PARE PROJECT NO. 17103.00

CLEAN WATER INFRASTRUCTURE REPLACEMENT PLAN

JAMESTOWN WATER DISTRICT

PREPARED FOR:

TOWN OF JAMESTOWN
P.O. BOX 377
JAMESTOWN, RI 02835

PREPARED BY:

PARE CORPORATION
8 BLACKSTONE VALLEY PLACE
LINCOLN, RI 02865

JULY 2019

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SECTION 1 - OVERVIEW

This Clean Water Infrastructure Replacement Plan (Plan) has been prepared in accordance with the Rules and Regulations for Clean Water Infrastructure Plans promulgated pursuant to the requirements and provisions of RIGL Chapter 46-15.6 Clean Water Infrastructure of the General Laws of Rhode Island, as amended and maintains consistency with the Clean Water Infrastructure Act, Chapter 46-15.6 of the General Laws of Rhode Island, as amended.

This Plan was prepared in conformance with applicable provisions of State and Federal laws including the Federal Safe Drinking Water Act (42 USC Section 300 f eq. seq.) and Chapter 46-13 of the General Laws of Rhode Island, Public Drinking Water Supply.

Furthermore, this Plan maintains consistency with the goals and policies of the Town of Jamestown Comprehensive Community Plan and the Water Supply System Management Plan for the Jamestown Water District.

SECTION 2 - INTRODUCTION

The Infrastructure Replacement Act (Act), Title 46, Chapter 15.6 designates the Rhode Island Department of Health (RIDOH) as the primary agency to administer the program for Clean Water Infrastructure Replacement Plans. This Act requires that water purveyors that annually supply, purchase, or sell over 50 million gallons of water prepare, maintain, and implement a detailed infrastructure plan of the principal components of the water system. Each water system is also required to provide a mechanism for funding to replace and/or rehabilitate these components at the end of their useful life within the framework of the Regulations. The intent of the Plan is to provide management of existing principal components of the water system as opposed to future large-scale capital improvements.

The Jamestown Water District (JWD) contracted Pare Corporation (Pare) to prepare this Plan for their water supply system. The goal of this Plan is to comply with the provisions of the Act as detailed in the Rules and Regulations for Clean Water Infrastructure Plans, by developing a comprehensive infrastructure plan for the JWD system. Development of this Plan was accomplished through review and evaluation of the condition of each of the major system infrastructure components as well as review of findings of others in recently completed inspections (e.g., RIDOH Sanitary Surveys). Each component was then assigned a life expectancy and the necessary improvement costs and estimated schedule for making the improvements was developed. Funding for such improvements and replacements will be through establishment of a capital Infrastructure Replacement Fund (IRF) as required by the Act, through the water system's general enterprise fund, or through bonding. The JWD maintains a "Capital Fund", which serves as the IRF and is their preferred method of funding infrastructure replacement projects. It is intended that any improvement in the form of rehabilitation and/or replacement be completed through a program in which the water system is upgraded and maintained to ensure the present and future needs of the customers.

This Plan provides the JWD with an effective tool for infrastructure management and planning of its major system components. As such, the JWD recognizes that maintenance and component replacement should not be deferred until failure, when full replacement is necessary. Therefore, the JWD's policy is that all system components be maintained continuously to avoid malfunction or unexpected failure to the degree possible.

SECTION 3 - SYSTEM OVERVIEW

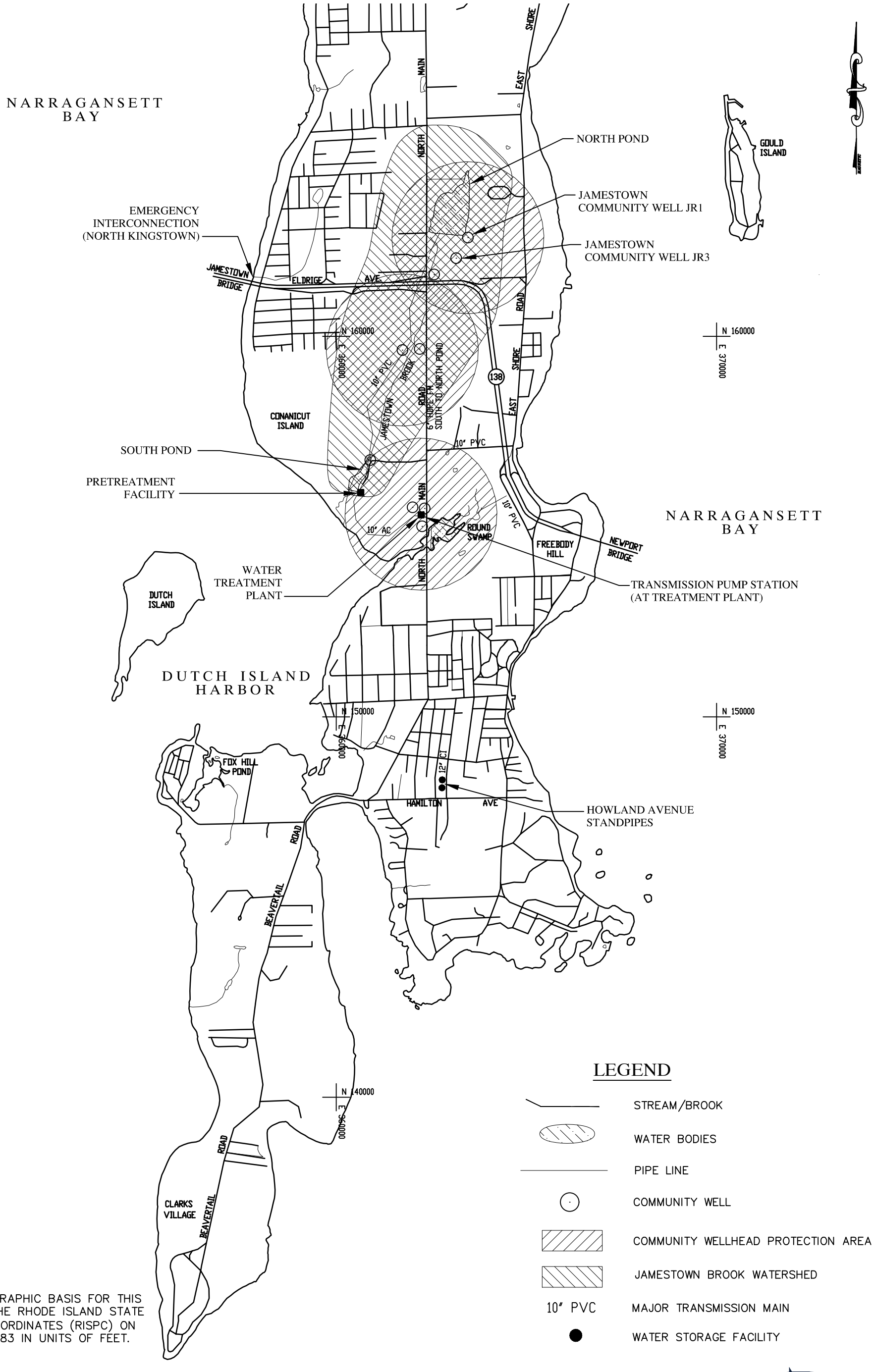
This section provides an overview of the JWD water supply system including its organization and legal structure, service area, and a brief description of the major system components. The locations of the major system components in the JWD system are depicted on **Figure 3-1**.

3.1 Organization and Legal Structure

The JWD was established by legislation of the General Assembly of the State of Rhode Island in March 1969. However, the water supply system on Conanicut Island dates back to 1890, when it was owned and operated by the Newport Water Works Corporation. Today, the JWD water supply system is classified as a "Community" Public Water Supply System within the Town of Jamestown (Town). As such, the JWD is required to conform to all applicable rules and regulations of the RIDOH and the Federal Safe Drinking Water Act (SDWA). The water system currently maintains full compliance with the stipulations of these rules and regulations.

The Town operates under the Council-Administrator form of government. The Town Council, which sits as the Board of Water and Sewer Commissioners (Board), is the governing body of the Town's water system. The Board creates and administers public water policies through the Town Administrator and Public Works Director, who is the head of the JWD. The Public Works Department, Town Engineer, and Water District personnel are responsible for the full implementation and operation of the public water supply system.

The Water Division, under the direction of the Public Works Director, is responsible for maintenance and operation of all physical facilities related to water supply, treatment, and delivery. The Water Division has 3 full-time employees. In addition to the Public Works Director, there is one other staff member at the managerial level. The Treatment Plant Operator must meet state certification requirements. The water system is designated by the State of Rhode Island Department of Health as #1858419. **Figure 3-2** provides a chart of the organizational framework of the JWD.



THE GEOGRAPHIC BASIS FOR THIS MAP IS THE RHODE ISLAND STATE PLANE COORDINATES (RISPC) ON THE NAD 83 IN UNITS OF FEET.

FIGURE 3-1
MAJOR SYSTEM COMPONENTS OF THE JAMESTOWN WATER DISTRICT

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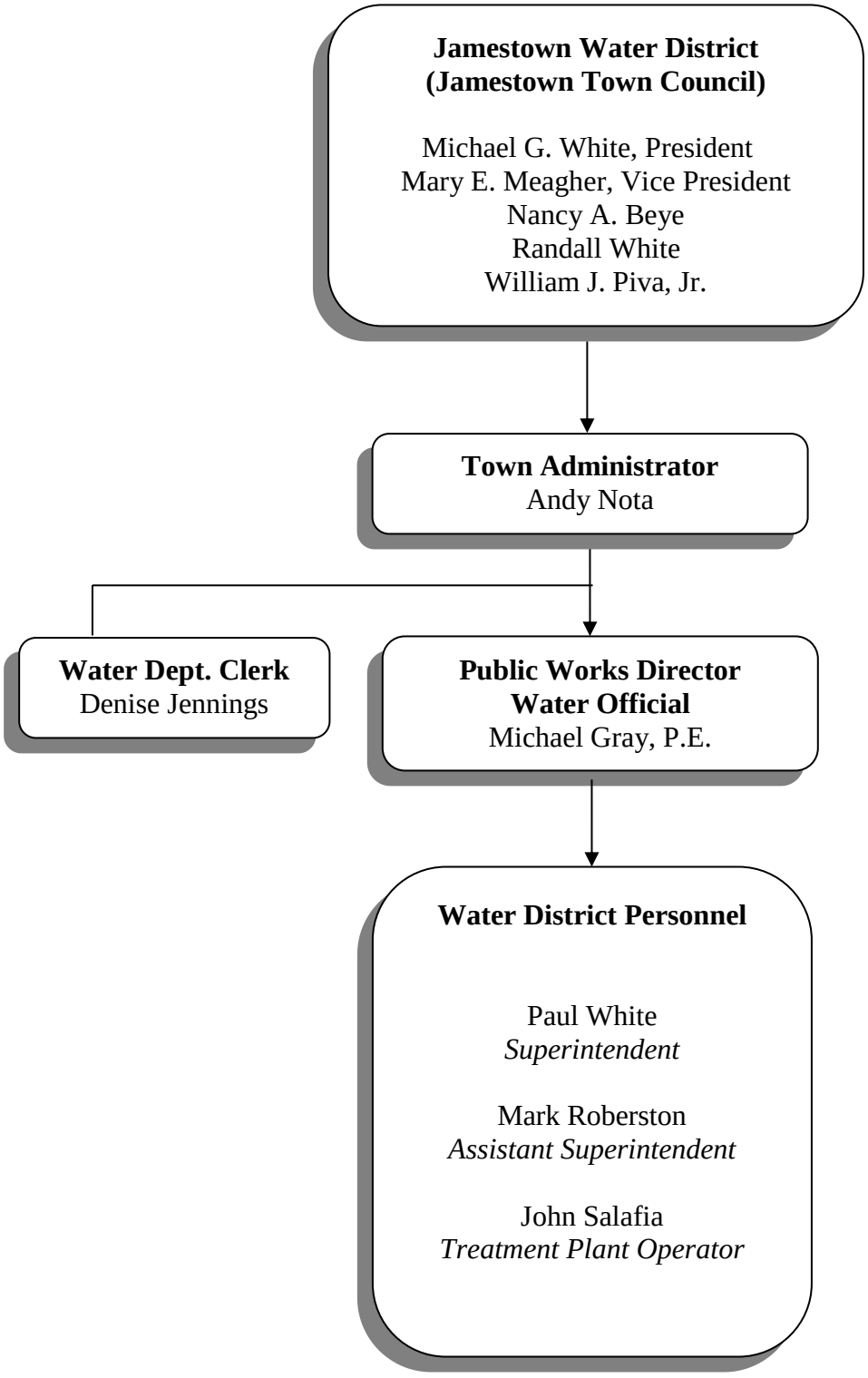
FIGURE 3-2

JAMESTOWN WATER DISTRICT ORGANIZATION CHART



3.2 Service Area

The JWD service territory is predominantly confined to the Jamestown Village area, which is the Town's urban district. Water service connections in the remaining rural portions of Town are predominately in the Beavertail section of Town, south of Jamestown Village. **Figure 3-3** provides a rough overview of the physical boundaries of the water service district.

