20-YEAR INFRASTRUCTURE REPLACEMENT PLAN 2021-2040

December 2020

Providence Water

Providence Water

Infrastructure Replacement Plan

For Fiscal Years 2021 through 2040

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PROVIDENCE WATER
Tap Water Delivers

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December 1, 2020

Carlene B. Newman
Environmental Engineer III
Center for Drinking Water Quality
Rhode Island Department of Health
3 Capitol Hill, Room 209
Providence, RI 02908-5097

RE: 2020 Infrastructure Replacement Plan

Dear Ms. Newman:

Providence Water is pleased to submit herein six (6) copies of its updated Infrastructure Replacement Plan consistent with the requirements of the Comprehensive Clean Water Infrastructure Act of 1993 in accordance with Chapter 46-15.6 of the General Laws of the State of Rhode Island and the appropriate rules and regulations pertaining to the Act.

Consistent with the requirements of the Act, our plan presents our infrastructure replacement needs for 5-year and 20-year planning horizons and addresses the funding requirements for implementing the plan.

The objective of the plan is to replace aging facilities and components of the water system on a systematic basis, within the limit of their useful lives, before failures jeopardize the reliability of water service and place the public's health and welfare at risk. Funding for the plan is from approved revenues annually set aside in a restricted account.

Since inception of our Infrastructure Replacement Program in 1996, Providence Water has reinvested approximately $436,998,045 into our Raw Water, Treatment, Storage, Pumping Transmission, Distribution and Support Facilities and Systems. Included in this plan is a report detailing the accomplishments of our infrastructure replacement and capital programs over the period from July 1995 through June 2020. It is our goal through these improvements, along with the ongoing planned improvements outlined in this plan submission that Providence Water will serve to safeguard the integrity and reliability of our water supply for generations to come.

Our plan was prepared by our in-house staff and reflects our best determination at this time of our anticipated system needs. The plan is subject to adjustments as may become necessary as the result of changes in the condition of system components, obsolescence, regulatory requirements, or unforeseen events which cannot now be reliably predicted over the period of the plan.

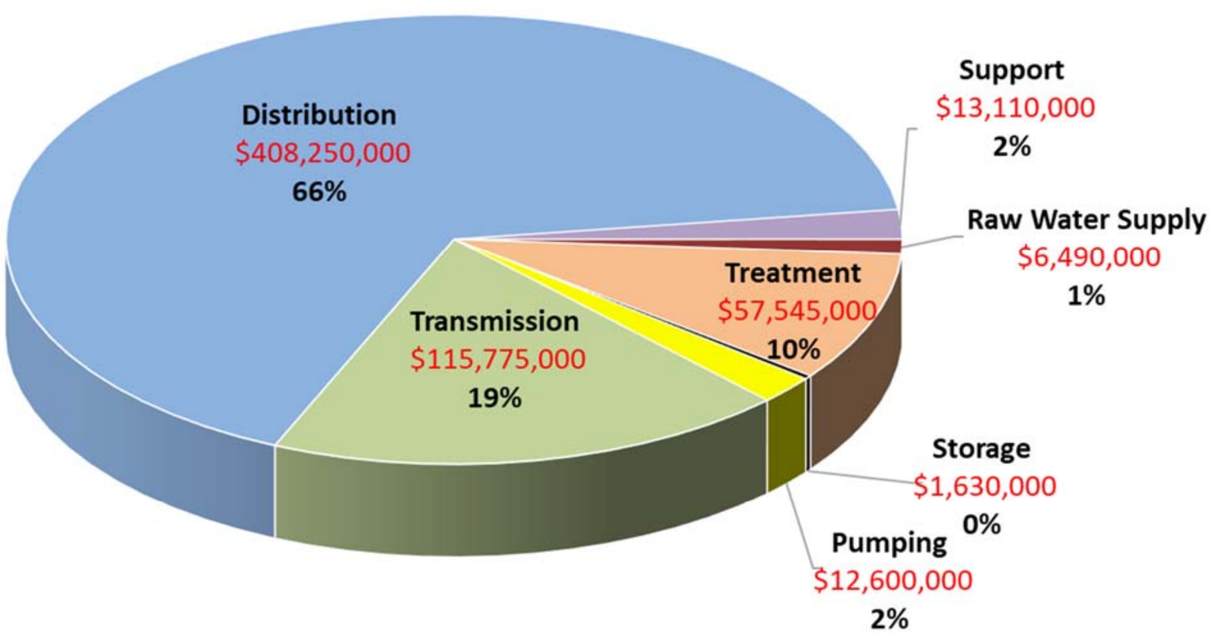
Respectfully,

PROVIDENCE WATER SUPPLY BOARD

Ricky Caruolo
General Manager

Exhibit 1 - 20 Year IFR Project Expenditure Plan - FY 2021 - 2040

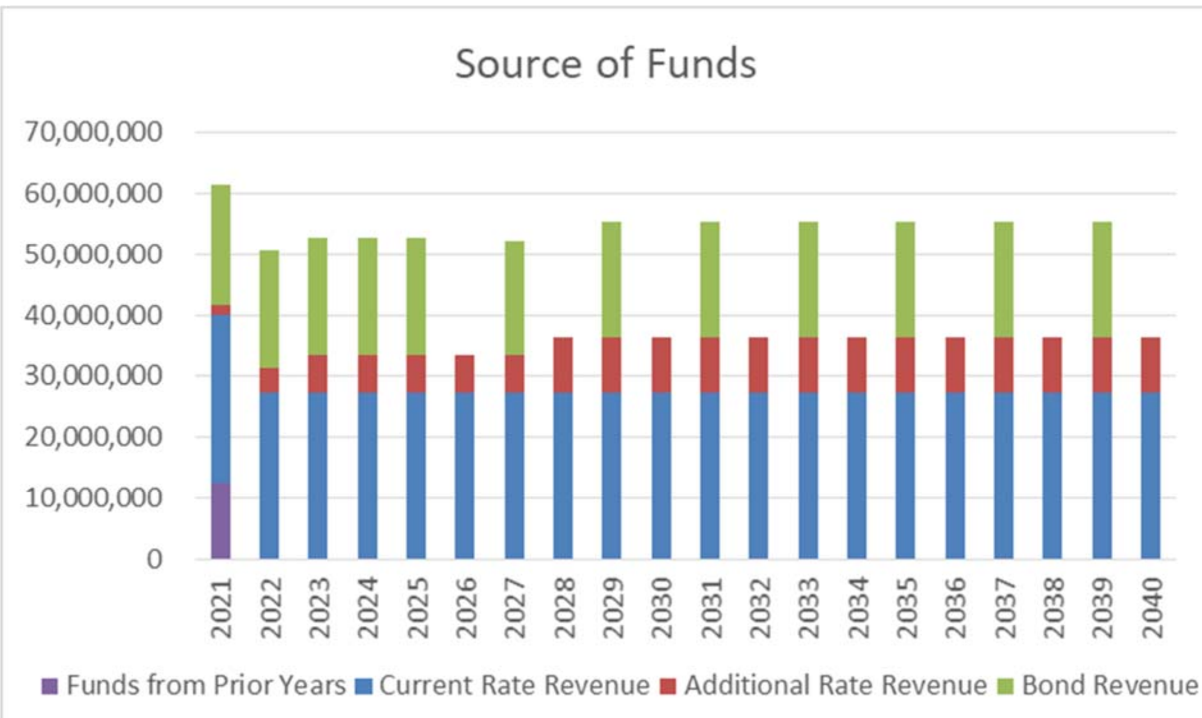
	Total Amount	Budget 2021-2025	Budget 2026-2030	Budget 2031-2035	Budget 2036-2040
Raw Water Supply	$6,490,000	$ 3,670,000	$ 2,080,000	$ 370,000	$ 370,000
Treatment	$57,545,000	$ 45,905,000	$ 2,850,000	$ 5,170,000	$ 3,620,000
Storage	$1,630,000	$ 480,000	$ 350,000	$ 450,000	$ 350,000
Pumping	$12,600,000	$ 7,000,000	$ 4,200,000	$ 1,050,000	$ 350,000
Transmission	$115,775,000	$ 33,225,000	$ 25,850,000	$ 30,850,000	$ 25,850,000
Distribution	$408,250,000	$ 108,250,000	$ 100,000,000	$ 100,000,000	$ 100,000,000
Support	$13,110,000	$ 7,500,000	$ 1,870,000	$ 1,870,000	$ 1,870,000
Total	**$615,400,000**	**$206,030,000**	**$137,200,000**	**$139,760,000**	**$132,410,000**



