TECHNICAL MEMORANDUM

825-12 – Lakeshore Water Plant – Reservoir and Wellhead No. 2 Rehabilitation

PREPARED FOR: Capital Budget Planning

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DATE: 2/5/2016

Introduction & Background

The Lakeshore Water Plant is located at 2113 Hamilton Street. The water plant was constructed in the early 1950's. The plant includes source water wells, ground storage reservoirs with fans primarily for hydrogen sulfide removal, sodium hypochlorite system for disinfection and high service pumps for conveying treated water to the distribution system (Figures 1 & 2).

Figure 1: Aerial View of the Lakeshore WTP

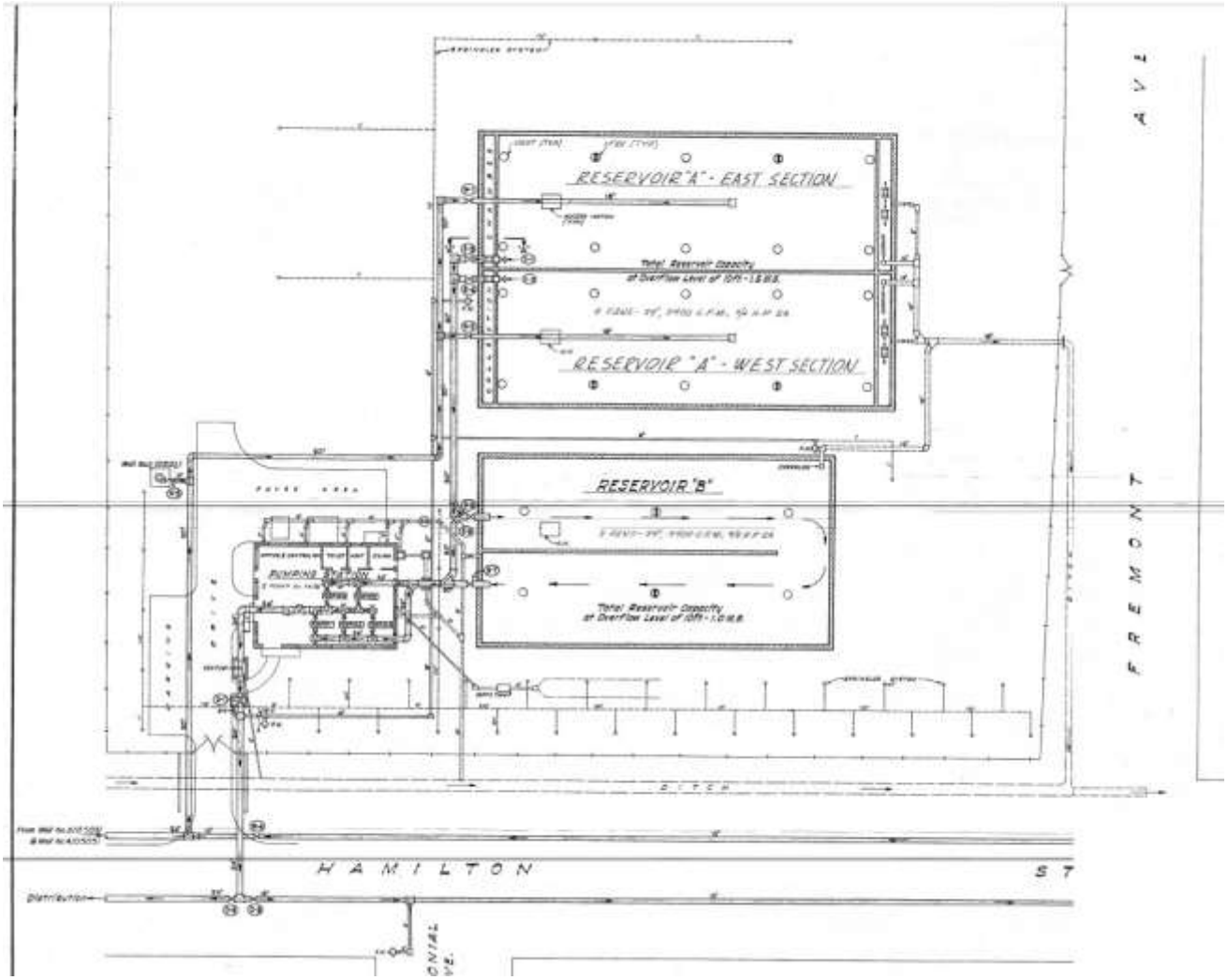

Figure 2: Facilities Plan of the Lakeshore WTP

Justification

The 2.0 million gallon (MG) and 1.0 MG reservoirs were constructed when the plant was built and the existing reservoir components are reaching the end of their useful life. There is currently no aeration of the raw water supply. Cascade tray aerators are needed to remove hydrogen sulfide from the raw water. The existing fans and ventilators need to be replaced due to their age. The conduit and wiring for the fans is in need of replacement as well. The other components associated with the reservoir need to be replaced including but not limited to the ladders/stairs, hatches, and level telemetry. The reservoir needs to be rehabilitated so it can continue to meet system demands including maximum flows and fire flow demands. This is the last of the JEA reservoirs to be rehabbed from the 1950's era following Norwood, Fairfax and River Oaks.

In March of 2016 there was a rupture in the discharge piping at Well No. 2 resulting in damage to the pump, piping, wellhead, and well building. The pump has since been pulled, the discharge repiped, and a blind flange installed. Wellhead rehab will be a minor activity attached to this project.

Scope

Inspection reports by the Crom Corporation dated September 21, 2015 for both reservoirs documented the existing conditions and needs for repair. Select report photos are presented below:


Previous repair with spalling


Delaminated coating


Cracking with efflorescence


Ladders with cracked concrete


Corroded steps


Exposed/corroded roof reinforce


Interior piping corrosion


Standing water on roof


Exposed reinforcing


Hollow previous repair


Biogrowth


Vents and screens


Telemetry house


Access hatch


Fan and fiberglass housing

Both reservoirs need a major rehabilitation including roof resurfacing, interior and exterior wall resurfacing, new access stairs, hatches and level transmitters. The reservoirs need cascade aerators added to remove hydrogen sulfide and improve taste and odor of the finished water. In addition, the reservoir fans and ventilators need to be replaced. It is assumed that the fans will be replaced with similar size fans; however as part of the design the fan sizing will be reviewed to determine the