The JWD has approximately 1,493 service connections (as of 2019), broken up as follows:

Residential	1,401
Commercial	96
Industrial	0
Governmental	31
Total	**1,528**

Every customer served by the JWD is supplied and billed through one primary water meter for each separate service connection, thus providing 100 percent distribution metering. Each customer service connection is therefore equipped with a service line, curb stop, and meter assembly. The service pipe from the distribution main to the curb stop is owned and maintained by the JWD. It is the responsibility of the customer for the installation and maintenance of the service line from the curb stop to the building structure plumbing system. All newly installed residential meters are of the remote read type, equipped with receptacles for remote reading from the outside.

3.3 Water Supply

Surface water is obtained primarily from North (Carr) Pond, which has occasionally been supplemented with water from South (Watson) Pond. Pumps are used to transfer water from South Pond to North Pond. North Pond was constructed in the early 1900s and then enlarged in 1914 to its current size of approximately 28 acres, with a watershed of approximately 192 acres. South Pond serves as a secondary water source for the system. It was constructed in the late 1800s and has an approximate size of seven 7 acres, with a watershed of approximately 448 acres.

Environmental constraints in the vicinity of the reservoirs prohibit them from undergoing expansion to increase the JWD's water supply. Therefore, the JWD installed groundwater production wells to develop

new sources of water supply. Two (2) bedrock wells located near North Pond, identified as JR-1 and JR-3 are used to supplement the water supply. Water from JR-1 is pumped directly into the North Pond intake while JR-3 is pumped directly into North Pond. Each well is rated for 50,000 gpd. There is a total of eight groundwater wells, which also include JR-2, JR-4, JR-5, JR-6, JR-7, and JR-8. While JR-1 and JR-3 are both active, typically only JR-1 is used, while the remaining wells are used only as monitoring wells.

FIGURE 3-3

Public Water and Sewer Service Area

TOWN OF JAMESTOWN RHODE ISLAND

Comprehensive Plan, 2014

Map Legend

Features

- Highways
- Roads

Boundaries

- Jamestown
- RI Municipal
- Streams
- Other States
- Sewer Pump Stations
- Rural Water District
- Urban Water and Sewer District

This map is not the product of a Professional Land Survey. It was created by Jamestown GIS Department for general reference, informational, planning or guidance use, and is not a legally authoritative source as to location of natural or manmade features. Proper interpretation of this map may require the assistance of appropriate professional services. The Town of Jamestown makes no warranty, express or implied, related to the spatial accuracy, reliability, completeness, or currentness of this map.

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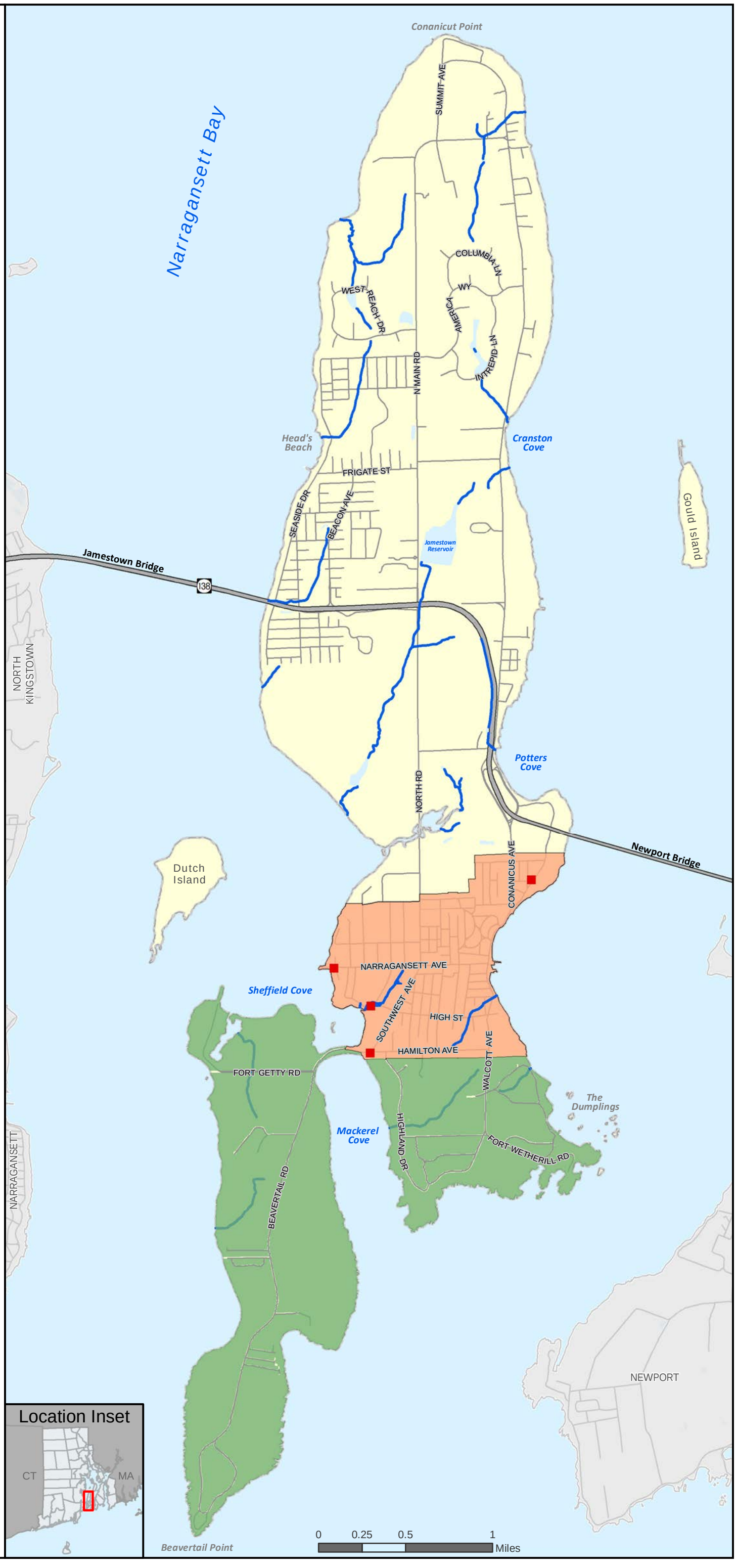
RIGIS

Justin Jobin
Jamestown GIS Dept.
May 2014



The JWD also maintains an emergency interconnection with the Town of North Kingstown through a six-inch flexible water main across the Jamestown Verrazano Bridge. The connection runs from a hydrant on Tashtassuck Road in Jamestown to a hydrant on Lorelei Drive in North Kingstown. The flexible water line consists of three, 2,500 linear foot trailer-mounted hose reels, which can be put into place by driving the trailer across the bridge between the two hydrants. These hose reels are located at the Treatment Plant.

Hose Reel at the Treatment Plant

The current agreement with North Kingstown allows for a maximum daily flow of 200,000 gpd and the interconnection is strictly for emergency purposes. It was most recently used in 2002.

3.4 Treatment Facilities

Raw water from North Pond flows through a 7,500-foot long, 10-inch PVC pipe to a pretreatment station at South Pond. Pretreatment consists of pH adjustment and the addition of chlorine dioxide for odor, color, and taste.

Pretreated water then flows by gravity through a 10-inch PVC pipe for an additional 2,600 feet to the water treatment facility on North Road.

The original water treatment plant (WTP) on North Road dates back to the 1930s but was completely reconstructed in 1991. The maximum treatment capacity of this plant was 375,000 gallons per day (gpd). In the mid-2000s the WTP was found to be incapable of meeting the maximum day water demand for the JWD system, and was deficient at meeting changing water quality criteria. The processes employed at this plant also produced a large volume of wastewater.

Since then, the JWD constructed a new, state-of-the-art ultrafiltration membrane-based treatment plant, which was completed in 2009 and put into service in May of that year. The new WTP is located in a new building adjacent to the existing plant but utilizes some of the existing facilities such as raw and finished water pumping. **Figure 3-4** shows a site plan of the new WTP. It produces 350,000 gpd of treated water on average and has an approximate maximum capacity of 500,000 gpd. The new WTP was also designed to reduce the amount of backwash wastewater that was previously generated.

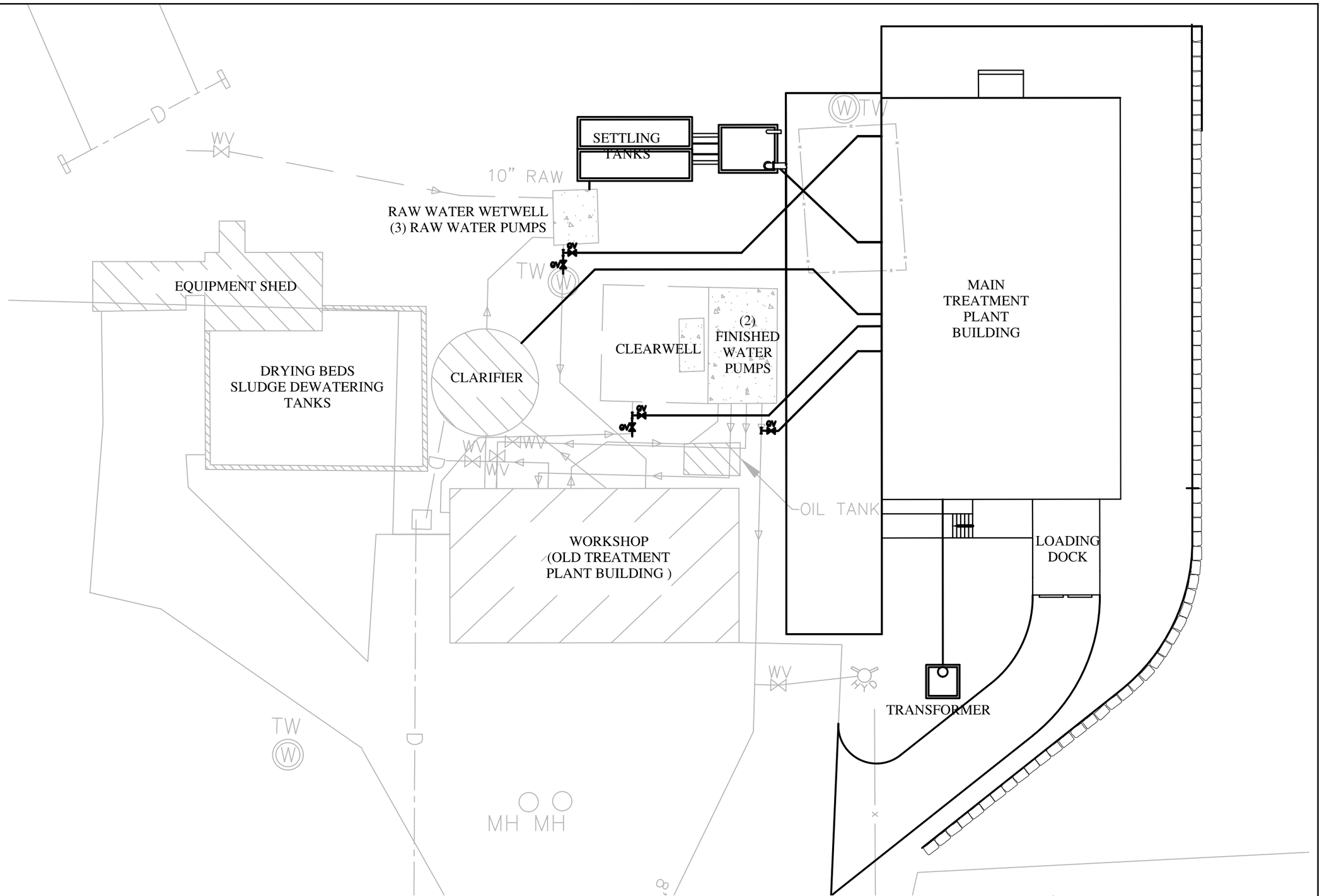


FIGURE 3-4
TREATMENT PLANT SITE PLAN

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3.5 Transmission and Distribution

From the treatment facility, potable water is stored in an underground clearwell and is then pumped directly into the distribution system. The storage capacity of the clearwell is 38,000 gallons. The station contains two (2) parallel 350-gpm pumps. The water system is operated as a single pressure zone, controlled via telemetry, by the water level in the two 1.0-million-gallon Howland Avenue standpipes. The original standpipe was constructed in 1974, and a second standpipe was constructed adjacent to it in 2009 to supplement the treated storage capacity in the water supply system. The storage tanks operate in conjunction with the pump station at the clearwell, and each tank has an overflow elevation of 204 feet above mean sea level. The tanks maintain system pressure in the range of 30 psi to 60 psi. During periods of high demand, water is pumped directly into the distribution system, with excess volume being stored in the two standpipes. Otherwise, water is pumped directly to the standpipes.