TOTAL INVESTMENT INTO SYSTEM $615,400,000

Exhibit 2 - 20 Year Sources and Uses of Funds - FY 2021 - 2040

Sources of Funding	Fiscal Years 2021 - 2025	Fiscal Years 2026 - 2030	Fiscal Years 2031 - 2035	Fiscal Years 2036 - 2040	Fiscal Years 2021 - 2040
Current Authorized Funding	136,500,000	136,500,000	136,500,000	136,500,000	546,000,000
Current Bond Proceeds	-	-	-	-	-
East Smithfield Debt Service Fund Transfer	259,861	250,403	156,596	-	666,860
Funds Available from Prior Years	12,636,999	7,627,159	3,483,185	12,847,365	12,636,999
Additional Rate Revenue	23,666,667	39,000,000	45,000,000	45,000,000	152,666,667
Additional Bond Proceeds	97,197,211	38,000,000	57,000,000	38,000,000	230,197,211
Total Sources of Funds	**270,260,738**	**221,377,562**	**242,139,781**	**232,347,365**	**942,167,737**
Uses of Funding					
Project Expenditures	206,030,000	137,200,000	139,760,000	132,410,000	615,400,000
Applied Overhead	10,000,000	10,000,000	10,000,000	10,000,000	40,000,000
Existing Debt Service	34,608,662	64,994,378	79,532,416	88,465,845	95,441,549
Additional Debt Service	11,994,916	5,700,000	14,250,000	14,250,000	189,854,668
Total Uses of Funds	**262,633,579**	**217,894,378**	**229,292,416**	**230,875,845**	**940,696,217**
IFR Program Surplus	**7,627,159**	**3,483,185**	**12,847,365**	**1,471,520**	**1,471,520**



INFRASTRUCTURE REPLACEMENT PLAN FY 2021 THROUGH FY 2040

The Plan is made up of four sections and an appendix as follows:

Section I – Facilities Description – A description of the water system. Included in the section are statistical data for key components of the system, a flow diagram originating from the source of supply to the service system, and a summary of the principal components of the system.

Section II – IFR Program Accomplishments – A summary of IFR program accomplishments with costs from fiscal years 1996 through 2020.

Section III – IFR Expenditure Plan – The section contains the projects and descriptions for the 20-Year IFR Plan (fiscal years 2021 through 2040). The projects are broken up into the 5-Year IFR Plan (fiscal years 2021 through 2025), and the 15-Year Plan (fiscal years 2026 through 2040).

Section IV – Revenue Requirements – The sources and uses of funds for the 20 -Year IFR Plan (fiscal years 2021 through 2040) and the IFR funding projections for the same period.

Appendix – The Comprehensive Clean Water Infrastructure Act of 1993 and the current Rules and Regulations for the Clean Water Infrastructure Plans.

I. FACILITIES DESCRIPTION

System Description – Included in the description are the raw water supply, treatment facility components and processes, storage and pumping facilities, the transmission and distribution systems, and the support facilities.

Exhibit 3 – Statistical Data – Exhibit 3 contains a summary of the major statistical data and information for the system.

Exhibit 4 – Process Diagram – Exhibit 4 is a process diagram of the Providence Water system. It shows in schematic form the sequence and inter-relation of various water treatment and delivery processes.

Exhibit 5 – Principal Components by Facility Category

Exhibit 5 is a tabular listing of the various components of the Providence Water system. Provided is a brief narrative description of the general condition of the facility, its approximate average age, and an estimate of its approximate remaining life, where applicable.

System Description

RAW WATER SUPPLY

1 - Raw Water Supply Facilities

Providence Water's sole source of supply is the Scituate Reservoir Complex. The Scituate Reservoir complex consists of six reservoirs: the main (Scituate) reservoir and five smaller reservoirs which are tributary to the main reservoir.

The watershed area around the reservoir consists of 92.8 square miles of land. Providence Water owns approximately 30% of the land in the watershed. There are many miles of fences and roadways that are utilized to protect and maintain the areas around the Raw Water Facilities

2 - Scituate Reservoir and Gainer Dam

The total storage capacity of the Scituate Reservoir is 37.011 billion gallons (BG). Dead storage is 400 million gallons (MG), resulting in a net storage volume of 36.611 BG. The reservoir has a water surface area of 5.30 square miles.

Water in the Scituate Reservoir is impounded behind the Gainer Dam, a large zoned earth structure at the southeast end of the Reservoir which is traversed along its 3,200 foot length by Rhode Island Route 12 (Scituate Avenue). Elevation of the crest of the dam is 299.0 feet Mean High Water Datum (MHW).

Crest elevation of the spillway is 284.00 feet (MHW). The flow discharges through a natural rock channel to the Pawtuxet River below the dam.

3 - Barden Reservoir

The total storage in Barden Reservoir is 853 MG. Due to the arrangement of the outlets there is no dead storage. The water surface area is 0.38 square miles, and the watershed area is 33.0 square miles.

The Barden Reservoir Dam is an earth embankment structure with a concrete core wall. The length, including the spillway, is approximately 612 feet. The crest of the dam is at elevation 352.2 feet (MHW). Elevation of the crest of the spillway is 345.1 feet (MHW).

4 - Moswansicut Reservoir

Moswansicut Reservoir covers a surface area of about 0.44 square miles. It has a total storage capacity of 1.781 BG and dead storage of 1.066 BG, for a net storage of 715 MG. The drainage area of this reservoir is about 3.9 square miles.

The dam forming Moswansicut Reservoir is a 450 feet long earth embankment structure. There are two spillways, an overflow spillway and an emergency spillway. Elevation of the overflow spillway crest is 301.90 feet (MHW); elevation of the emergency spillway crest is 303.4 feet (MHW).

5 - Ponaganset Reservoir

Ponaganset Reservoir has a watershed area of 2.1 square miles, and a water surface area of 0.36 square miles. Total storage in the reservoir is 742 MG of which 49 MG is dead storage. Net storage capacity is 693 MG.

The dam impounding the Ponaganset Reservoir is an approximately 635 foot long earth embankment structure. Crest of the dam is elevation 641.4 feet (MHW). Spillway crest elevation is 633.05 feet (MHW).

6 - Regulating Reservoir

Regulating Reservoir has a total storage capacity of 428 MG, of which 7 MG is dead storage. The drainage area of this reservoir is 22.3 square miles, while the water surface area is 0.38 square miles.

The dam impounding the waters in the Regulating Reservoir is an approximately 600 foot long earth embankment structure which includes a 260 foot long concrete over fall spillway. Elevation of the crest of the over fall is 285.50 feet (MHW).

7 - Westconnaug Reservoir

Westconnaug Reservoir has a total storage capacity of 453 MG with no dead storage. Its surface area covers about 0.27 square miles. It has a drainage area of 4 square miles.

The dam is an earth embankment structure with a steel sheeting and concrete core wall. The length of the dam is approximately 320 feet long, with a crest elevation of 457.2 feet (MHW). The crest elevation of the spillway is 454.17 feet (MHW). Both the spillway and the outlet conduit discharge into Westconnaug Brook.

