2016

Highland City Drinking Water Maintenance Plan

HIGHLAND CITY

Highland City

Public Works Department

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Table of Contents

CHAPTER 1 MAINTENANCE PLAN 3

I. INTRODUCTION 3
II. MAINTENANCE PLAN 3
III. MAINTENANCE PLAN DESCRIPTION 3
a. System Inspections 3
b. Warranty of Equipment 4
c. Storage Tank Maintenance 4
d. Pump Station Maintenance 4
e. Well Maintenance 5
f. Distribution System Maintenance 5
g. SCADA System Maintenance 6
h. Battery Replacement in Meters 6
IV. 10-YR ANNUAL MAINTENANCE COST ESTIMATES 6
V. CAPITAL OPERATION EXPENDITURES DESCRIPTIONS 6
a. Equip the Viewpointe Booster Pump Station with Generator 6
b. Lower Zone Modification 7
c. Replacement of Well House 7
d. Replacement of VFD's in Booster Pump Stations 7
e. Replacement of SCADA System 7
f. Chlorination Equipment 7
g. Replacement of Booster Pump Station Interior Components 7
VI. CAPITAL OPERATION EXPENDITURES COST ESTIMATES 8

Chapter 1 Maintenance Plan

I. Introduction

The purpose of the Drinking Water Maintenance Plan (Plan) is to prolong the life of the existing infrastructure and provide reliable potable water to residents of Highland City. Construction of the drinking water system was begun in 1958 through the Highland Drinking Water Company. During the fall of 2004 the membership of the Water Company voted to dissolve the Company and transfer all assets and obligations to the City of Highland. Since 2005 the City has operated and maintained the system. Drinking water facilities have been constructed as necessary to meet the needs of the developing City. The system utilizes only wells as the source for the system.

This plan identifies annual maintenance and capital expenditures required for wells, pump stations, storage tanks, 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 and the plan.

II. Maintenance Plan

Highland City Public Works performs routine preventative maintenance to ensure the drinking water 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 Tank 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 Drinking Water system the following are annual requirements.

a. System Inspections

System operators provide inspections of the system throughout the year. Daily inspections are provided at the pump stations and at the well houses that are in operation. Well houses, that are not in operation during the winter, are

inspected a minimum of twice a week. The tanks should be leak tested every five years to inspect for leaks. Wells are inspected when pumps have been removed. Pumps are inspected on a daily basis through visual and SCADA data. Meter boxes are also inspected regularly.

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 Tank Maintenance

There are four concrete storage tanks that service the system. There are two large Main City Zone tanks each with two million gallons of storage. The smaller tanks provide storage for the Northwest Upper Zone (600,000 gallons) and the View Pointe Zone (250,000 gallons). The tanks are conventional reinforced tanks and were constructed in 2004 and 2005. The concrete construction requires very little maintenance. Xypex admixture was utilized in the construction of the Beacon Hills Tanks to minimize leaks.

The concrete roofs of the tanks are exposed. The City has determined to provide a sealant on the roofs that did not utilize the Xypex as they are now 10 years old. A Xypex sealant will provide protection from spalling and other freezing/thaw issues. Staff will keep records on the sealant to determine its effectiveness and performance over time.

d. Pump Station Maintenance

The typical design life of a pump station is approximately 45-50 years. The City's well pump stations are between 58 and 28 years old. The booster pump stations are nine years old. The common maintenance items on the booster pump 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 over 25 years.

Included in the booster pump station maintenance is the building. Over time roofing, HVAC, and electrical components require maintenance. Staff will annually inspect these items for replacement/maintenance needs.

e. Well Maintenance

Well #2 has recently had a new pump installed, the intake lowered 100 feet and a new motor and drive installed. Well #3 recently had a new motor and soft start drive installed. It is recommended that at a maximum well pumps be removed and the well inspected by camera every 10-15 years depending on use, specific capacity, and pump performance.

During inspection of the well it is recommended that level sensors be installed to observe the groundwater levels and trends. It is also anticipated that while the pump column has been removed that the pump be set an additional 100-feet due to the decrease in the regional groundwater levels.

The high quality groundwater has not required a lot of rehab of the actual well casings in the past. In 2007 a Bacteriological Inspection was performed for all of the wells and biofouling was not present. 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 galvanized services, hydrant replacements, and Pressure Reducing Valve (PRV) maintenance.

i. Galvanized Service Replacement

Due to the rusting of older galvanized steel pipe service, the City is required to replace approximately five a year. A new poly-line is installed between the meter and the main line. City staff are able to provide the replacements.

ii. Hydrant Replacement

Water Department Staff have identified the need to replace three fire hydrants per year. Hydrants have a typical service life of 50-years. Hydrants require replacement due to age or damage. The hydrants that have been identified to be replaced, due to age, were placed into the system during the 50's and 60's and no longer meet current fire codes. The City also replaces hydrants when they have been damaged.

iii. PRV Maintenance

It is important to regularly maintain the PRV's that reduce pressure between the different zones. 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 storage tanks. 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.

h. Battery Replacement in Meters

The City in 2007 installed radio meters at all services. The radios provide monthly totals for all residences and business. The batteries have a 10-year warranty and then a prorated warranty for years 11 through 20. As the batteries are nearing 10 years old in over 3,600 meters, replacement should be planned.