The transmission and distribution system consist of approximately 21 miles of pipe ranging in size from 6 to 12 inches. The majority of the pipelines in the JWD system are less than 25 years in age and are considered to be in good physical condition. The distribution system consists of a mixture of asbestos cement, cast iron, ductile iron, and polyvinyl chloride pipe.

SECTION 4 - SYSTEM COMPONENT ANALYSIS

This section includes an analysis and description of the major system components in the JWD water supply system. Specifically, a discussion related to component condition, function, original date of construction, future life expectancy, and record of maintenance and/or repair is provided. As allowed per the Regulations, small and numerous system components such as water mains, valves, hydrants, and service connections have been evaluated as a group.

Component condition and future life expectancy was primarily determined by observation, interviews with JWD personnel, record plans, and engineering studies or inspection reports. The source of determination for each assessment is noted. On this basis, life expectancy may vary significantly from the guidelines in the Regulations. In addition, by employing proper routine maintenance in combination with replacement of critical items and "wear use" components, the useful life expectancy of a particular system component may be significantly extended.

Cost opinions for required rehabilitation/replacement of system components are also provided. These costs are provided in present day (2019) figures and should be considered budgetary estimates for planning purposes. In many cases, a more detailed design effort beyond the scope of this Plan would be required to provide a more accurate cost estimate.

Photographs, depicting the current condition of major system components in the JWD system, are included in **Appendix A.**

4.1 Raw Water Production Sources/Groundwater Well Stations

4.1.1 North Pond Reservoir

North Pond serves as the primary water source for the system. The dam, which is considered a Significant hazard potential structure by the RIDEM Office of Compliance and Inspection, was constructed in the early 1900s and then enlarged in 1914 to its current size of approximately 28 acres. It is 17 feet deep with a useable depth of 12 feet and has a net usable volume estimated near 60 million gallons. The contributing watershed is approximately 192 acres. According to a 2000 Safe Yield Analysis, the total maximum safe daily yield from North Pond is 194,000 gallons

North Pond Aerial

North Pond Dam – Looking West

An approximately 1,000-foot long earthen embankment dam extends across the southern end of the pond.

Discharges from the pond flow through a 20-foot wide concrete spillway structure located at the western end of the embankment. Vegetation should be removed from the spillway retaining walls as part of a routine maintenance program.

North Pond Spillway

The intake structure for the water supply system consists of a flexible intake pipe connected to a mooring set about 12" below the water surface to obtain the best water quality. The intake connects to a 10" pipe that penetrates the dam and carries the water by gravity to South Pond. The connection between the mooring and the dam penetration is reported to be in fair condition and will require a repair to ensure its long-term integrity.

Intake at North Pond

A wood-frame building (constructed circa 1995) located west of the dam currently houses a blower motor and associated electrical controls that are part of an aeration system used to improve water quality in the pond. This system was installed circa 2012 which replaced the former compressed air system. Since the motor runs hot, two ventilation fans are used to keep the motor cool. The JWD should monitor this system and consider providing improved ventilation and cooling to preserve the life of the motors.

North Pond – Blower Building

Active seepage was noted along the base of the dam, west of a blanket drain system installed in 2010. A bike trail project is currently in progress and includes installing a new bike trail along the toe of the existing dam. As part of this design, improvements to the dam including flattening the slope and extending the horizontal limits of the blanket drain system are also being completed. This project also includes rip-rap armoring of the waterward side of the dam. This work has been designed and is scheduled for completion in 2019.

A visual inspection/evaluation was performed on the North Pond dam on August 7, 2012 by Pare Corporation. The report noted seven (7) deficiencies and fourteen (14) recommendations which should be implemented, if they have not been performed already. Recommended maintenance/minor repair activities that do not appear to have been designed or completed to date include the following:

Seepage at Toe of North Pond Dam (looking east)

1. Repoint the spillway retaining wall
2. Locate and clear the toe drain outlet

Recent Rehabilitation/Repairs:

A blanket drain/toe drain was installed along a 70-foot section of the dam to control seepage in 2010. However, as previously noted, seepage was observed immediately to the east of the new blanket/toe drain. Prior to this the dam had been repaired in 1995 to improve its structural integrity. The spillway was modified in 1980, raising the water height in the reservoir by approximately 8 inches. It is currently in fair condition but may require rehabilitation within the next 5 years.

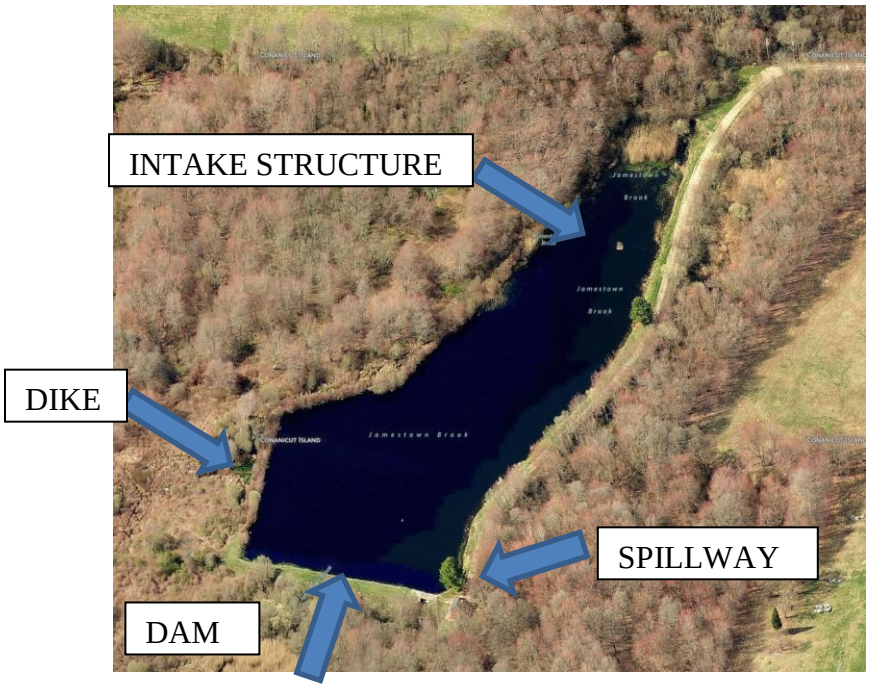
The Town of Jamestown also installed three water quality basins, 3,000 linear feet of piping and catch basins and to improve the water quality entering the North Pond. This work will be complete in July 2019.

Component General Condition:	***Life Expectancy***
Spillway: Fair - Cast in Place Concrete & Field Stone Escarpments	10 years
Dam: Fair, repaired in 1995, toe drain installed in 2010, active seepage remains	10 years
Intake structure and area: Fair, per JWD personnel	5 years
Pond Aeration Building: Good.	10 years
Blower Motor: Very good, recently replaced	10 years

North Pond - Required or Scheduled Rehabilitation/Replacement:

Time Interval/Year	**Description**	**Opinion of Probable Construction Cost**
5-year/2019	Flatten dam embankment, extend toe drain, provide upstream slope protection	$50,000
	Spillway repairs;	$10,000
	Intake Repairs	$5,000
	DEM inspection performed March 2019	$0
5-year/2024	Inspect dam, intake structure and spillway	$3,500
10-year/2029	Inspect dam, intake structure and spillway	$3,500
10-year/2029	Replace Pond aeration building and blower motor	$15,000
15-year/2034	Inspect dam, intake structure and spillway	$4,000
20-year/2039	Inspect dam, intake structure and spillway	$4,500

4.1.2 South Pond Reservoir



South Pond Aerial

South Pond serves as a secondary water source for the system. The dam, which is considered a Significant hazard potential dam by the RIDEM Office of Compliance and Inspection, was constructed in the late 1800s and has an approximate surface area of 7 acres with a watershed of approximately 448 acres.

It has an estimated net usable volume of approximately 8 million gallons.

According to a Safe Yield Analysis conducted by the JWD in 2000, the total maximum safe daily yield from South Pond is 89,000 gallons.

The pond's dam is an approximately 800-foot long earth and rock fill dam with a maximum structural height of approximately 12-feet. The dam system includes an approximately 300-foot long earthen dam, an approximately 600-foot long earthen dike, and a spillway structure. The upstream side of the dam is a vegetated slope averaging roughly 2H:1V. The crest is a vegetated surface varying in width from approximately 14-feet along the right half of the dam to near 20-feet wide in the area of the spillway. The downstream side of the dam is a variable earthen slope averaging roughly 2H:1V.

The dike is an earthen embankment extending approximately 600 feet along the western shoreline of the impoundment. Along the left side of the dike for 300 feet, the embankment is well defined and varies in height between 6.5 feet and 4.5 feet. For the remaining 300 feet, the dike becomes less defined and is low with an average height of 3 feet before transitioning to the right abutment.

Discharges from the pond flow through a spillway structure located at the east end of the dam. The

existing spillway consists of an approximately 9-foot wide cast-in-place concrete overflow spillway section with roughly 14-foot by 13-foot rectangular concrete abutments at either side. Immediately upstream of the spillway, a small stilling basin is located with a rim set to allow flow during normal pool elevations. During periods of low flow, discharge is via a bubbler set in the middle of the stilling basin below the normal pool level. The bubbler is fed by a deep-water intake reportedly located approximately 100-feet upstream of the embankment. A concrete apron covers a portion of the slope downstream of the spillway before transitioning to a stone lined discharge channel. Past visual inspections by Pare report this concrete apron to be deteriorating. During periods of elevated pool levels, 18-inch diameter conduits passing through each concrete abutment provide additional capacity.

A corrugated metal pipe culvert is buried within the downstream slope near the toe to provide drainage of the downstream area. This pipe is reportedly the source of audible flow in this area. This pipe will be removed and replaced with an open swale to manage flow around the dam structure.

South Pond Intake Structure

South Pond Dam Embankment

South Pond Dike Earthen Berm

South Pond Spillway

A floating intake structure is located on the northern tip of the reservoir which contains two horizontal turbine pumps rated at 150 gpm and 300 gpm. The pumps are controlled manually and discharge to a 6" HDPE force main that runs directly to, and discharges in, the northern portion of North Pond.

South Pond Spillway

Visual inspections performed by Pare as recently as 2013 identified concerns with the dam at South Pond that require remediation. Specifically, the dike was found to be deteriorated with low areas, breaches, root penetration and other deficiencies. It was also identified that the spillway cannot accommodate a 2-year flood without the lower portion of the dike overtopping. It was recommended that a new spillway with larger capacity be constructed should the dike be reconstructed, or a new smaller-sized spillway be constructed with the low section of the dike converted to a more permanent, armored overflow section spillway.

In 2018, Pare prepared design documents for the completion of a rehabilitation program at the dam and dike at South Pond to address the issues raised in previous visual inspections including the deteriorated condition of the dike, seepage, inadequate spillway discharge capacity, and lack of upstream slope protection. The designs consists of the following components:

1. Clear and grub trees, brush, and roots from the dam and dike embankment, 10 feet beyond the downstream toe areas, 10 feet beyond the proposed relocated dike embankment, and within the footprint of the proposed rip rap swale;
2. Remove and dispose of the CMP at the dam/dike transition;
3. Remove existing soils along the dike to expose sound soil;
4. Remove existing soils along the footprint of the proposed relocated dike to expose sound soil;
5. Construct the proposed dike along the relocated alignment and install a 12" bypass pipe;
6. Raise the dam crest to elevation 20 and regrade the downstream slope to 2H:1V;
7. Install upstream rip rap slope protection along the existing dike and new dike embankment;
8. Install Articulated Concrete Blocks along the crest and downstream slope of the dike;
9. Install riprap scour protection along the downstream toe of the dike;
10. Complete a permeation grouting program at the primary spillway to reduce observed seepage.