8 – Secondary Reservoirs and Dams

There are 11 small secondary dams located throughout the watershed that Providence Water is responsible for inspecting and maintaining. These secondary dams were constructed primarily for mill purposes in the mid to late 1800's prior to the development of the Scituate Reservoir.

TREATMENT

9 - Treatment Plant Facilities

Providence Water operates one conventional water treatment plant to purify source water which flows from the Scituate Reservoir to the plant. The raw water characteristics from the Scituate Reservoir are typical of well protected surface water supplies in the New England region. It is a low pH, low alkaline, low turbidity water with seasonal overturn events.

The plant utilizes a conventional treatment process. The hydraulics of the plant allow it to be normally operated under gravity flow conditions. The Raw Water Booster Pump Station is available for pumping water to the plant under extremely low reservoir conditions. The treatment process consists of aeration, coagulation-flocculation, lime addition for corrosion control and pH adjustment, sedimentation, disinfection, filtration, and fluoridation.

Electrical service is provided by a 23 kilo-volt (KV) transmission line to a 2.3 KV service to the treatment plant. The emergency electrical power at the plant is provided by a 600 KW diesel generator. This generator is capable of providing adequate power for treatment operations and life safety requirements during power outages. Redundant backup power for the system is also available through a 2000 KW diesel generator located at the Raw Water Booster Pump Station.

10 – SCADA / Control System

The Supervisory Control and Data Acquisition System (SCADA) is the computer system at the heart of the Treatment Plant's operation. All water flow and chemical treatment around the treatment plant as well as the operation of all of the system's remote facilities are monitored and sometimes controlled using this system.

11 - Treatment Plant Structures and Conduits

The influent control chamber is a concrete structure consisting of internal chambers and control and drain valves that regulate the flow of water entering the plant from the 90" Raw Water Conduit.

Water flows from the influent chamber to the aeration basin through four 48" pipes. The aerated water travels to the sedimentation basins through a 108-inch conduit and then through two 72-inch by 36-inch diameter venturi meter tubes which measure the influent flow before proceeding on to the sedimentation basins through an 8.5-foot wide, 10-foot high rectangular concrete conduit.

Settled water travels from the basins through a 10-foot wide, 11-foot high rectangular concrete conduit to the plant's filters. Filtered water effluent is collected into a 400,000 Gallon Clearwell before proceeding through the effluent venturi meters to the 90" Plant Effluent pipe.

The Emergency Bypass Structure is a short conduit with 4 sluice gates that when open allow the flow of untreated water to bypass the filters and sedimentation basins in the event of an emergency.

12 - Aeration System

Water flows from the influent chamber to the aeration basin. The aeration system works under gravity pressure and sprays water into the air in a fountain style. This treatment step removes volatile organics and gases. The aerated water travels by gravity to the sedimentation basins.

13 - Sedimentation System

Ferric sulfate is added as a coagulant to the aerated water as it passes through the 108-inch conduit utilizing the pumped flash mix system. Further mixing and flocculation takes place in a tangential mixer. The water enters the mixer through a 4-foot wide, 3-foot high opening at the bottom of the mixing chamber. The mixer works under gravity feed and imparts a slow cylindrical motion to the water. This step is commonly known as flocculation. The next step is the removal of the flocculated colloidal material through sedimentation. The treatment plant has two large sedimentation basins; the north basin (43 million gallon capacity) and the south basin (111 million gallon capacity). Here, the flocculated material is allowed to settle on the bottom of the basins. The resulting ferric sludge must be removed manually by periodically draining and flushing the basins.

14 – Sludge Residual System

Two treatment processes consisting of clarification (coagulation-flocculation-sedimentation) and filtration generate ferric hydroxide sludge residuals which must be periodically removed. Approximately 90% of the sludge residuals settle in the basins during the sedimentation process. The residuals removal from the sedimentation process is accomplished by dredging the sedimentation basins through by-pass piping that transports the sludge to drying beds located adjacent to the off-site settling lagoon system. In addition, the residuals removal from the filtration process is accomplished through the backwashing of the filters. For this process, the sludge residuals are transported through the plant's main drain which then conveys the residuals to the off-site settling lagoon system.

The lagoon system consists of three settling lagoons, three overflow structures and outfalls, and a series of swales and control structures that allow the lagoons to be independently placed out of service for dewatering and cleaning operations. Lagoons 1a and 1b are used to store the majority of residuals received by the lagoons. Lagoon 2 is used as a 'polishing' lagoon for further removal of sediments. Discharge limits including flow, pH, iron and total suspended solids are established by our RIPDES permit issued by the Rhode Island Department of Environmental Management.

15 - **Filtration System**

There are eighteen (18) filters which remove non-settle able floc and impurities remaining following the coagulation, flocculation, and sedimentation stages. Existing filters have dual (sand and anthracite) media along with air scour backwash and filter to waste capability. Each filter is operated over a flow range of 5 to 8 million gallons per day. The number of filters on-line concurrently is dependent upon water demand. Each filter has two 16-inch effluent lines with 14-inch butterfly valves that control discharge into the Clearwell. The average filter run is approximately 72 hours and, generally, a backwash is initiated when head loss through the filter reaches approximately 6.5 feet of water. The filter backwash water is supplied by gravity via a 400,000 gallon wash water tank which is then discharged to the sludge lagoons.

16 – **Service Water System**

The service water system consists of two 25 hp pumps that pump water from the Clearwell up to the 40,000 gallon steel Service Water Tank. The tank provides all potable water for the treatment plant process. The service water system also includes a 30 hp fire pump for fire protection and to feed the hydrants located around the sedimentation basins.

17 – **Wash Water System**

The wash water system consists of two 125 hp pumps that pump water from the Clearwell up to the 400,000 gallon concrete Wash Water Tank. The water is then used to back wash the filters.

18 – Ascorbic Acid System

Ascorbic acid is added seasonally to the waste stream, which includes backwash water, as it leaves the treatment plant to neutralize the chlorine residual before it enters the sludge lagoon system. Ascorbic acid is delivered in powdered form and is dissolved and stored in a solution tank. Ascorbic acid is then pumped to the injection point in the waste stream at a rate proportional to the average waste stream flow leaving the plant.

19 - Chlorine System

Chlorine is added to the settled water for disinfection using three feeders. Chlorine is delivered to the plant in one ton containers which are transported to a storage room. The storage room is equipped with a ventilation system that would turn on and exhaust air to the outdoors in the event that a chlorine leak is detected.

20 - Ferric System

The plant uses ferric sulfate as a coagulant. Ferric sulfate arrives at the plant in liquid form and is stored in three bulk storage tanks before being transferred by two pumps, as needed, into two day tanks. Two metering pumps are then used to provide a measured feed rate to the raw water which is then injected into the flow using a flash mix pump. Ferric sulfate is added to the treatment process after aeration occurs.

21 - Fluoride System

Fluoride is added to the water to help prevent tooth decay. Hydrofluorosilicic acid is added to filtered water just downstream of the Clearwell. Fluoride is delivered in liquid form and is stored in four storage tanks. Fluoride is then pumped utilizing two transfer pumps to the injection point from a day tank using two metering pumps at a rate paced to the metered effluent flow of the plant.

22 – Lime System

Quicklime is added to aerated water for pH adjustment and corrosion control purposes. A pneumatic blower-style transfer system is utilized to convey lime from a bulk storage silo to four secondary feeder hoppers from which four gravimetric feeders, slakers, float tanks, and pumps are utilized to add lime to the unfinished water. Lime is added to the treatment process in two locations, both prior to, and after sedimentation.

23 – Orthophosphate System

Phosphoric Acid (Orthophosphate) is added to the filtered water downstream of the clearwell. Phosphoric Acid is delivered in liquid form and is stored in three bulk chemical storage tanks. Phosphoric Acid is then pumped to the injection point from a day tank at a rate paced to the metered effluent flow of the plant to achieve the target dosage of orthophosphate. The orthophosphate is added to the finished water as a distribution system-wide corrosion inhibitor.