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 2016 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 Drinking Water system. These items are necessary for replacement of the pump station pumps and other projects to improve the operation of the system.

a. Equip the Viewpointe Booster Pump Station with Generator

Currently the Viewpointe Booster Pump Station does not have a dedicated backup generator. The City has identified the need for a dedicated generator to provide power to the station should power not be available. The current emergency response plan identified the City's large portable generator to supply power during an outage. However, during a City wide power outage the portable generator would be needed at the Wells to provide water to the

overall population. If the City requires the portable generator at a well site the Viewpointe zone would not have access to water.

b. Lower Zone Modification

Pressures to the south of the Murdock Canal are in excess of 120 psi. The previous Master Plan's identified construction of PRV's to lower the overall pressure in the area. Lowering the pressure will decrease the wear on the distribution system and make repairs less difficult. Costs identified are only for the PRV's and not for the master planned tank and booster station.

c. Replacement of Well House

The typical useable life of a pump station is 45-50 years. Some of the City's well stations are nearing their design life. A capital expenditure to replace the pumps, worn valving, electrical and ventilation equipment needs to be anticipated. Also for the oldest of buildings a complete replacement should be planned.

d. Replacement of VFD's in Booster 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.

e. 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.

f. Chlorination Equipment

The City currently does not provide a chlorine residual in the drinking water system. In the 2012 Master Plan chlorination equipment was proposed in the Capital Facility Plan. The equipment could be installed during a well house replacement or a retrofit. A separate building or room is required to house the chlorine.

g. Replacement of Booster Pump Station Interior Components

The typical useable life of a booster pump station is 45-50 years. The City's stations are 9 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.

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, from past projects within the City and Master Planning Studies. The costs are in 2016 dollars.

TABLE 1
ANNUAL MAINTENANCE COST ESTIMATE

REPAIR TYPE	2016 COST	2017 COST	2018 COST	2019 COST	2020 COST	2021 COST	2022 COST	2023 COST	2024 COST	2025 COST	2026 COST
Concrete Sealing for Exposed Tank Roof	$ 5,000	$ 30,000									
Well Maintenance	$ 60,000		$ 63,600		$ 67,416		$ 71,461				
Viewpointe Booster Pump Station Maintenance	$ 1,000	$ 1,030	$ 1,061	$ 1,093	$ 1,126	$ 1,159	$ 1,194	$ 1,230	$ 1,267	$ 1,305	$ 1,344
Beacon Hill Booster Pump Station Maintenance	$ 1,200	$ 1,236	$ 1,273	$ 1,311	$ 1,351	$ 1,391	$ 1,433	$ 1,476	$ 1,520	$ 1,566	$ 1,613
Replacement of Galvanized Services	$ 5,000	$ 5,150	$ 5,305	$ 5,464	$ 5,628	$ 5,796	$ 5,970	$ 6,149	$ 6,334	$ 6,524	$ 6,720
Hydrant Replacements	$ 15,000	$ 15,450	$ 15,914	$ 16,391	$ 16,883	$ 17,389	$ 17,911	$ 18,448	$ 19,002	$ 19,572	$ 20,159
PRV Maintenance	$ 400	$ 412	$ 424	$ 437	$ 450	$ 464	$ 478	$ 492	$ 507	$ 522	$ 538
SCADA System	$ 2,000	$ 2,060	$ 2,122	$ 2,185	$ 2,251	$ 2,319	$ 2,388	$ 2,460	$ 2,534	$ 2,610	$ 2,688
Meter Battery Replacement		$ 4,200	$ 9,800	$ 14,000	$ 18,200	$ 22,400	$ 26,600	$ 30,800	$ 35,000	$ 39,200	$ 43,400
Total	$ 89,600	$ 59,538	$ 99,498	$ 40,881	$ 113,304	$ 50,918	$ 127,435	$ 61,055	$ 66,163	$ 71,297	$ 76,460

TABLE 2
OPERATION CAPITAL EXPENDITURE COST ESTIMATE

EXPENDITURE	NUMBER/TYPE	YEAR ANTICIPATED	COST PER UNIT	TOTAL COST
View Pointe Booster Station Dedicated Generator	1	2017	$65,000	$65,000
PRV Placement in Lower Zone	1	2018	$220,000	$220,000
Well House #2 Replacement	Building, Valves, Pump, Electrical & HVAC	2019	$400,000	$400,000
Well House #3 Replacement	Building, Valves, Pump, Electrical & HVAC	2021	$400,000	$400,000
VFD Replacement in Booster Stations	1	2027	$60,000	$60,000
SCADA System Upgrade	1	2030	$30,000	$30,000
Well House #5 Replacement	Valves, Pump, Electrical & HVAC	2030	$150,000	$150,000
Well House #4 Replacement	Valves, Pump, Electrical & HVAC	2035	$150,000	$150,000
Chlorination	Intsall Chlorination Systems at Well House #4 & #5	2030+	$80,000	$160,000
View Pointe Booster Station	Valves, Pumps, Electrical & HVAC	2045	$50,000	$50,000
Beacon Hill Booster Station	Valves, Pumps, Electrical & HVAC	2045	$60,000	$60,000