Recent Rehabilitation/Repairs:

Clearing of vegetation at the South Pond had been performed prior to Pare's most recent formal visual inspection in 2012, but the area downgradient of the dam appeared overgrown with vegetation during recent site visits performed in preparing this CWIRP. However, in 2018, JWD mobilized to begin construction of repairs but was unable to continue due to heavy rain. They will continue to monitor and continue construction when possible. As part of the mobilization, JWD cleared and grubbed the dike and downstream areas in preparation for construction. Bonding for this work in the amount of $500,000 has been approved and is in place.

Component General Condition	***Life Expectancy***
Spillway: Undersized, requires improved scour protection per 2007 evaluation	5 years
Earthen Embankment Dam (southern section): Unable to inspect due to overgrowth	5 years
Earthen Dike (western section of dam): Significantly degraded. In need of repair	5 years
Intake structure and area: Good, rebuilt in 2012	20 years

South Pond - Required or Scheduled Rehabilitation/Replacement:

Time Interval/Year	**Description**	**Opinion of Probable Construction Cost**
Yearly	Maintain vegetation along entire dam	$10,000/year
1-year/2019	Rebuild earthen berm, improvements to spillway and dike	$500,000 *
5-year/2024	Inspect dam, dike, intake structure and spillway	$3,500
10-year/2029	Inspect dam, dike, intake structure and spillway	$3,500
15-year/2034	Inspect dam, dike, intake structure and spillway	$4,000
20-year/2039	Inspect dam, dike, intake structure and spillway	$4,500

* This amount is funded through fiscal year 2019 bonding

4.1.3 Production Well JR-1

Production Well JR-1 was constructed in 1996 and is approximately 15 years old. It serves as the primary groundwater well for the JWD system and discharges directly into the intake of North Pond. It is a bedrock well and is approximately 345 feet deep, with an eight-inch casing and submersible pump rated at 50 gpm.

JR-1 Well head

JR-1 Pump Control

Recent Rehabilitation/Repairs:

A new pump and controls were installed in 2012. The JWD has not experienced any significant problems with production well JR-1 and it is considered to be in very good condition.

Component General Condition	***Life Expectancy***
Pump/Motor: Excellent, recently installed	20 years
Wellhead: Very Good, original to the well	25 years
Mechanical Systems: Good, components are original to the well	10 years
Electrical: Excellent, recently installed	20 years
Building Structure: Not Applicable – no building structure at JR-1	

Production Well JR-1 - Required or Scheduled Rehabilitation/Replacement:

Time Interval/Year	Description	Opinion of Probable Construction Cost
5-year/2022	Well inspection/redevelopment as required	$15,000
5-year/2022	Construct well building	$10,000
10-year/2029	Perform well inspection, test pump	$5,000
	Replace mechanical/electrical equipment, as required	$15,000
15-year/2034	Well inspection/redevelopment as required	$15,000
20-year/2039	Perform well inspection, test pump	$5,000

4.1.4 Production Well JR-3

Production Well JR-3 serves as a secondary groundwater well for the JWD system and it discharges directly into North Pond. It was constructed circa 1997. It is a bedrock well and is 225 feet deep, with a 6-inch casing and submersible pump rated at 50 gpm.

Recent Rehabilitation/Repairs:

No major repairs have been required at Production Well JR-3. The pumps, mechanical equipment, and electrical equipment are all original to the well. The JWD has not experienced any significant problems with production well JR-3 and it is considered to be in good condition.

Component General Condition	***Life Expectancy***
Pump/Motor: Good, original to the well	10 years
Wellhead: Very Good, original to the well	25 years
Mechanical Systems: Good, original to the well	10 years
Electrical: Good, original to the well	10 years
Building Structure: Not Applicable – no building structure at JR-3	

Production Well JR-3 - Required or Scheduled Rehabilitation/Replacement:

Time Interval/Year	**Description**	**Opinion of Probable Construction Cost**
5-year/2022	Well inspection/redevelopment as required	$15,000
10-year/2029	Perform well inspection, test pump	$5,000
	Replace pump and mechanical/electrical equipment, as required	$25,000
15-year/2034	Well inspection/redevelopment as required	$15,000
20-year/2039	Perform well inspection, test pump	$5,000

4.2 Treatment Facilities

The JWD treatment operations are comprised of two facilities, a pretreatment facility located at South Pond and the main treatment facility on North Road.

4.2.1 Pretreatment Facility

The pretreatment facility is located adjacent to South Pond and provides disinfection via chlorine dioxide to treat for color, odor, and taste. All of the flow from the raw water sources in the JWD system, be it from the two reservoirs or the two supply wells, is treated at the pretreatment facility prior to flowing to the main treatment plant. The facility consists of a block wall building with brick veneer and a hip style wood framed roof. The facility is approximately 30 years old.

Pretreatment building at South Pond

Recent Rehabilitation/Repairs:

The entire facility was constructed in 1987 and there have been no major rehabilitations or repairs performed to date. The dosing pumps were rebuilt in 2018. A direct connection to the treatment plant was installed in 2018 for real time monitoring with SCADA, including flow, chemical dosing and alarms.

New Dosing Pumps

Component General Condition	***Life Expectancy***
Building Structure & Foundation: Good, based on visual observation	25 years
Building Envelope: Average, based on visual observation by PARE	5 years
Chlorine Dioxide Generator: Good, per JWD personnel	10 years

Pretreatment Facility - Required or Scheduled Rehabilitation/Replacement:

Time Interval/Year	Description	Opinion of Probable Construction Cost
5-year/2019	Replace asphalt shingle roof and fascia boards	$2,000
	Inspect and repoint brick where needed, paint doors and trim	$2,000
5-year/2024	Perform Facility Inspection, minor repairs	$3,000
10-year/2029	Perform Facility Inspection, minor repairs	$3,000
	Replace Chlorine Dioxide Generator	$10,000
15-year/2034	Perform Facility Inspection, minor repairs	$4,000
20-year/2039	Perform Facility Inspection, minor repairs	$5,000

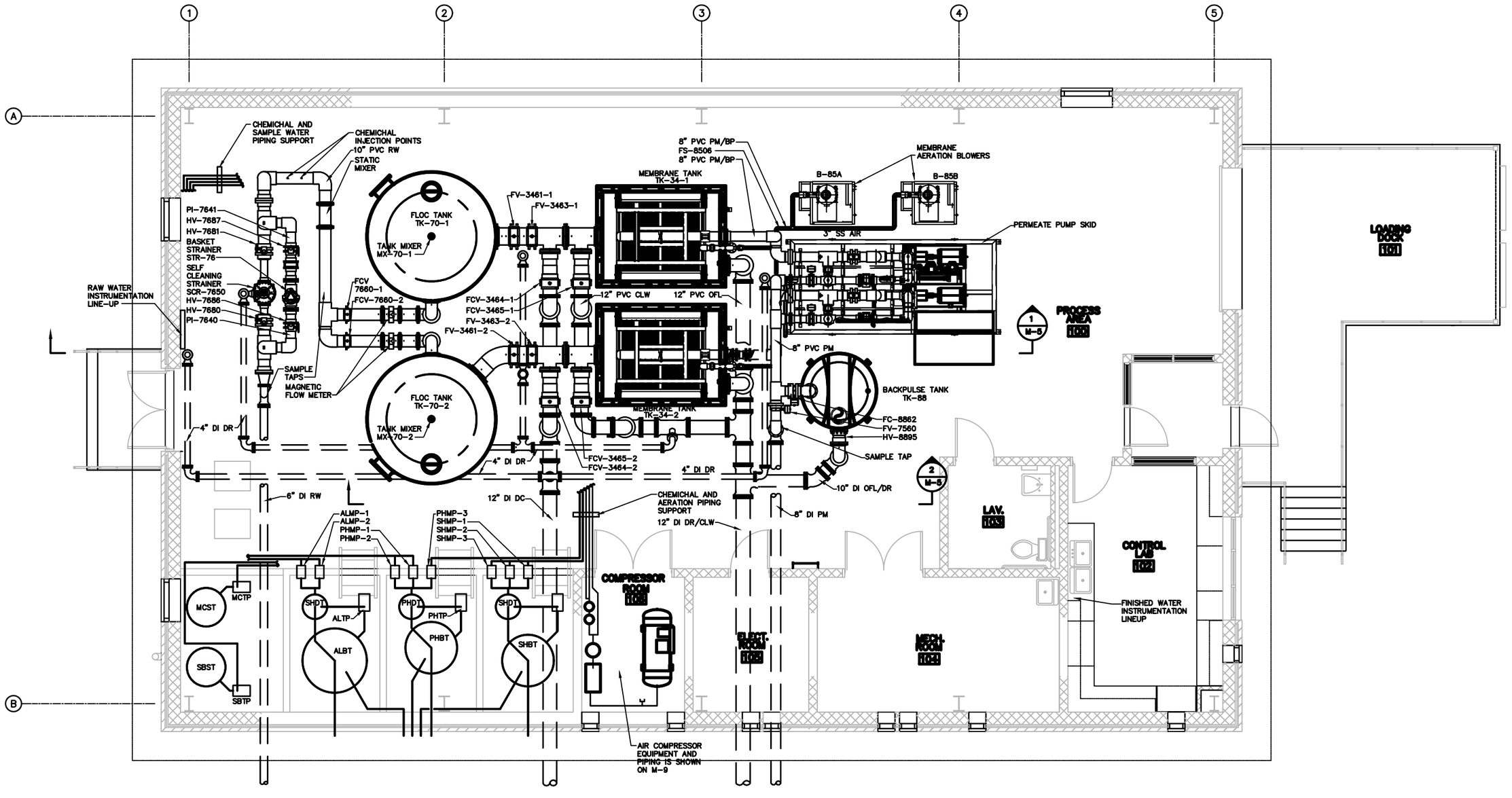
4.2.2 Main Treatment Facility

The new treatment facility was put into service in late May 2009, replacing a previous treatment facility at the site that dated to 1991. The new facility has a peak design flow of 500,000 gpd, while the previous treatment facility had a design flow of 350,000 gpd.

New Treatment Plant

Figure 4-1 shows a site plan of the existing treatment plant site while figure 4-2 depicts a process flow diagram. Pretreated raw water enters a wetwell at the headworks of the plant, then is injected with alum and is adjusted for pH. Water flows into two parallel coagulation basins and then to two membrane basins, also in parallel. Treated effluent is pumped out of the membrane basins to the finished water pump station, which dates back to the previous treatment facility. Finished water is then pumped to the two Howland Avenue storage tanks.

Raw water enters the preexisting raw water wetwell that remains active from the original plant, where it passes through a basket screener. From the raw water wetwell, the flow is injected with powdered activated carbon and is directed to two parallel coagulation basins. Following coagulation, water flows by gravity through membrane filtration units where sludge is removed and sent to a holding tank for dewatering. Dewatered sludge is hauled to the Central Landfill in Johnston, RI for disposal, while decanted water discharges to Narragansett Bay at Great Creek. The JWD maintains a RIPDES discharge permit for this outfall. A back pulse tank is used to frequently backwash the membrane units. Vacuum pumps draw water out of the membrane units and directs it to the existing finished water pump station.