STORAGE

24 - Storage Facilities

Providence Water operates six water storage facilities throughout the distribution system. These facilities are used to meet peak demand flows and to provide storage for emergency and firefighting purposes.

25 - Aqueduct Reservoir and Gatehouse

The Aqueduct Reservoir has a storage capacity of 43.4 MG and is 390 x 590 foot enclosed underground concrete structure with a water depth of approximately 25 feet and an overflow elevation of 231 feet mean high water (MHW). The facility is gravity fed and provides operational storage for the Low Service area of the distribution system. Water is supplied to the reservoir through aqueducts and transmission mains from the treatment plant.

26 – Greenville Avenue Tank

The Greenville Avenue Tank has a storage capacity of 1.02 MG and is a 56' diameter x 61' High AWWA D110 Type III tank, with a water depth of approximately 55 feet and an overflow elevation of 410 feet mean high water (MHW). Water is pumped to the tank by the Greenville Avenue Pumping Station.

27 - Lawton Hill Reservoir and Gatehouse

The Lawton Hill Reservoir has a storage capacity of 5.0 MG and is a 187-foot by 187-foot enclosed underground concrete structure with a water depth of 20 feet and an overflow elevation of 485 feet mean high water (MHW). The facility provides operational storage for the Western Cranston area of the distribution system. Water is pumped to the reservoir by the Aqueduct Pump Station adjacent to the Aqueduct Reservoir.

28 - Longview Reservoir and Gatehouse

The Longview Reservoir has a storage capacity of 24.8 MG and has an overflow elevation of 306 feet MHW. A 200 foot x 323 foot x 29 foot deep cast in place concrete underground addition was constructed immediately adjacent to the existing reservoir and was put on line in 1990. This doubled the size of the reservoir to its current capacity. The facility provides operational, emergency, and fire storage to the High Service area of the distribution system.

29 - Neutaconkanut Reservoir and Gatehouse

Water continues to flow through the Neutaconkanut Conduit to the further downstream Neutaconkanut Reservoir. The Neutaconkanut Reservoir has a storage capacity of 42.09 MG and is a 397 x 597 foot enclosed underground concrete structure with an average water depth of approximately 25 feet and an overflow elevation of 227 feet MHW. The facility provides operational storage for the gravity fed Low Service area and a portion of the pumped supply to the High Service area of the distribution system.

30 - Ridge Road Tank

The Ridge Road Tank has a capacity of 3.5 MG and provides operational, emergency, and fire storage for the Extra-High Service area of the distribution system. Water is pumped to the tank by the Fruit Hill Pump Station. The structure is a prestressed concrete tank with a water depth of 40 feet and an overflow elevation of 398 feet MHW.

PUMPING

31 – Pumping Facilities

In order to maintain an adequate supply of potable water at a sufficient pressure, Providence Water owns and operates nine water pump stations in the distribution system and one emergency pump station in the transmission system. A description of the pump stations follows:

32 - Raw Water Booster Pumping Station

The Raw Water Booster Pumping Station (RWBPS) contains four pumps, two with a pumping capacity of 50 MGD and two with a pumping capacity of 30 MGD. The station is used to supplement the head to provide adequate delivery capacity the water treatment plant under low reservoir water level conditions. The RWBPS is equipped with emergency power supplied by a 2000 KW diesel generator.

33 - Aqueduct Pump Station

The Aqueduct Pump Station contains four vertical turbine pumps with a pumping capacity of approximately 2,000 GPM each. A 600 KW diesel generator supplies emergency power for the station. The station pumps water to Lawton Hill Reservoir and the Western Cranston Service area.

34 - Ashby Street Pump Station

The Ashby Street Pump Station contains three 31 GPM jockey pumps, three 105 GPM domestic pumps, two 750 GPM fire pumps, and a 79 gallon diaphragm pressure tank. Electrical power and emergency power is supplied to the station from the Neutaconkanut Pump Station. The station provides water to approximately 100 residential services in the Neutaconkanut Hill area in Johnston.

35 - Bath Street Pump Station

The Bath Street Pump Station contains three pumps with a pumping capacity of approximately 6,700 GPM each. A 1000 KW diesel generator supplies emergency power for the station. The station pumps water to Longview Reservoir and supplies water to the High Service area as well as the high pressure fire zone in downtown Providence.

36 - Cranston Commons Pump Station

The Cranston Commons Pump Station contains two 130 GPM jockey pumps and three 800 GPM domestic pumps. The station utilizes an underground 528 gallon hydro-pneumatic storage tank. Emergency power is supplied by a diesel generator, which is owned and maintained by a privately managed water/sewer utility company who also uses the generator as an emergency power supply for a booster pump station for the sewer system in the City of Cranston. The station provides water to Cranston Commons and Alpine Estates subdivision in Western Cranston.

37 - Dean Estates Pump Station

The Dean Estates Pump Station contains one 200 GPM pump, two 475 GPM pumps and two 1,200 GPM pumps. Emergency power is supplied by a 150 KW natural gas generator. The Dean Estates Pump Station serves the higher elevations in the Dean Estates and the Garden Hills subdivisions.

38 - Fruit Hill Pump Station

The Fruit Hill Pump Station contains two 1,500 GPM pumps and provides water to the Extra High Service area. Emergency power is provided by a 150 KW natural gas generator.

39 - Greenville Avenue Pump Station

The Greenville Avenue Pump Station contains three 1,500 GPM pumps. Emergency power is supplied by a 230 KW natural gas generator. The Pump Station supplies water the Greenville Avenue Tank which serves higher elevations in the Town of Johnston.

40 - Neutaconkanut Pump Station

The Neutaconkanut Pump Station contains four pumps with a pumping capacity of approximately 6,700 GPM each. A 1000 KW diesel generator supplies emergency power for both the Ashby and Neutaconkanut pump station. The station pumps water from the

Neutaconkanut Reservoir and supplies water to Longview Reservoir and the High Service area.

41 - Waltham Street Pump Station

The Waltham Street Pump Station contains three 115 GPM pumps and two 810 GPM pumps. Emergency power is supplied by a 150 KW Diesel generator. The Waltham Street Pump Station serves the higher elevations in East Smithfield.

TRANSMISSION SYSTEM

Finished water is transmitted from the Clearwell at the plant to the distribution system through two major transmission conduits, the 90-inch diameter Scituate Tunnel and Aqueduct (ScTA) and the 78-inch and 102-inch diameter Supplemental Tunnel and Aqueduct (STA).

42 – Scituate Aqueduct and Tunnel (90")

The 90" pipeline was the original aqueduct and tunnel installed in the early 1920's with the construction of the Gainer Dam and the Treatment Plant. The pipe travels from the Clearwell underneath the sedimentation basins for about nine hundred feet before transitioning to a rock tunnel. The tunnel continues for about seventeen thousand feet before changing back to a pipeline for the final six thousand feet to the siphon chamber.

43 – Supplemental Tunnel and Aqueduct (78" & 102")

The 78" and 102" pipelines were installed in the late 1960's in anticipation of increasing demand and the installation of the Big River Reservoir as an alternate supply. The 78" travels from a connection to the 90" Aqueduct at the Treatment Plant to Structure E in West Warwick. The pipeline consists of two short tunnel sections totaling about three thousand feet and 3.8 miles of pipe. The 102" pipe travels 5.2 miles from Structure E northerly to a connection to the distribution system on Budlong Rd.

Structure "D" in its normal capacity is an isolation transmission structure for the 78-inch Aqueduct. Structure "D" also contains two 2,800 gpm pumps that can provide a wholesale emergency pump station connection.

44 - Raw Water Conduits

The Raw Water is transported from the intake of the Gainer Dam gatehouse through twin 60” steel riveted pipelines that were installed along with the dam in the 1920’s. The two pipelines, each 1,584 feet long travel in front of the Raw Water Pump Station before combining into a single 90” concrete lined, concrete encased pipeline that travels 2,640 feet across the road till its end at the influent structure of the treatment plant.