optimum size fans required with the addition of the cascade aeration. The conduit and wiring for the fans and telemetry need to be replaced. The reservoir ventilators are also in need of replacement. The rehabilitation activities may include the following:

- Repair of leaking cracks of wall surfaces
- Patching of spalled concrete areas
- Application of cementitious coating(s) to the interior of the reservoirs
- Removal of interior walls and piping not in use
- Preparing and coating of remaining piping
- Removal of any accumulated grit, sand, or sludge settlements
- Painting of exterior of reservoirs
- Cleaning and restoring of reservoirs back to service
- Any incidental work (such as valve installation/replacement, bypass line installation) required for isolation of reservoirs and creation of a safe work area

The tank interior rehabilitation as well as the aerator replacement will require the reservoirs to be removed from service in series while the work is performed. The reservoirs are interconnected, and the integrity of the infrastructure, including the valves and piping, must be verified before isolation of each reservoir is attempted. If repair or replacement of piping or valves is needed, the work will be covered under the scope of this project.

Engineering evaluation shall be performed to determine cost benefit analysis of rehabilitating existing 65 year old structures versus installing new precast concrete storage reservoir(s).

Process Checkpoint Variance

This project will not require "standard" engineering drawings. The Engineer will perform full facility inspections and evaluations and then prepare the specifications and drawings for the rehabilitation of the reservoirs.

Since this project does not include any process treatment or hydraulic work, process & instrumentation diagrams (P&IDs) and hydraulic profiles will not be required.

Variances to checkpoint include the following:

- Release of funding to repair and/or replace valves and piping so that the reservoirs can be drained, cleaned, and isolated for inspection.
- The 30% Conceptual Design Document (CDD) will include the following:
    - Inspection report, including structural calculations if applicable
    - Recommended rehabilitation scope and methods
    - Plan & elevation views with locations of repair/replacement
    - List of specifications
    - Cost estimates (+30%/-15%)
    - Project schedule
- The 30% Conceptual Design Document will NOT include the following:
    - P&IDs
    - Process calculations
    - Hydraulic profile
- The 100% Final Design Document will include the following:
    - Updated CDD
    - Final cost estimate (+10%/-5%)
    - Final rehabilitation drawings
    - Final rehabilitation specifications
    - Project schedule

  - Final structural calculations, if applicable
- The 100% Final Design Document will NOT include the following:
  - Critical Spare Parts review

Wellhead Rehabilitation

Because this is a preexisting well, this portion of the project will include well investigation, pump selection, and wellhead design and construction. The process will advance as follows:

- Consultant will develop a complete well investigation plan preceding the initiation of any rehabilitation strategy. This plan will include an anticipated schedule and cost of performance and will be reviewed with JEA prior to implementation. Well evaluation will consist of:
  - Well Performance Testing – Step drawdown pumping tests will be performed to verify specific capacity, production rate, and well efficiency. A temporary test pump will be required to complete the evaluation.
  - Geophysical Logging – Static and dynamic logging will be conducted to identify water-producing zones and water quality characteristics in the open borehole.
  - Water Quality Sampling – Samples will be collected at the conclusion of well performance testing. Areas of concern identified in geophysical logging will be investigated here.
  - Video Logging – Visual observation of existing conditions will help to identify definitive next steps.
- Pump Selection and Sizing
- Wellhead Design
- Wellhead Construction

Implementation Schedule

Lakeshore Water Plant – Reservoir Rehabilitation	FY 2017											
	10	11	12	1	2	3	4	5	6	7	8	9
Engineering Procurement = 180 Days												

Lakeshore Water Plant – Reservoir Rehabilitation	FY 2018											
	10	11	12	1	2	3	4	5	6	7	8	9
Design Duration = 270 Days												
Procurement - Bid Duration = 90 Days												

Lakeshore Water Plant – Reservoir Rehabilitation	FY 2019											
	10	11	12	1	2	3	4	5	6	7	8	9
Procurement - Bid Duration = 60 Days												
Construction Duration = 300 Days												
Closeout Duration = 0 Days												

Lakeshore Water Plant – Reservoir Rehabilitation	FY 2020											
	10	11	12	1	2	3	4	5	6	7	8	9
Construction Duration = 210 Days												
Closeout Duration = 60 Days												

Project Management & Delivery

Stage	Project Definition	30% Schematic Design	60% Conceptual Design	90% Detail Design	100% Final Design	Bid	Construction
To Project Delivery	O&M	PEC	PEC	PEC	PEC	PEC	PEC

OPB Established | Trend | Trend | Trend

Cost Estimate and Expenditure Forecast (Current $)

ACTIVITY/DESCRIPTION	SUB-TOTAL	TOTAL
Reservoir Contractor Direct Cost	2,000,000	2,000,000
Reservoir Contractor Indirect Cost		500,000
Overhead & Profit	250,000	
Miscellaneous-General/Special Conditions	0	
Supplemental Work Allowance -10% max	250,000	
Well Contractor Direct Cost	240,000	240,000
Well Contractor Indirect Cost		60,000
Overhead & Profit	30,000	
Miscellaneous-General/Special Conditions	0	
Supplemental Work Allowance -10% max	30,000	
Fan Contractor Direct Cost	400,000	400,000
Fan Contractor Indirect Cost		100,000
Overhead & Profit	50,000	
Miscellaneous-General/Special Conditions	0	
Supplemental Work Allowance -10% max	50,000	
JEA Cost & Engineering		730,000
Engineering	470,000	
Project Management	90,000	
Services During Construction	150,000	
Miscellaneous	20,000	
TOTAL PROJECT COST		**4,030,000**

PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR									
ACTIVITY	**FY 2017**				**FY 2018**				**TOTAL**
QUARTER	**1ST**	**2ND**	**3RD**	**4TH**	**1ST**	**2ND**	**3RD**	**4TH**	
JEA Cost		4,000	6,000	40,000	122,000	146,000	149,000	40,000	**507,000**
Construction									
Project Closeout									
TOTAL		4,000	6,000	40,000	122,000	146,000	149,000	40,000	**507,000**

PROJECTED EXPENDITURE FORECAST BY FISCAL YEAR									
ACTIVITY	**FY 2019**				**FY 2020**				**TOTAL**
QUARTER	**1ST**	**2ND**	**3RD**	**4TH**	**1ST**	**2ND**	**3RD**	**4TH**	
JEA Cost									
Construction	194,116	582,353	582,353	582,353	582,353	582,353	194,116		**3,299,997**
Project Closeout							223,003		**223,003**
TOTAL	194,116	582,353	582,353	582,353	582,353	582,353	417,119		**3,523,000**

SIGNIFICANT MATERIAL SUMMARY			
DESCRIPTION	**UNIT MEASURE**	**QUANTITY**	**CONSTRUCTION**
Fans and Ventilators	LS	1	400,000

Risks:

Project risks include potential reservoir failure if the walls and dome are not rehabilitated. If the aerators are not installed the sulfide concentration can result in taste and odor complaints from water customers. If the wellhead is not rehabilitated, JEA will not be able to provide adequate water to supply to customers.

Revision History

Name	Date	Version	Revision Notes