MAP REFERENCE: "FAY, SPOFFORD & THORNDIKE PROJECT NUMBER WJ-007 CONTRACT NO. 2 WATER SYSTEM IMPROVEMENTS WATER TREATMENT PLANT BUILDING FLOOR PLAN" DRAWING NO. M-4, DATED MARCH 9, 2007

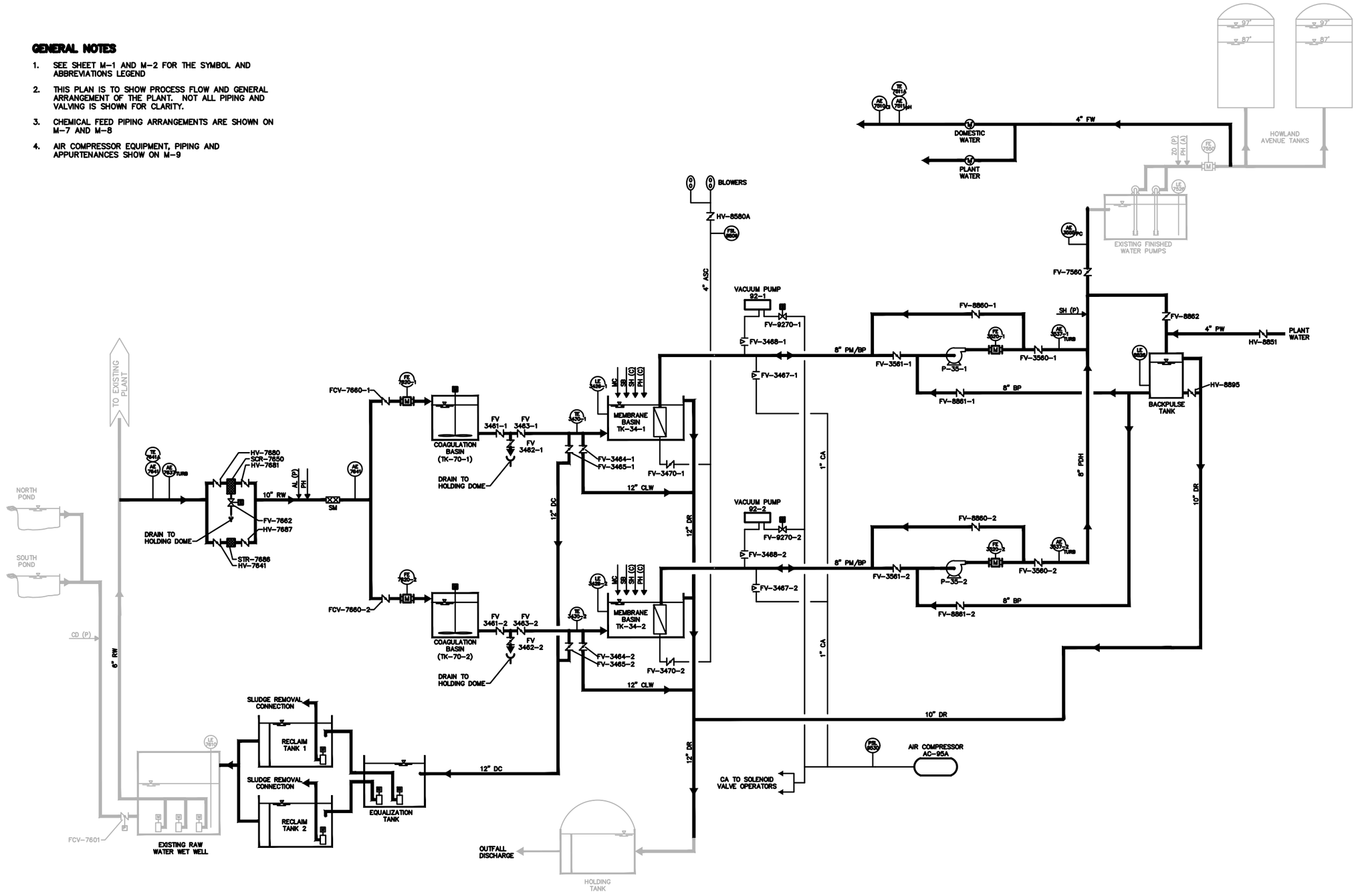
FIGURE 4-1
TREATMENT PLANT LAYOUT

NOVEMBER 2017

PARE CORPORATION
ENGINEERS - SCIENTISTS - PLANNERS
8 BLACKSTONE VALLEY PLACE
LINCOLN, RI 02865
401-334-4100

GENERAL NOTES

1. SEE SHEET M-1 AND M-2 FOR THE SYMBOL AND ABBREVIATIONS LEGEND
2. THIS PLAN IS TO SHOW PROCESS FLOW AND GENERAL ARRANGEMENT OF THE PLANT. NOT ALL PIPING AND VALVING IS SHOWN FOR CLARITY.
3. CHEMICAL FEED PIPING ARRANGEMENTS ARE SHOWN ON M-7 AND M-8
4. AIR COMPRESSOR EQUIPMENT, PIPING AND APPURTENANCES SHOW ON M-9



MAP REFERENCE: "FAY, SPOFFORD & THORNDIKE PROJECT NUMBER WJ-007 CONTRACT NO. 2 WATER SYSTEM IMPROVEMENTS WATER TREATMENT PLANT PROCESS FLOW DIAGRAM", DRAWING NO. M-3, DATED MARCH 9, 2007,

FIGURE 4-2
TREATMENT PLANT PROCESS FLOW DIAGRAM

NOVEMBER 2017

PARE CORPORATION
ENGINEERS - SCIENTISTS - PLANNERS
8 BLACKSTONE VALLEY PLACE
LINCOLN, RI 02865
401-334-4100

The plant has the ability to recycle backwash water by sending it to the raw water wet well at the head of the treatment plant; however, the JWD has had to manage their backwash recycle procedures to avoid fouling the membranes and a substantial amount of backwash water is clarified in settling basins then discharged to Great Creek. The JWD is currently working with Harbor Controls for the design of a pumping system that will pump the clarified backwash water into the plant headworks instead of discharging it to Great Creek. This represents a major component of non-account water that the JWD may be able to reclaim for use in the distribution system, estimated at approximately 8 million gallons of water annually.

Coagulation Tanks

Membrane Tanks

Recent Rehabilitation/Repairs:

The vast majority of the treatment facility, including the building structure, was constructed between 2007 and 2009 and is in excellent condition. No repairs or rehabilitation have been required at the new treatment facility and there have been no major problems associated with it to date. The pump starters and controls for the raw water and finished water pumps were transferred from the old building to the new building in early 2017. In 2015, two new raw water pumps were installed. In 2012, improvements were made to the sludge dewatering tanks. In 2018, a new compressor was installed, and SCADA and new computers/software were installed. In 2019, new fiber was installed to the water towers. New lab equipment was installed in 2017 and 2018.

The former treatment facility building is over 100 years old and is currently used for storage, workshop and corrosion control. The raw water wetwell is original to the previous treatment plant, as is the finished water pump station and the sludge dewatering tank.

Old Treatment Plant Building
Corrosion Control System

Component General Condition	***Life Expectancy***
Raw Water Wetwell: Good, original to 1991 Treatment Facility	30 years
Coagulation Basins: Excellent, new in 2009	50 years
Membrane Basins: Excellent, new in 2009	50 years
Membranes: Fair, new in 2009	5 years
Residual Sludge Containment/Drying Beds: Good, upgraded in 2012	20 years
Electrical: Good, upgraded in 2009	20 years
Instrumentation Control Equipment: Good, upgraded in 2009	20 years
New Treatment Facility Building: Excellent, new in 2009	100 years
Original Treatment Facility Building: Fair, dates to late 1800s	10 years
Generator: Excellent, replaced in 2009	20 years

Main Treatment Building - Required or Scheduled Rehabilitation/Replacement:

Time Interval/Year	Description	Opinion of Probable Construction Cost
5-year/2020	Replace Roof and Windows on Original Treatment Building	$40,000
	Replace membranes (15-year life span); tank improvements	$310,000*
	Replace Static Mixers	$5,000
10-year/2029	Inspect and Service Generator, Pumps, & Other Components	$15,000
10-year/2029	Replace Permeate Pumps	$25,000
10-year/2029	Replace Blowers	$50,000
15-year/2034	Perform Inspection of Treatment Facility	$5,000
20-year/2039	Inspect and Service Generator, Pumps, & Other Components	$15,000

* This amount is funded through fiscal year 2020 bonding

4.3 Storage Facilities

The JWD system has two storage facilities for finished water, both 1.0 MG steel standpipes located on Howland Avenue in the southern part of Town. Both standpipes have an overflow elevation of 204 feet mean sea level (MSL) and the JWD system operates on a single pressure zone.

Howland Avenue Standpipes

4.3.1 Howland Avenue Standpipe #1

The original Howland Avenue standpipe was constructed in 1974 and is approximately 37 years old. It is a welded steel tank with 13 shell rings, a self-supporting roof, and concrete ring wall foundation. It has a nominal capacity of 1.0 million gallons and is 41 feet in diameter and 101 feet in height to the overflow. The usable storage volume is approximately 700,000 gallons.

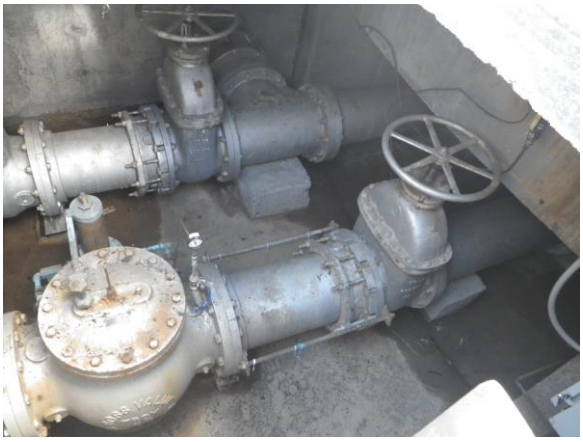
Howland Avenue Standpipe #1

Recent Rehabilitation/Repairs: The tank interior was sandblasted to bare metal, spot primed, and repainted in 1998. The exterior of the tank was also water blasted and encapsulated with two coatings at this time as well. The JWD made repairs to the overflow flap valve, rendering it operable, and also replaced the tank vault vent screen with No. 24 mesh circa 2000.

The tank was most recently inspected and cleaned in June 2013. The inspection report recommended recoating the entire interior and exterior within 5 years and to repair or replace the anchor bolt nuts. Chain link fence was installed around the site in 2007 when the new standpipe was constructed, which appears to be in good condition.

Component General Condition	***Life Expectancy***
Structure: Good, per most recent inspection report	25-30 years
Protective Coatings: fair, recommended to be repainted	1 year
Concrete Foundation: Very Good, per most recent inspection report	25-30 years
Altitude Valve/Piping/Vault: Very Good, per most recent inspection report	25-30 years

Standpipe #1 Anchor Bolts



Standpipe #1 Altitude Valve

Howland Avenue Standpipe #1 - Required or Scheduled Rehabilitation/Replacement:

Time Interval/Year	**Description**	**Opinion of Probable Construction Cost**
5-year/2019	Perform inspection	$5,000
5-year/2020	Welding repairs/refurbish interior & exterior protective coatings	$400,000*
5-year/2024	Perform tank inspection	$5,000
10-year/2029	Perform tank inspection	$6,000
15-year/2034	Perform tank inspection	$7,000
20-year/2039	Perform tank inspection	$8,000

* This amount is funded through fiscal year 2020 bonding

4.3.2 Howland Avenue Standpipe #2

The new Howland Avenue standpipe was constructed in 2007 to provide redundant water supply in the JWD system. The new standpipe was constructed adjacent to the original Howland Avenue standpipe. It also is a 1.0-million-gallon standpipe with a diameter of 41 feet and height to overflow of 101 feet. The usable storage volume is approximately 700,000 gallons.

Recent Rehabilitation/Repairs: The new standpipe is approximately five years old and is in excellent condition. The tank was recently inspected in June 2013 and no deficiencies were identified

Standpipe #2

Component General Condition	***Life Expectancy***
Structure: Excellent (tank constructed in 2007)	30-40 years
Protective Coatings: Excellent (tank constructed in 2007)	10 years
Concrete Foundation: Excellent (tank constructed in 2007)	30-40 years
Altitude Valve/Piping/Vault: Excellent (tank constructed in 2007)	30-40 years

Howland Avenue Standpipe #2 - Required or Scheduled Rehabilitation/Replacement:

Time Interval/Year	Description	Opinion of Probable Construction Cost
5-year/2023	Perform tank inspection	$5,000
10-year/2028	Perform tank inspection	$6,000
10-year/2029	Welding repairs/refurbish interior & exterior protective coatings	$500,000
15-year/2034	Perform tank inspection	$7,000
20-year/2039	Perform tank inspection	$8,000

4.3.3 Howland Avenue Standpipe Transfer Pump

In 2007 a new pump was installed to allow the transfer of water between standpipes. It has not been used yet. It should be exercised regularly.