The Meter Chamber is a 600 ft. long concrete bunker located at the base of the Gainer Dam Gatehouse. Inside the chamber is the first section of the twin 60” pipelines that are located above the water channel from the old hydro generator.

The Junction Chamber is a small concrete bunker located just before the two twin 60” pipelines join together to form the 90” Treatment Plant Influent Pipeline. Two 60” Valves are located inside this structure.

45 – Transmission System Facilities

Providence Water currently operates 113 miles of various sizes of transmission piping (16" to 66"). The table below describes the current makeup of the system by size and type

Transmission Mains (Feet)

Diameter	AC	CI	CIR	DI	PC	RC	ST	Total
16	14,509	131,653	2,369	85,003	-	2,444	-	235,978
20	3,426	15,438	-	24,332	-	-	-	43,197
24	64	56,160	-	53,282	19,013	13,571	-	142,090
30	-	54,969	-	1,756	32,479	189	-	89,394
36	-	8,142	-	1,098	262	729	-	10,231
42	-	21,636	-	4,071	29	41	67	25,845
48	-	2,105	-	2,406	130	11,610	1,418	17,669
60	-	-	-	3,049	829	19,332	36	23,246
66	-	-	-	54	-	-	8,422	8,476
	17,999	290,104	2,369	175,052	52,742	47,915	9,944	596,126

DISTRIBUTION

Service Area

Providence Water supplies approximately 600,000 people in the State of Rhode Island with potable water through both its retail and wholesale customers.

The Retail Area

The retail service area consists essentially of all of Providence, Cranston, North Providence, and a significant portion of Johnston. The retail service area is divided into four major separate pressure zones: the Low Service, High Service, Extra High Service, and the Western Cranston water district. Various smaller booster pump stations supply water to smaller areas of the system from these primary pressure zones.

46 – Distribution Water Mains

The Providence Water Distribution mains range in size from 6 inches to 12 inches in diameter and are constructed of a variety of materials including cast iron, ductile iron, and asbestos cement. The table below describes the current makeup of the system by size and type.

Distribution Mains (Feet)

Diameter	AC	CI	CIR	DI	PVC	Total
6	611,110	1,395,159	208,419	159,318	1,540	2,375,546
8	663,803	443,590	66,666	669,992	2,198	1,846,249
10	-	6,040	-	448	-	6,488
12	42,733	317,593	38,270	112,979	-	511,574
	1,317,646	2,162,381	313,355	942,738	3,738	4,739,857

47 – Distribution System Facilities

The distribution system contains valves, hydrants, services and other appurtenances along with the water mains. This category includes all of them. The system currently contains approximately 14,000 valves, 6,400 Hydrants and 77,000 active service connections. The service connections include residential, industrial, commercial, and fire service supplies and they range from 5/8-inch to 12-inches in size. Service connections are generally constructed of lead, copper, cast iron, or ductile iron.

SUPPORT

48 – Support System Facilities

Providence Water owns and maintains three major facilities whose primary use is not directly related to the production, transmission or distribution of the water. These support system facilities are primarily used for operations and maintenance personnel to house equipment and materials as well as a place to house administrative office space. Major road and fencing projects not confined to one location are also accounted for in this category.

49 – Central Operations Facility

The Central Operations Facility (COF) is located on a 16.53 acre parcel on Dupont Drive in Providence. The COF was renovated in 2017 and is now a mixed use two story 165,000 sq. foot facility that contains 111,000 sq. foot of administrative offices, all construction services and a 54,000 sq. foot automotive parking/ repair garage. The COF also includes customer service area, an emergency operations center, and laboratory.

50 – Forestry Garage

The forestry garage is located on the grounds of the treatment plant and contains the office and garage space for the department that manages and maintains all of the organization’s land. The facility, constructed in 1962 contains 12,083 sq. feet of garage space and 1,260 sq feet of office space.

51 – Watershed Storage Facility

The watershed storage facility is located across the street from the treatment plant and contains extra storage space for the equipment and materials of the forestry department and the treatment plant personnel. The facility, constructed in 2009 contains 7,500 sq feet of storage space.

52 – Records Management System (GIS/AM)

The records management system contains two major computer software components to help maintain accurate records of Providence Water's operations. The first system, GIS, was initially installed in the mid 2000's and is primarily utilized to maintain and manage the watershed areas and the transmission and distribution system. In 2017, an asset management system, currently Cityworks, was installed to help manage and maintain all of Providence Water's assets. These two systems work together as an operational resource for the operations areas of the organization.

53 – Billing System

The existing billing system is a twenty-five year old home grown system that has been customized over the years to fit the needs of Providence Water. The system is responsible for the metering and billing of all of Providence Water's 77,000 customers. The system is scheduled for replacement in the first 5 years of this plan.

Exhibit 3 - Statistical Data

WATER SUPPLY SOURCES

	Watershed Area (Sq Miles)	Surface Area (Sq Miles)	Storage Capacity (MG)	Dam Length (feet)	Spillway Elevation (MHW)
Scituate Reservoir	92.8	5.30	37011	3200	284.00
Barden Reservoir	33.0	0.38	853	530	345.10
Moswansicut Reservoir	3.9	0.44	1781	450	301.90
Ponaganset Reservoir	2.1	0.36	742	635	633.05
Regulating Reservoir	22.3	0.38	428	340	285.50
Westconnaug Reservoir	4.0	0.27	453	320	454.17

TREATMENT FACILITIES

Providence Water operates one treatment plant to purify the Scituate Reservoir water. The plant is located approximately 4,400 feet from the Gainer Dam in Scituate and operates as a conventional treatment process. The treatment process consists of aeration, coagulation-flocculation, corrosion control, sedimentation, filtration, disinfection, and fluoridation.

STORAGE FACILITIES

	Storage Capacity (MG)	Overflow Elevation (MHW)
Aqueduct Reservoir	43.4	231
Greenville Ave Tank	1.0	410
Lawton Hill Reservoir	5.0	485
Longview Reservoir	24.8	306
Neutaconkanut Reservoir	42.1	227
Ridge Road Reservoir	3.5	398

PUMP STATIONS

Raw Water	2 - 30 MGD pumps; 2 - 50 MGD pumps; Emergency power 2000 KW diesel generator
Aqueduct	4 - 2,000 GPM pumps; Emergency power provided by 600 KW diesel generator
Ashby St.	3 - 31 GPM jockey pumps; 3 - 105 GPM domestic pumps; 2 - 750 GPM fire pumps; Emergency power provided by Neut. P.S. and generator.
Bath Street	3 - 6,700 GPM pumps; Emergency power provided by 1000 KW diesel generator
Cranston Commons	2 - 130 GPM jockey pumps; 3 - 800 GPM domestic pumps; Emergency power provided by private source
Dean Estates	1 - 200 GPM pump; 2 - 475 GPM pumps; 2 - 1,200 GPM pumps; Emergency power provided by 150 KW natural gas generator
Fruit Hill	2 - 1,500 GPM pumps; Emergency power provided by 150 KW natural gas generator
Greenville Ave.	3 - 1500 GPM pumps; Emergency power provided by 230 KW natural gas generator
Neutaconkanut	4 - 6,700 GPM pumps; Emergency power provided by 1000 KW diesel generator
Waltham St	3 - 115 GPM jockey pumps; 2 - 810 GPM domestic pumps; Emergency power provided by 200 KW natural gas generator

TRANSMISSION AND DISTRIBUTION SYSTEM

4.5 miles - 90" Scituate Tunnel and Aqueduct

9.5 miles - 78" / 102" Supplemental Tunnel and Aqueduct

113 miles of transmission piping (16" to 66")

863 transmission valves

900 miles of distribution piping (12" and under)

