2,610	$ 2,688
Main Valve Replacements	$ 5,000	$ 5,150	$ 5,305	$ 5,464	$ 5,628	$ 5,796	$ 5,970	$ 6,149	$ 6,334	$ 6,524	$ 6,720
PRV Maintenance	$ 400	$ 412	$ 424	$ 437	$ 450	$ 464	$ 478	$ 492	$ 507	$ 522	$ 538
SCADA System	$ 1,000	$ 1,030	$ 1,061	$ 1,093	$ 1,126	$ 1,159	$ 1,194	$ 1,230	$ 1,267	$ 1,305	$ 1,344
Drain Valve Replacements	$ 5,000	$ 5,150	$ 5,305	$ 5,464	$ 5,628	$ 5,796	$ 5,970	$ 6,149	$ 6,334	$ 6,524	$ 6,720
Total	$ 25,400	$ 26,162	$ 26,947	$ 27,755	$ 28,588	$ 26,547	$ 27,344	$ 28,164	$ 29,009	$ 29,879	$ 30,776

TABLE 2
OPERATION CAPITAL EXPENDITURE COST ESTIMATE

EXPENDITURE	NUMBER/TYPE	YEAR ANTICIPATED	COST PER UNIT	TOTAL COST
Upper Zone Station Replacement	Valves, Pumps, Electrical & HVAC	2035	$300,000	$300,000
11800 Station PS Replacement	Valves, Pumps, Electrical & HVAC	2050	$250,000	$250,000
Hogs Hollow PS Replacement	Valves, Pumps, Electrical & HVAC	2050	$60,000	$60,000
Lower Pond PS Replacement	Valves, Pumps, Electrical & HVAC	2040	$160,000	$160,000
Flow Meters in Upper Station	1	ASAP	$4,000	$4,000
VFD Replacement in 11800 & Upper Zone PS	5	2030	$12,000	$60,000
New SCADA System	1	2030	$30,000	$30,000
Gantry Crane	1	ASAP	$5,000	$5,000
Granite Well	Inspect Well, Motor and Pump	2030	$30,000	$30,000
Provo Well	Inspect Well, Motor and Pump	2030	$30,000	$30,000
11800 Well (#6)	Inspect Well, Motor and Pump Replacement	2030	$60,000	$60,000
CUP #1 Filter Station Upgrade	1	ASAP	$80,000	$80,000
11800 Pressure Zone Modifications	1	ASAP	$300,000	$300,000