Tank Transfer Pump/Vault

Recent Rehabilitation/Repairs: A new compressor was installed in 2019

Component General Condition	***Life Expectancy***
Transfer Pump: Good (installed in 2007)	10 years

Howland Avenue Standpipe Transfer Pump - Required or Scheduled Rehabilitation/Replacement:

Time Interval/Year	Description	Opinion of Probable Construction Cost
10-year/2029	Pump Replacement	$5,000
10-year/2029	Compressor Replacement	$5,000

4.4 Pump Stations

The JWD system has one finished water pump station consisting of a high service pump station located in the clearwell of the former treatment plant. The high service pump station was constructed in 1990 and contains two alternating 350-gpm pumps.

Recent Rehabilitation/Repairs: The pump motors were replaced in 1998. Electrical service to the pump station was replaced in 2009 when the new treatment plant was constructed. Pumps and control valves are serviced on a yearly basis.

Component General Condition	*Life Expectancy*
Structure: Good, constructed in 1990	30 years
Mechanical Systems: Average, pump motors replaced in 1998	10 years
Electrical: Excellent, electrical service replaced in 2009	30 years
Instrumentation Control Equipment: Good, per JWD personnel	20+ years

Pump Station - Required or Scheduled Rehabilitation/Replacement:

Time Interval/Year	Description	Opinion of Probable Construction Cost
5-year/2022	Inspect and service pumps	$5,000
10-year/2027	Replace pumps as required	$50,000
15-year/2032	Inspect and service pumps	$5,000
20-year/2037	Inspect and service pumps	$5,000

4.5 Transmission and Distribution System Components

4.5.1 Water Mains

The JWD water distribution system consists of approximately 21 miles of water main. Five of these water mains are classified as transmission mains, as follows:

DESCRIPTION	INSTALLATION DATE	SIZE (in.)	MATERIAL	LENGTH (feet)	GENERAL CONDITION
North Pond to South Pond	1980	10	PVC	7,500	Good
South Pond to Treatment Plant	1975	10	AC	2,600	Good
Weeden Lane	1980	10	PVC	2,250	Good
East Shore Road	1991	10	PVC	3,000	Good
Howland Avenue	2005	12	DI	2,500	Excellent

Note: PVC - polyvinyl chloride; AC - asbestos cement; DI - ductile iron

The remainder of the JWD system is comprised of distribution mains which are a combination of cast iron (CI), polyvinyl chloride (PVC), cement-lined ductile iron (DI), and asbestos cement (AC) pipe. Distribution pipe sizes are either 6-inch or 8-inch in diameter. The majority of these pipelines are less than 25 years in age. New and replacement mains consist predominantly of PVC pipe. It is estimated that the useful life of PVC and DI pipe materials is 75 years or better, while it is 50-75 years for AC pipe. The useful life of CI pipe is estimated to be 50 years or better but can be extended significantly by employing a program of cleaning and lining to remove tuberculation and provide a smooth cement lined, corrosion-free surface. Overall, transmission and distribution piping in the JWD system is generally in good physical condition.

Fay Spofford and Thorndike, Inc. (FST) developed a report entitled "Water Distribution System Improvements to Meet Deficiencies Report, February 2003", which detailed replacement strategies and costs associated with system wide improvements governed by fire flow and storage analysis. The recommended improvements consisted of installation of new pipe and cleaning and lining of existing pipes to improve system wide pressure and satisfy both fire flow and storage demands. The total cost of these improvements was found to be on the order of $6.75 million. A listing of the recommended improvements, adapted from FST's 2003 report, is provided in Appendix C.

The JWD has continued replacing sections of water main identified as part of a 20-year major distribution upgrade program. The program is being implemented to correct fire flow deficiencies, replace aging components, and improve transmission capacities. In each case, relatively small diameter pipes were replaced with new 8-inch or 12-inch ductile iron or PVC pipe. Major recent water main upgrades performed by the JWD are as follows:

- West Street (2011): Installation of approximately 300 feet of new 8-inch PVC pipe to eliminate a dead-end pipe and improve water quality.
- Green Lane and High Street (2012): Replacement of approximately 2,500 feet of 6-inch C.I. with new 12-inch PVC pipe to improve water quality and fire flow.
- Northern section of Ocean Ave: 300feet
- Narragansett Ave (2015): Installation of approximately 1,500 feet of new 12-inch DI generally from Southwest Avenue to Green Lane to replace smaller diameter water main.
- Racquet Road (2016): Replacement of 1000 lf of 2" pipe with 6" PVC
- West Bay View Drive (2016): Extension of 500 lf
- Hull Cove Farm Road (2016): Replacement of 3000 lf of 4" pipe with 6" PVC
- Conanicus Ave from Narragansett Ave. to Union Street (2018): Replacement of 300 lf of 6" pipe with 8" PVC

Water Mains - Required or Scheduled Rehabilitation/Replacement:

Time Interval/Year	Description	Opinion of Probable Construction Cost
5-year/2021	Conanicus Ave from Union to Lincoln – 400 feet 8"	$60,000
5-year/2022	Fowler and Douglas – 800 feet of 8"	$120,000
5-year/2023	Narragansett SW Ave to end of West Ferry - 2000 feet 12" and 1000 feet 8", done by 2023 *	$750,000
5-year/2023	Crossing at Great Creek – 1,500 feet 8 and 12", by HDD *	$500,000
10-year/2025	North Road from Narragansett Ave to Arnold Ave – 2000 feet	$400,000

* These projects are planned to meet the schedule for RIDOT road/bridge improvements.

4.5.2 Hydrants

The JWD owns, operates, and maintains a total of approximately 175 hydrants, the majority being Mathews, Kennedy, or Mueller. The JWD has standardized on the Kennedy fire hydrant equipped with a 5 ¼" valve opening, for all new and replacement hydrants.

The JWD embarked on a hydrant replacement program in 1999, replacing upwards of 50 hydrants in the system. Hydrants that have not been replaced are those that do not have an inline valve on the hydrant branch, making isolation of the hydrant from the system not possible. Hydrants have historically been replaced when the water main to which they are connected is replaced, which will likely continue to be the case for anticipated future water main replacement projects. Costs associated with hydrant replacement are therefore combined with anticipated water main replacement costs.

4.5.3 Valves

The JWD maintains between 190 and 200 gate valves in the distribution system, excluding hydrant valves. In general, they are of similar age as the pipe section or hydrant assembly on which they were installed. Since 1995, the JWD has standardized on resilient seat, epoxy coated valves, which are widely used in water systems today. Generally, the useful life of a valve, based on interviews and inquiries with older water systems which maintain infrastructure over 100 years in age, is expected to be 75 years, or longer.

New valves will continue to be installed as older water mains are replaced in the system. Costs associated with valve replacement are therefore combined with anticipated water main replacement costs.

4.5.4 Customer Meters

The JWD provides for 100 percent distribution metering, as required by the State Guide Plan Element No. 721 for public water systems. All meters are owned, installed, maintained, and removed by the JWD as required. Between 1996 and the end of 2000, each of the approximately 1,400 distribution meters in the JWD system were replaced with ARB style remote meters. This has enabled JWD staff to complete meter reading more efficiently while eliminating the risk of human error.

JWD is investigating the use of cellular water meters to allow real time monitoring of water use. Although a system wide upgrade is not planned due to cost (about $250,000), JWD may allow customers to upgrade individual meters and as needed for replacement.

4.5.5 Customer Services

The JWD owns and maintains the portion of the water service that lies within the public right-of-way, generally from the corporation stop at the supply main to a curb stop valve located in the vicinity of the customer's property line. From the point of the curb stop valve to the internal plumbing system, the

customer is responsible for ownership and maintenance of the line. This portion of the service is referred to as the customer service line.

There are approximately 1,528 customer service lines within the JWD's service area. The JWD has standardized on Type K copper tubing, having a minimum diameter of one (1) inch. Underground soldered joints are not permitted.

4.6 Administrative Components

4.6.1 Vehicles

The JWD owns, operates, and maintains a fleet of two (2) vehicles for use in normal day-to-day system operation and maintenance. The vehicles used by the JWD, and their current conditions, are as follows:

- 2010 Ford F550 - fair
- 2016 Ford F150 - good

The 2010 F550 will likely require replacement soon, anticipated for the upcoming 5-year planning period of this CWIRP. The replacement cost for this vehicle is estimated to be $60,000.

4.6.2 Computer Equipment/Billing Software

The JWD employs an automated utility billing and collection system, whereby bills and other reports, useful to the utility, are computer generated. The system allows for the entry and storage of information necessary to produce tax bills and various detailed reports. The costs for upgrades to computing equipment are taken out of the Town's Public Works budget and not the JWD operating budget. No upgrades or modifications to the billing software are anticipated at this time.

4.6.3 Telemetry System

The JWD utilizes a telemetry system to control the operation of its water treatment plant, the well pumps, the finished water pump station, and the storage tanks. The new water treatment plant also has Supervisory Control and Data Acquisitions (SCADA) controls. New SCADA has been installed to connect the Howland Tanks and Pretreatment Facility to the Treatment Plant.

SECTION 5 - COMPLIANCE WITH WATER QUALITY REGULATIONS & PLANNING DOCUMENTS

The JWD is cognizant of the requirements of the Safe Drinking Water Act (SDWA) and maintains a constant effort to ensure compliance. The construction of an entirely new state-of-the-art treatment facility in 2009, a new 1.0 million gallon standpipe in 2007, and the systematic replacement of thousands of feet of water main starting in 2005 are significant developments that help ensure that the system is compliant with these Regulations.

The Rhode Island Department of Health (RIDOH) is the primary agency for enforcing these Regulations. The JWD is designated by the RIDOH as a community potable water system. As such, it is required to sample water from the distribution system that is representative of that which consumers drink to assure conformance with these regulations. For the JWD, this most notably includes the Total Coliform Rule whereby the JWD is required to collect samples from the distribution system to verify the presence/absence of total coliform bacteria. The JWD also performs sampling for lead and copper at select individual consumer taps in accordance with the provisions of the Lead and Copper Rule.

The most recent Consumer Confidence Report, for 2018, indicates that there were no contaminant exceedances identified.

This Plan is intended to be consistent with the goals and policies outlined in the *Water Supply System Management Plan*, dated November 2006 and last amended in 2017, and the *Town of Jamestown Comprehensive Community Plan*, dated June 2014. Conversely, it shall be incumbent upon the Jamestown Water District to promote consistency between the contents of this plan and the policies of the Water Supply System Management Plan, and as appropriate, the Comprehensive Community Plan.

On September 21, 2016, JWD was issued a violation from the RIDOH as a result of a sample collected at the treatment plant on April 17, 2016 which measured chlorine dioxide at 0.95 mg/L and a sample collected on May 1, 2016 which measured chlorine dioxide at 1.23 mg/L. These samples exceeded the standard of 0.8 mg/L. It was later determined that a mechanical problem with the chlorine dioxide generator caused the exceedances. There have been no exceedances since it was repaired on May 5, 2016. A notice was mailed to all JWD customers on September 23, 2016.

In response to this violation, JWD installed 1000 feet of fiber between the pre-treatment building and the treatment plant to allow for real-time monitoring of chlorine residual in the raw water feed to the plant. The system is configured such that if the chlorine residuals is within 50% of the MCL, the chlorine pumps will shut off and an alert will be sent to the operator through the alarm notification system so that the issue can be addressed in a timely manner.

SECTION 6 - INFRASTRUCTURE REPLACEMENT PLAN

The purpose of this Plan has been to identify water system infrastructure components within the JWD water supply system that require rehabilitation and replacement in accordance with the requirements of the Rules and Regulations for Clean Water Infrastructure Plans. It is the obligation of the JWD that in combination with these infrastructure improvements and general system maintenance, operation, and upkeep, that the water system operates and provides a safe and reliable water supply for an indefinite period of time.

Table 6-1 summarizes the 5-year infrastructure improvement costs. This includes four major projects including rebuilding the earthen berm at South Pond, replacing the membranes at the Treatment Plant, refurbishing Howland Standpipe #1, and nearly $1.5 million in water main replacement work. The total cost of these projects has been estimated to be **$2,934,000**, or $587,000 per year over the 5-year period.

Table 6-2 summarizes the 5- to 20-year infrastructure improvement costs. This includes the rehabilitation of Howland Standpipe #2, routine inspections and equipment replacement. The total cost of all projects anticipated during the 5 to 20-year period has been estimated to be **$1,423,000**, or $95,000 over the 15-year period.