14,000 distribution valves

6,400 hydrants

77,000 active service connections

Exhibit 4 - Process Diagram

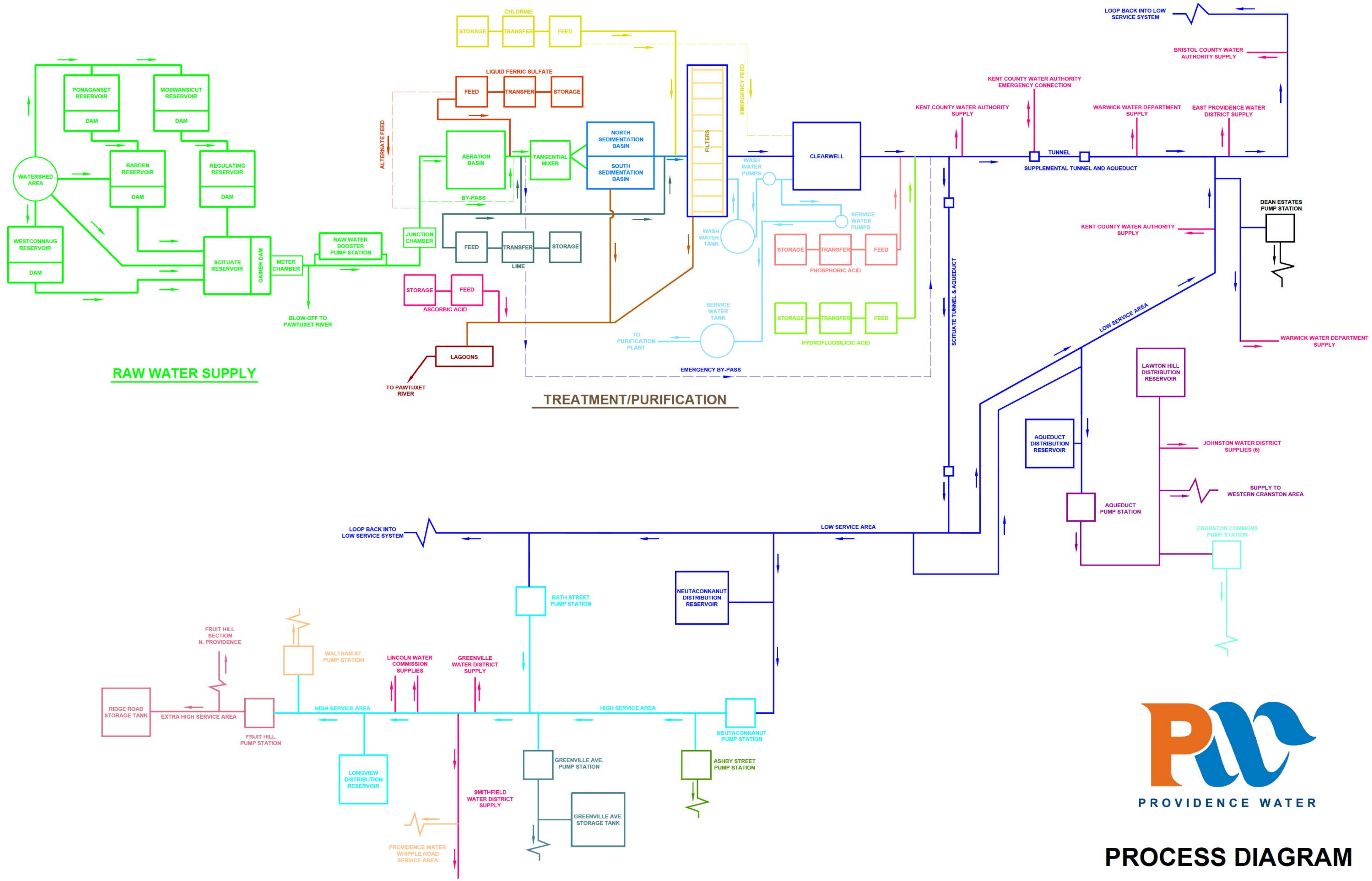


Exhibit 5 - Principal Components by Facility Category

Asset	Principal Components by Category	Installation Date(s)	Age of Component	Date of Last Major Rehabilitation	Practical Remaining Life (years)	Assessment
	Raw Water Supply					
1	Raw Water Supply Facilities	Various	Various	Various	Various	Fencing and roadways in the watershed are utilized to protect and maintain the areas around the Raw Water Reservoirs. There are small projects that require the replacement of fencing and regrading of roadways included in the plan.
2	Scituate Reservoir and Gainer Dam	1926	95	2019	50	The gatehouse has just finished a major rehabilitation project and is generally in good condition. There is minor concrete work needed on the upstream side of the spillway that is scheduled for 2021.
3	Barden Reservoir and Dam	1883	138	2003	33	The last time this dam was rehabilitated was in 2003. There is currently no work scheduled at this dam. This dam requires an inspection every 5 years. The next inspection is scheduled for 2025.
4	Moswansicut Reservoir and Dam	1919	102	2004	34	The last time this dam was rehabilitated was in 2004. There is currently no work scheduled at this dam. This dam requires an inspection every 5 years. The next inspection is scheduled for 2025.
5	Ponagansett Reservoir and Dam	1885	136	1999	29	The last time this dam was rehabilitated was in 1999. There is currently no work scheduled at this dam. This dam requires an inspection every 2 years. The next inspection is scheduled for 2022.
6	Regulating Reservoir and Dam	1918	103	Unknown	20	Rehabilitation of the upstream and downstream slopes, existing stone walls, concrete spillway and outlet structure, and drainage system is scheduled for 2029. This dam requires an inspection every 5 years. The next inspection is scheduled for 2025.
7	Westconnaug Reservoir and Dam	1924	97	2004	34	The last time this dam was rehabilitated was in 2004. There is currently no work scheduled at this dam. This dam requires an inspection every 2 years. The next inspection is scheduled for 2022.
8	Secondary Reservoirs and Dams	Various	Various	Various	Various	6 of the 11 secondary dams located around the watershed require inspection every 5 years and each one has a scope of work for improvements from an inspection in 2019. These improvements are scheduled in the first 5 years of the plan.

Asset	Principal Components by Category	Installation Date(s)	Age of Component	Date of Last Major Rehabilitation	Approximate Practical Remaining Life (years)	Assessment
	Treatment Plant Facilities					
9	Treatment Plant Facilities	1926	95	Various	Various	The plant is generally in good condition with recent improvements having been made to many areas of the building under many other projects. The passenger and freight elevators are scheduled to be rehabilitated in 2021. The plant is also in need of various architectural improvements including replacement of the siding and windows on the back side of the plant which is scheduled to begin in 2022. Money is also budgeted for various smaller projects as they are identified based on historical needs.
10	SCADA Control System	2010	11	2019	Various	The main servers of the SCADA system are new and in excellent condition. A budget has been planned for periodic hardware and software upgrades at the Treatment Plant and at the remote facilities over the entire 20 year plan. This includes replacement of all instrumentation responsible for providing data to the main system.
11	Treatment Plant Structures and Conduits	1926	95	Various	Various	The influent structure and conduits to and from the sedimentation basins were recently rehabilitated and are in good condition. The plant clear well, emergency bypass structure and effluent venturi meters are scheduled to be inspected in the first 5 years of the plan.
12	Aeration System	2016	5	2016	75	The influent structure and aeration basin were recently rehabilitated and are in excellent condition.
13	Sedimentation System	1939	82	1939	10	The concrete sedimentation basins at the plant currently consist of two large open water surface basins constructed in 1939. The concrete walls and slabs making up the basin have deteriorated over time and are in need of rehabilitation. An evaluation to determine whether to rehabilitate the basins in kind or to replace them with a new process is scheduled to begin in 2021. Current budget assumes the rehabilitation of the existing basins.
14	Sludge Residual System	2004	17	2016	20	The system is currently struggling to meet discharge limits using the existing processes. An evaluation of alternatives to the current process will be performed in conjunction with the sedimentation system evaluation. Current budget for improvements is currently included with the Sedimentation Basin Rehabilitation.
15	Filtration System	2016	5	2016	50	The plant's 18 filters including all valves, underdrains, wash water troughs, and media as well as all associated wash water, filter effluent and filter-to-waste piping is included in this category. Replacement of the media is included in the later part of the 20 year plan.

Asset	Principal Components by Category	Installation Date(s)	Age of Component	Date of Last Major Rehabilitation	Approximate Practical Remaining Life (years)	Assessment
	Treatment Plant Facilities (continued)					
16	Service Water System	1960	61	2004	15	The current Service Water System is constantly running to keep up with current demands for process water. An evaluation of the system to determine the size of any new tanks or pumps is included with the Sedimentation Basin Rehabilitation. Internal piping within the Treatment Plant facility also needs to be replaced.
17	Wash Water System	1926	95	2010	30	An inspection of the system is scheduled every 5 years. A small amount of internal piping will be replaced as part of the Service Water piping replacement.
18	Ascorbic Acid System	2017	4	2017	Various	The overall system is in good working condition. Minor upgrades will be needed to the system that are required with normal use and are addressed in the plan.
19	Chlorine System	1997	24	2005	Various	The overall system is in good working condition. Minor upgrades will be needed to the system that are required with normal use and are addressed in the plan.
20	Ferric System	1997	24	2013	Various	The bulk storage tanks have been replaced. The rehabilitation of the day tanks and associated pumps and piping are included in the plan.
21	Fluoride System	2005	16	2005	Various	The system is in good operating condition. Minor upgrades will be needed to the system that are required with normal use and are addressed in the plan.
22	Lime System	1960	61	2020	Various	A project to replace the feeders began in 2020. The storage and transfer system is in good working condition. Some upgrades will be needed to the system that are required with normal use and are addressed in the plan.
23	Orthophosphate System	2020	0	2020	Various	This system was installed in 2020 and is in excellent condition

Asset	Principal Components by Category	Installation Date(s)	Age of Component	Date of Last Major Rehabilitation	Approximate Practical Remaining Life (years)	Assessment
	Storage					
24	Storage Facilities	Various	Various	Various	Various	Pavement and Fencing around all of the facilities are beginning to break down. A project to improve the condition at all of the storage facilities over time will be planned.
25	Aqueduct Reservoir and Gatehouse	1962	59	2000	40	The reservoir and gatehouse are in good condition. An inspection will be performed in 2021. At this time only minor rehabilitation work is expected.
26	Greenville Ave Tank	2018	3	2018	28	This tank is new and no immediate rehabilitation work is expected. Regular inspections of the storage tank are addressed in the plan.
27	Lawton Hill Reservoir	1972	49	1972	10	The tank and tank isolation valves are scheduled to be inspected in 2021. Minor rehabilitation work is anticipated and is included in the plan.
28	Longview Reservoir and Gatehouse	1928, 1990	93, 31	1999,1990	39	Inspection of each half of the storage tank and gatehouse are scheduled for 2021. Minor rehabilitation work is anticipated and is included in the plan.
29	Neutaconkanut Reservoir and Gatehouse	1928	93	2008	48	The reservoir and gatehouse were rehabilitated under a past contract and are in good condition. An inspection is scheduled for 2021. Minor rehabilitation work is expected and is included in the plan.
30	Ridge Road Tank	1989	32	2019	29	This tank was recently rehabilitated. Regular inspections of the storage tank are addressed in the plan.

Asset	Principal Components by Category	Installation Date(s)	Age of Component	Date of Last Major Rehabilitation	Approximate Practical Remaining Life (years)	Assessment
	Pumping					
31	Pumping Facilities	Various	Various	Various	Various	Pavement and Fencing around all of the facilities are beginning to break down. A project to improve the condition at all of the storage facilities over time will be planned.
32	Raw Water Pump Station	1966	55	2011	39	The station is in relatively good condition. Architectural improvements to the station are scheduled for 2023.
33	Aqueduct Pump Station	2007	14	2019	25	The pump station is fairly new and is in excellent condition. VFD drives were just added to the pumps
34	Ashby St Pump Station	2020	1	2020	39	The entire pump station was replaced in 2020. The station is in excellent condition. The station has no generator because the power feed for the station comes from the Neutaconkanut Pump Station which has a generator.
35	Bath St Pump Station	1928	93	2019	50	Complete rehabilitation of the pump station was completed in 1999. The VFD drives were just replaced, and subsequent upgrades to the station are required later in the plan.
36	Cranston Commons Pump Station	1996	25	1996	15	The pump station is in need of replacement. Future consideration to this station will depend on future overall improvements in Western Cranston and Johnston service areas.
37	Dean Estates Pump Station	1982	39	2012	50	The pump station was rehabilitated in 2012 but it currently struggles to meet the high demand period of the service area. A project to upgrade the existing pumps and generator to meet the higher demands is planned during the first five years of the plan.
38	Fruit Hill Pump Station	1989	32	2016	35	The pump station was rehabilitated in 2016 and is in good condition. Replacement of the existing generator will be addressed in the first 5 years of the plan.
39	Greenville Ave Pump Station	2020	1	2020	40	The pump station was completely replaced in 2020. The last phase of the project, including the installation of the new generator will be completed in 2021.
40	Neutaconkanut Pump Station	1935	86	1999	50	Complete rehabilitation of the pump station was completed in 1999. The VFD drives were just replaced, and subsequent upgrades to the station are required later in the plan.
41	Waltham St Pump Station	2014	7	2020	33	The pump station was built in 2014 and is in good condition. An additional pump was added in 2020.

Asset	Principal Components by Category	Installation Date(s)	Age of Component	Date of Last Major Rehabilitation	Approximate Practical Remaining Life (years)	Assessment
	Transmission					
42	Scituate Aqueduct and Tunnel (90”)	1925	96	2005	75	The entire 4.5 mile 90” conduit is in good condition. The conduit was inspected and various concrete rehabilitative work was conducted including crack injections, spalled concrete repairs, and the investigation and repair of hollow sounding areas. Further rehabilitative work may be required in the tunnel section consisting of contact grouting to fill various voids between the concrete tunnel and the bedrock. The tunnel and aqueduct will also be inspected again during the first five years of the plan.
43	Supplemental Tunnel and Aqueduct (78” and 102”)	1970	51	2020	49	The 78" and 102" transmission lines, approximately 9.6 miles in length, were constructed in the 1960's and consist of prestressed concrete cylinder pipe (PCCP) and two sections of concrete lined tunnel. Because of prior deficiencies encountered on these pipelines, a program has been adopted in which the pipelines are inspected and repairs are conducted at regular intervals. In addition to the inspections, a fiber optic acoustic monitoring system has been installed in the 102" pipeline that continually monitors the pipeline for wire breaks.
44	Raw Water Conduits	1926	95	2015	50	The exposed portion of the conduits located inside the meter and junction chambers are in good condition. An inspection of the conduits is scheduled in the first five years of the plan. The cathodic protection system installed for the underground portion is in good working condition and will also be periodically inspected. Two of the 6 60-inch influent BFV's are scheduled for replacement in the first five years. Minor repairs to the 90" were identified in the last inspection of the pipeline and are planned during the next inspection.
45	Transmission System Facilities (16” to 66”)	1871 - 2006	15-150	Various	Various	Some of the mains are older than 100 years and will eventually need to be replaced. None of the large transmission mains have been specifically identified for replacement in the plan. Presently the transmission valves are in good condition. Valves that are found to be defective are replaced.