Table 6-1
JAMESTOWN WATER DISTRICT
Infrastructure Improvements
Five-Year Plan (2019 – 2024)

Time Interval/Year	Project Description	Opinion of Probable Construction Cost
North Pond		
2019	Flatten dam embankment, extend toe drain, provide upstream slope protection	$50,000
	Spillway repairs;	$10,000
	Intake Repairs	$5,000
2024	Inspect intake structure/spillway	$3,500
South Pond		
Yearly	Maintain vegetation along entire dam	$50,000
2019	Rebuild earthen berm, improvements to spillway and dike	$500,000
2024	Inspect dam, dike, intake structure and spillway	$3,500
JR-1		
2022	Well inspection/redevelopment as required	$15,000
2022	Construct well building	$10,000
JR-3		
2022	Well inspection/redevelopment as required	$15,000
Pretreatment Facility		
2019	Replace asphalt shingle roof and fascia boards	$2,000
	Inspect and repoint brick where needed, paint doors and trim	$2,000
2024	Perform Facility Inspection, minor repairs	$3,000
Main Treatment Building		
2020	Replace Roof and Windows on Original Treatment Building	$40,000
	Replace membranes (15-year life span); tank improvements	$310,000
	Replace Static Mixers	$5,000

Table 6-1 (cont'd)
JAMESTOWN WATER DISTRICT
Infrastructure Improvements
Five-Year Plan (2019 – 2024)

Howland Standpipe #1		
2019	Perform inspection	$5,000
2020	Welding repairs/refurbish interior & exterior protective coatings	$400,000
2024	Perform tank inspection	$5,000
Howland Standpipe #2		
2023	Perform tank inspection	$5,000
Pump Station		
2022	Inspect and service pumps	$5,000
Water Mains		
2021	Conanicus Ave from Union to Lincoln – 400 feet 8"	$60,000
2022	Fowler and Douglas – 800 feet of 8"	$120,000
2023	Narragansett SW Ave to end of West Ferry - 2000 feet 12" and 1000 feet 8", done by 2023	$750,000
2023	Crossing at Great Creek – 1,500 feet 8 and 12", by HDD	$500,000
Vehicles		
2023	F550	$60,000
TOTAL 5 YEAR PLAN		**$2,934,000**

* Information presented in this table is only a guideline. As such, it is important to note that it does not represent the JWD Infrastructure Replacement budget.

Table 6-2
JAMESTOWN WATER DISTRICT
Infrastructure Improvements
5-20 Year Plan (2025 – 2040)

Time Interval/Year	Description	Opinion of Probable Construction Cost
North Pond		
10-year/2029	Inspect intake structure/spillway	$3,500
10-year/2029	Replace Pond aeration building and blower motor	$15,000
15-year/2034	Inspect intake structure/spillway	$4,000
20-year/2039	Inspect intake structure/spillway	$4,500
South Pond		
Yearly	Maintain vegetation along entire dam	$150,000
10-year/2029	Inspect dam, dike, intake structure and spillway	$3,500
15-year/2034	Inspect dam, dike, intake structure and spillway	$4,000
20-year/2039	Inspect dam, dike, intake structure and spillway	$4,500
JR-1		
10-year/2029	Perform well inspection, test pump	$5,000
	Replace mechanical/electrical equipment, as required	$15,000
15-year/2034	Well inspection/redevelopment as required	$15,000
20-year/2039	Perform well inspection, test pump	$5,000
JR-3		
10-year/2029	Perform well inspection, test pump	$5,000
	Replace pump and mechanical/electrical equipment, as required	$25,000
15-year/2034	Well inspection/redevelopment as required	$15,000
20-year/2039	Perform well inspection, test pump	$5,000
Pretreatment Facility		
10-year/2029	Perform Facility Inspection, minor repairs	$3,000
	Replace Chlorine Dioxide Generator	$10,000
15-year/2034	Perform Facility Inspection, minor repairs	$4,000
20-year/2039	Perform Facility Inspection, minor repairs	$5,000

Table 6-2 (cont'd)
JAMESTOWN WATER DISTRICT
Infrastructure Improvements
5-20 Year Plan (2025 – 2040)

Main Treatment Building		
10-year/2029	Inspect and Service Generator, Pumps, & Other Components	$15,000
10-year/2029	Replace Permeate Pumps	$25,000
10-year/2029	Replace Blowers	$50,000
15-year/2034	Perform Inspection of Treatment Facility	$5,000
20-year/2039	Inspect and Service Generator, Pumps, & Other Components	$15,000
Howland Standpipe #1		
10-year/2029	Perform tank inspection	$6,000
15-year/2034	Perform tank inspection	$7,000
20-year/2039	Perform tank inspection	$8,000
Howland Standpipe #2		
10-year/2028	Perform tank inspection	$6,000
10-year/2029	Welding repairs/refurbish interior & exterior protective coatings	$500,000
15-year/2034	Perform tank inspection	$7,000
20-year/2039	Perform tank inspection	$8,000
Howland Ave. Pumps		
10-year/2029	Pump Replacement	$5,000
10-year/2029	Compressor Replacement	$5,000
Pump Station		
10-year/2027	Replace pumps as required	$50,000
15-year/2032	Inspect and service pumps	$5,000
20-year/2037	Inspect and service pumps	$5,000
Water Mains		
10-year/2025	North Road from Narragansett Ave to Arnold Ave – 2000 feet	$400,000
	TOTAL 5-20 YEAR PLAN	**$1,423,000**

* Information presented in this table is only a guideline. As such, it is important to note that it does not represent the JWD Infrastructure Replacement budget.

SECTION 7 - FUNDING AND CASH FLOW ANALYSIS

7.1 Operation

The JWD operates as a self-supporting, Enterprise Fund Agency within the municipal corporation of the Town of Jamestown. The Town Council, which sits as the Board of Water and Sewer Commissioners (Board), is the governing body for the Town's water system. The Board creates and administers public water policies through the Town Administrator and Public Works Director, who is the head of the Water Division. Together, the Public Works Department, and Water Division personnel are responsible for the full implementation and operation of the public water supply. The Water Division, under the direction of the Public Works Director, is responsible for the maintenance and operation of all facilities related to water supply, treatment, and distribution.

The Board practices full-cost accounting using the accrual method. As such, all operations are financed through user fees in the form of water service. Charges are appropriately adjusted by the Board to reflect the cost of customer service and to ensure an adequate revenue stream to fund operations, debt service, and capital improvements.

7.2 Funding Sources

Section 6-6(a) of the Clean Water Infrastructure Act and Section 6.2 of the RIDOH Rules and Regulations for Clean Water Infrastructure Plans require that the "cost of the program…shall be paid by the water users at a rate directly proportionate to the users' water consumption." As such, the JWD has established a "Capital Fund", which is funded through a portion of water rate charges collected by the JWD's customer base. The Capital Fund serves as the JWD's Infrastructure Replacement Fund (IRF) and is used to fund infrastructure repair, replacement, and rehabilitation efforts in the water system, such as those identified in this Plan.

The Capital Fund is the JWD's preferred revenue source for infrastructure projects, and the JWD looks to avoid borrowing whenever possible. However, additional sources are available to fund large-scale infrastructure projects, as summarized in the following sections.

7.2.1 General Obligation Bonds

The JWD can obtain financing through General Obligation Bonds issued by the Town. However, the Town's Finance Department and Town Council must evaluate the desire to issue General Obligation debt for future water projects.

7.2.2 Rhode Island Water Resources Board

The Rhode Island Water Resources Board (RIWRB) has grant and loan programs available for implementing various water system projects. Under this program, the RIWRB finances and builds the improvements to the requirements of the water system and leases the improvements to the system charging enough to pay back the bonded indebtedness for the project.

7.2.3 Rhode Island Clean Water Finance Agency

The State of Rhode Island passed legislation in 1993 creating the Safe Drinking Water Revolving Fund under the auspices of the Agency and the Department of Health. This program established a subsidized loan program for eligible publicly and privately organized drinking water supplies in the State of Rhode Island. In order to determine which projects are to be funded, the RIDOH annually prepares a Priority Project Listing. This listing forms the basis for appropriation of funds.

7.2.4 Rural Utilities Service (RUS)

The Rural Utilities Service (RUS), an agency created in 1994 under the auspices of the U.S. Department of Agriculture, administers a water and wastewater loan and grant program to various eligible rural communities and other eligible participants. The RUS replaced the Rural Development Administration and the Farmers Home Administration.

7.3 Financial Analysis

Previous sections of this Plan provided an analysis and discussion of system infrastructure components related to condition, remaining useful life and anticipated replacement and/or rehabilitative costs. This specifically included those components for which a remaining useful life of 20 years or less was identified. In general, the infrastructure rehabilitation or replacement of any particular component has been prioritized by the time interval based on its expected useful life.

A discussion was also provided for those improvements categorized as general operations and maintenance expenses of the water system. These, by definition of the Regulations, do not qualify for

funding under the IRF, but rather must be funded through the general operating budget. This is consistent with current practices of the JWD.

The Rules and Regulations for Clean Water Infrastructure Plans require that a financial element be addressed as a method to fund identified infrastructure improvements. The purpose of this financial analysis is to evaluate the financial impact of the identified infrastructure improvements on the water system and to identify the appropriate funding source(s). The IRF qualified costs are presented in Tables 6-1 and 6-2 for the 5- and 20-year planning horizons, respectively.

Table 6-1 provided a detailed breakdown for the 5-year period (2019-2024) that totals $2,934,000 or an annualized cost of approximately $587,000. However, since the JWD has $1,200,000 of bonding in place for three of these projects, the net 5-year cost is $1,734,000. Taking this bonding into account, this equates to approximately $227 annually per service connection for this 5-year period. These are the dollar values that the JWD must endeavor to collect through user fees in order to fund the necessary infrastructure rehabilitation and meet the requirements of the IRF.

Table 6-2 provided a summary breakdown for the following 15-year period (2025-2040) that totals $1,423,000 or an annualized cost of approximately $95,000. This equates to approximately $62 annually per service connection for this 15-year period. These are the dollar values that the JWD must endeavor to collect through user fees in order to fund the necessary infrastructure rehabilitation and meet the requirements of the IRF.

Currently, the JWD maintains a method of customer rate charges based on full cost of service allocation accounting. In other words, the JWD seeks to recover all the costs associated with administration, operation, and maintenance of the system through customer rate charges. This type of system establishes uniform rates for customers and maintains individual customer bills based on the actual volume of water used. In addition, all customers pay an annual service charge based on meter size to cover the cost of meter maintenance, administration, and billing. The customer bill is comprised of two components, a retail water use charge based upon volume, and an annual service charge.

The JWD is cognizant of the need for proper planning and fiscal management for pending water system infrastructure improvements. As such, a portion of the revenue collected from customer rate charges is put into a “Capital Fund”, used to fund infrastructure projects. This is the JWD’s preferred funding mechanism for infrastructure replacement projects. Other funding sources, such as borrowing, are not as

desirable to the JWD and will be used only when necessary for large-scale projects. No large-scale infrastructure projects, on the scale of the new treatment facility and new standpipe, are anticipated at this time.

The JWD intends to review this Plan on an annual basis and to make any necessary adjustments to ensure compliance with the Infrastructure Replacement Regulations.

REFERENCES

1. *Water Supply System Management Plan for the Town of Jamestown*, submitted May 2017, prepared by Pare Corporation.

2. *Jamestown Rhode Island 2014 Comprehensive Community Plan*, Adopted by the Jamestown Town Council/June 18, 2014.

3. *Water Distribution System Improvements to Meet Fire Flow Deficiencies*, dated February 2003, prepared by Fay, Spofford, & Thorndike, Inc.

4. *Clean Water Infrastructure Plan Jamestown Water District*, dated July 2012, prepared by Pare Corporation.

5. *Jamestown Reservoir Dam – Visual Inspection/Evaluation Report*, date of inspection August 7, 2012, prepared by Pare Corporation

6. *Jamestown Lower Reservoir Dam – Visual Inspection/Evaluation Report*, date of inspection August 7, 2012, prepared by Pare Corporation

APPENDIX A

PHOTOGRAPHS

NORTH POND

INTAKE AREA

LOOKING NORTH FROM DAM

LOOKING WEST ALONG TOP OF DAM

LOOKING EAST ALONG TOP OF DAM

AREA OF NOTED SEEPAGE

LOOKING EAST ALONG TOP OF DAM NEAR WELL JR-1

SPILLWAY

SPILLWAY ABUTMENT WALL

BLOWER MOTOR

BLOWER BUILDING

SOUTH POND

INTAKE STRUCTURE

CONNECTION TO PIPELINE TO NORTH POND

UPSTREAM SIDE OF SPILLWAY

DOWNSTREAM AT SPILLWAY

SOUTHEAST CORNER OF DAM – LOOKING WEST

SOUTHWEST CORNER OF DIKE – LOOKING NORTH

PRETREATMENT BUILDING AT SOUTH POND

LOOKING NORTH

CHLORINE INJECTION

CHLORINE TANKS

WELL JR-1

WELL HEAD

CONTROL PANEL

TREATMENT PLANT

CHEMICAL MIXING

`

CHEMICAL MIXING – OLD TREATMENT BUILDING

RAW WATER ENTERING BUILDING

COAGULATION TANKS

MEMBRANE FILTER

TREATED WATER

`

GENERATOR

CLEARWELL

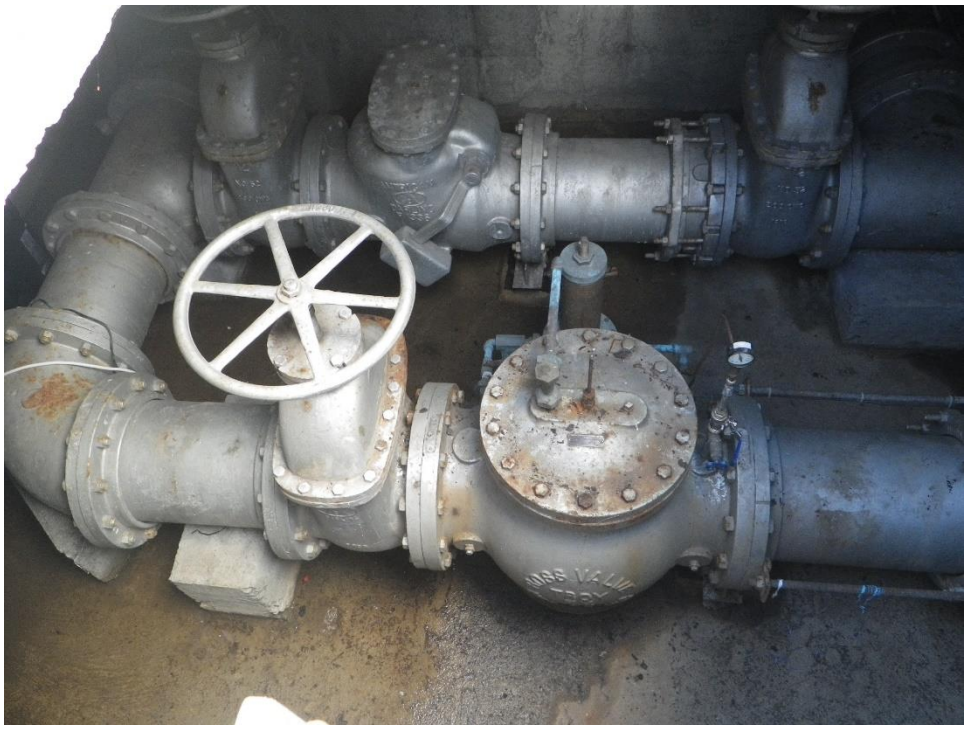
SETTLING TANKS

RAW WATER WET WELL

HOWLAND STANDPIPES

STANDPIPE #1

STANDPIPE #2



ALTITUDE VALVE

STANDPIPE TRANSFER PUMP

APPENDIX B

RECOMMENDED IMPROVEMENTS IN JWD SYSTEM

adapted from *Fay, Spofford & Thorndike Inc. "Water Distribution System Improvements to Meet Deficiencies Report", dated February 2003*

TABLE 3
TOWN OF JAMESTOWN, RI
WATER SYSTEM PRIORITIZED IMPROVEMENTS

Imp. Priority	Priority Sub-Number	Improvement Type	Street	From	To	Size in	Length ft	Unit Cost	Estimated Cost	Estimated Cost w/ Contingency	General Water System Benefit(s)
1	1A	New Pipe	Howland Avenue	High Street	Narragansett Avenue	12"	1,680	$90.00	$151,200	$196,560	Eliminate 6" bottleneck between supply & tank.
	1B	New Pipe	Narragansett Avenue	Howland Avenue	North Main Road	12"	760	$90.00	$68,400	$88,920	Increase general fire flow to many locations.
	1C	New Pipe	North Main Road	Narragansett Avenue	WTP	12"	5,000	$90.00	$450,000	$585,000	Increase flow that can't be delivered from tank.
	1D	New Pipe	North Main Road	WTP	Weeden Lane	10"	1,720	$87.50	$150,500	$195,650	Increase flow North of WTP. Strengthen Northern Loop.
									$820,100	$1,066,130	
2	2A	New Pipe	Narragansett Avenue	Howland Avenue	Canonicus Avenue	8"	1,385	$85.00	$117,725	$153,043	Increase fire flows where requirements are high.
	2B	New Pipe	Canonicus Avenue	Park Lane	Narragansett Avenue	8"	600	$85.00	$51,000	$66,300	Looping of the system.
	2C	New Pipe	Park Lane	Canonicus Avenue	Canonicus Avenue	8"	865	$85.00	$73,525	$95,583	
	2D	New Pipe	Canonicus Avenue	Mt. Hope Avenue	Bayview Drive	10"	1,620	$87.50	$141,750	$184,275	
	2E	New Pipe	Canonicus Avenue	Mt. Hope Avenue	10" PVC Water Main	10"	160	$87.50	$14,000	$18,200	
									$398,000	$517,400	
3	3A	Clean & Line	Arnold Avenue	Melrose Avenue	North Main Road	8"	1,800	$55.00	$99,000	$128,700	Increase fire flow to the school.
	3B	New Pipe	Melrose Avenue	Watson Avenue	Narragansett Avenue	8"	730	$85.00	$62,050	$80,665	
	3C	New Pipe	Narragansett Avenue	North Main Road	Melrose Avenue	8"	1,780	$85.00	$151,300	$196,690	
	3D	Clean & Line	Lawn Avenue	Arnold Avenue	Watson Avenue	8"	1,350	$55.00	$74,250	$96,525	
	3E	New Pipe	Lawn Avenue	Watson Avenue	Narragansett Avenue	8"	730	$85.00	$62,050	$80,665	
									$448,650	$583,245	
4	4A	New Pipe	Southwest Avenue	Narragansett Avenue	Hamilton Avenue	8"	3,240	$85.00	$275,400	$358,020	Improve system looping.
	4B	New Pipe	Howland Avenue	Tank	Hamilton Avenue	12"	580	$90.00	$52,200	$67,860	Reinforce the system South of Narragansett Ave.
	4C	New Pipe	Cole Street	Existing 6" Water Main	Hamilton Avenue	8"	580	$85.00	$49,300	$64,090	Increase general fire flow to many locations.
	4D	Inspect	Check for closed valve or obstruction - Int. of Hamilton Ave, Southwest Ave & Beavertail Rd						$10,000	$10,000	
									$376,900	$489,970	
5	5A	New Pipe	Bryer Avenue	Longfellow Road	Canonicus Avenue	8"	1,155	$85.00	$98,175	$127,628	Increase general fire flow to many locations.
	5B	New Pipe	Longfellow Road	North Main Road	Bryer Avenue	8"	1,960	$85.00	$166,600	$216,580	Improve system looping.
	5C	New Pipe	Standish Road	Longfellow Road	Coronado Street	8"	1,540	$85.00	$130,900	$170,170	Reinforce the North area of the system.
	5D	New Pipe	Coronado Street	Standish Road	Narragansett Avenue	8"	360	$85.00	$30,600	$39,780	
	5E	New Pipe	Plymouth Road	Valley Street	Shady Lane	8"	100	$85.00	$8,500	$11,050	
									$434,775	$565,208	
6	6A	New Pipe	Bayview Drive	Canonicus Avenue	Mt. Hope Avenue	8"	2,160	$85.00	$183,600	$238,680	Reinforce Northeast area of system.
	6B	New Pipe	Bayview Drive	Mt. Hope Avenue	Sewage Plant	10"	1,440	$87.50	$126,000	$163,800	Increase general fire flow to many locations including the
	6C	New Pipe	Mt. Hope Avenue	Canonicus Avenue	Bayview Drive	8"	980	$85.00	$83,300	$108,290	Sewage TP.
									$392,900	$510,770	
7	7A	New Pipe	Hamilton Avenue	Howland Avenue	Walcott Avenue	12"	1,570	$90.00	$141,300	$183,690	Reinforce Southeast area of system.
	7B	New Pipe	Walcott Avenue	Hamilton Avenue	Racquet Road	12"	1,440	$90.00	$129,600	$168,480	Increase general fire flow to many locations.
	7C	New Pipe	Walcott Avenue	Racquet Road	Fort Wetherill Road	8"	1,360	$85.00	$115,600	$150,280	Improve system looping.
	7D	New Pipe	Fort Wetherill Road	Walcott Avenue	Newport Street	8"	720	$85.00	$61,200	$79,560	
	7E	New Pipe	Newport Street	Fort Wetherill Road	Dumpling Drive	8"	1,745	$85.00	$148,325	$192,823	
	7F	New Pipe	Dumpling Drive	Newport Street	Racquet Road	8"	1,120	$85.00	$95,200	$123,760	
	7G	New Pipe	Racquet Road	Dumpling Drive	Walcott Avenue	10"	1,800	$87.50	$157,500	$204,750	
									$848,725	$1,103,343	
8	8A	New Pipe	Walcott Avenue	High Street	Hamilton Avenue	8"	1,100	$85.00	$93,500	$121,550	Reinforce Eastern area of system.
	8B	New Pipe	High Street	Walcott Avenue	Baldwin Court	8"	450	$85.00	$38,250	$49,725	Improve system looping.
	8C	New Pipe	High Street	Green Lane	Howland Avenue	8"	760	$85.00	$64,600	$83,980	Increase general fire flows to many locations.
	8D	New Pipe	Canonicus Avenue	Narragansett Avenue	High Street	8"	2,040	$85.00	$173,400	$225,420	
	8E	New Pipe	Friendship Street	End	Canonicus Avenue	4"	100	$70.00	$7,000	$9,100	
									$376,750	$489,775	

TABLE 3
TOWN OF JAMESTOWN, RI
WATER SYSTEM PRIORITIZED IMPROVEMENTS

Imp. Priority	Priority Sub-Number	Improvement Type	Street	From	To	Size in	Length ft	Unit Cost	Estimated Cost	Estimated Cost w/ Contingency	General Water System Benefit(s)
9	9A	New Pipe	Spring Street	Prospect Place	Southwest Avenue	8"	200	$85.00	$17,000	$22,100	Improve system looping.
	9B	New Pipe	Prospect Place	Westwood Road	Spring Street	8"	1,680	$85.00	$142,800	$185,640	Increase general fire flow to many locations.
	9C	New Pipe	Westwood Road	Narragansett Avenue	Prospect Place	8"	1,080	$85.00	$91,800	$119,340	
	9D	New Pipe	Avenue B	Watson Avenue	Narragansett Avenue	8"	1,440	$85.00	$122,400	$159,120	
	9E	New Pipe	Watson Avenue	Melrose Avenue	Avenue B	8"	930	$85.00	$79,050	$102,765	
									$453,050	$588,965	
10	10A	New Pipe	Highland Drive	Hamilton Avenue	Juniper Circle	8"	800	$85.00	$68,000	$88,400	
	10B	New Pipe	Beavertail Road	Battery Lane	Bonnet View Drive	10"	3,920	$87.50	$343,000	$445,900	Increase general fire flow to many locations.
									$411,000	$534,300	
11	11A	New Pipe	Battery Lane	Beavertail Road	End	8"	1,600	$85.00	$136,000	$176,800	Reinforce the system.
	11B	Clean & Line	Fort Wetherill Road	Dumpling Drive	End	6"	1,600	$50.00	$80,000	$104,000	Improve fire flow
									$216,000	$280,800	
									Total Est. Cost	Total Est. Cost w/ Cont.	
									$5,176,850	$6,729,905	

Rehabilitation of
Remaining Unlined Water Pipe

Pipe Size in	Pipe Length ft	Clean & Line Pipe Est. Cost	Replace Pipe Est. Cost
6"	32,444	$1,622,200	$2,838,850
8"	9,304	$511,720	$837,360
		$2,133,920	$3,676,210
With Contingency		$2,774,096	$4,779,073