Asset	Principal Components by Category	Installation Date(s)	Age of Component	Date of Last Major Rehabilitation	Approximate Practical Remaining Life (years)	Assessment
	Distribution					
46	Distribution Mains (6" to 12")	1871 - 2020	0-150	Various	Various	A scheduled program is in place to rehabilitate water mains with the priority on unlined cast iron pipe where water quality and flow issues have been documented, and mains in areas of local and state road resurfacing projects.
47	Distribution System Facilities	1871 - 2020	0-150	Various	Various	Plans are to replace valves in conjunction with the main rehabilitation program. Older distribution valves that are found to be defective are also replaced. Lead services will be replaced on main rehabilitation projects. Lead services are also replaced that are found leaking. Plans are to replace older hydrants on main rehabilitation projects with new breakaway style hydrants. Hydrants that are found to be defective are replaced.

Asset	Principal Components by Category	Installation Date(s)	Age of Component	Date of Last Major Rehabilitation	Approximate Practical Remaining Life (years)	Assessment
	Support					
48	Support System Facilities	Various	Various	Various	Various	This category is to capture work across all of the support system facilities.
49	Central Office Facility	2018	3	2018	50	This building located at 125 Dupont Drive in Providence was remodeled in 2018 and is in excellent condition. No major projects are currently planned but a budget for small projects is included in the later years of the plan.
50	Forestry Garage	1962	59	2006	25	Various rehabilitative work has been conducted on the facility. The building will require various architectural and mechanical improvements on an ongoing basis.
51	Watershed Storage Facility	2009	12	2009	50	The building is a pre-engineered metal frame storage building constructed in 2009. The facility is in excellent condition and does not require rehabilitative work.
52	Records Management System (GIS/AM)	2007	14	2017	27	This system consists of the organizations Geographic Information System and an Asset Management System (currently Cityworks). As with all software programs they must be updated and expanded to keep up with the current technology.
53	Billing System	1995	26	1995	5	This system is responsible for tracking the metering and billing of all of Providence Water's customers. The current system is built on antiquated technology and will be replaced in the first 5 years of this plan.

II. IFR PROGRAM ACCOMPLISHMENTS

Summary of IFR Program Accomplishments (Fiscal Years 1996 through 2020)

Exhibit 6 – IFR Project Expenditures for Fiscal Years 1996 – 2020 by Facility Type

Exhibit 7 – IFR Project Expenditures for Fiscal Years 1996 - 2020 by Facility Type (Pie Chart)

Exhibit 8 – IFR Expenditures for Fiscal Years 1996 - 2020 by Year (Bar Graph)

Summary of IFR Program Accomplishments FY 1996 - 2020

In 1990, Providence Water initiated an Infrastructure Replacement Program with limited funds. In 1993, the State legislature, recognizing the need for establishing a funding mechanism with the intention of staving off deterioration and obsolescence of the State's water infrastructure systems, adopted the Comprehensive Clean Water Infrastructure Act in accordance with Chapter 46-15.6 of the General Laws of the State of Rhode Island. The law set aside portions of water revenues for long-term planned infrastructure replacement programs.

In accordance with the requirements of the legislation, a water supplier subject to Chapter 46-15.6 is required to develop and maintain an infrastructure replacement plan to be submitted to the Rhode Island Department of Health once every five years for review and approval. In accordance with the legislation, Providence Water prepared and submitted its first 20-year Infrastructure Replacement Plan in 1996. Subsequent 5-year plan updates were submitted thereafter in 2001, 2006, 2010, and 2015 with this being our sixth plan submission on December 1, 2020.

Since adoption of the Act requiring submission of our first plan in 1996, we have made substantial improvements to our infrastructure, having reinvested approximately $437 million into system improvements, with $228 million in improvements into distribution, $115 million into treatment, $51.2 million into transmission, $15.6 million into pumping, $6.5 million into storage, $8.9 million into raw water supply, and $6.6 million into support and $4.3 million in overhead and general planning costs.

The success of Providence Water's IFR program can be attributed to the hard working staff which until his retirement last year were guided by the leadership of Steven Santaniello. Over the course of 30 years Steve created the foundations of the program from the ground up and led the program through many tremendous successes. Under his direction, the program grew from an original annual budget of $4 million in 1996 to the current annual budget of almost $30 million. Steve's initiative, ground breaking work, and dedication has enabled Providence Water to effectively implement a plan to provide support for the organization's critical infrastructure for years to come.

The following section is a summary of Providence Water's ongoing IFR program since its inception in 1996. These improvements, along with the ongoing planned and future improvements outlined in this 2020 plan submission, address our needs for the integrity and reliability of our water supply for future generations of the State of Rhode Island.

Exhibit 6 - IFR Expenditures from FY 1996 - 2020 by Facility Type

	PROJECT DESCRIPTION	Start Date	Percent Complete	Completion Date	Expenditures
	Raw Water Supply				**$ 8,898,480**
1	**Raw Water Supply Facilities**				
	Dam Inspections and Improvements		Various Projects		$731,666
2	**Scituate Reservoir and Gainer Dam**				
	Gainer/Regulating Dam Rehabilitation	Jun 96	100%	Oct 97	$1,792,063
	Gainer Dam Stonewall Rehabilitation	May 08	100%	Apr 10	$592,038
	Gainer Dam Gatehouse - Replace Valve Shafts, Sluice Gates, Stop Shutters	Jan 03	100%	Sep 05	$739,423
	Gainer Dam Gatehouse Rehabilitation	Jul 18	100%	Nov 19	$738,633
3	**Barden Reservoir and Dam**				
	Barden Reservoir Dam Rehabilitation	Sep 01	100%	Sep 03	$1,589,358
4	**Moswansicut Reservoir and Dam**				
	Moswansicut Reservoir Dam Rehabilitation	Oct 03	100%	Sep 04	$392,241
5	**Ponagansett Reservoir and Dam**				
	Ponaganset Reservoir Dam Rehabilitation	Jul 98	100%	Oct 99	$856,439
6	**Regulating Reservoir and Dam**				
	Regulating Reservoir Dam Rehabilitation	Jun 07	100%	Jun 09	$86,023
7	**Westconnaug Reservoir and Dam**				
	Westconaug Reservoir Dam Rehabilitation	Aug 02	100%	Jun 04	$1,272,757
8	**Secondary Reservoirs and Dams**				
	Burton Pond Dam Rehabilitation	Sep 95	100%	Oct 95	$35,772
	Evaluation of Secondary Dams		Various Projects		$72,066
	Treatment				**$ 114,941,227**
9	**Treatment Plant Facilities**				
	Treatment Process and Water Quality Studies		Various Projects		$6,455,535
	Treatment Plant - Electrical Supply System Upgrade	Mar 96	100%	Sep 96	$932,511
	Treatment Plant - Convert Secondary Voltage - 550V to 480V	Jan 01	100%	Dec 01	$1,285,413
	Treatment Plant - Replace Roof	Apr 97	100%	Dec 97	$321,890
	Treatment Plant - Replace Boilers & Water Heaters	Jun 95	100%	Jun 97	$199,360
	Treatment Plant - Lab Improvements	Sep 01	100%	Dec 02	$507,594
	Treatment Plant - Rehabilitate Limestone and Granite Exterior Blocks	Jun 04	100%	Sep 04	$163,507
	Various Treatment Plant Facilities Projects		Various Projects		$297,822
	Treatment Plant - HVAC Upgrades	May 04	100%	Jun 06	$1,860,519
	Treatment Plant Facility Improvements		Various Projects		$2,654,523
	Process Meter and Lab Equipment Replacement		Various Projects		$438,211
10	**SCADA / Control System**				
	Process Control / Data Aquisition System Replacement	Jun 96	100%	May 01	$2,589,636
	Process Control and Control System Upgrades		Various Projects		$1,915,421
11	**Treatment Plant Structures and Conduits**				
	Aerated, Settled, and Filter Influent Conduits	Oct 13	100%	Dec 18	$1,173,466
	Clearwell and Effluent Yard Rehabilitation	Jun 99	100%	Nov 00	$1,309,391
	Emergency Bypass Rehabilitation	Apr 01	100%	Jun 01	$274,464
12	**Aeration System**				
	Plant Influent and Aerator Rehabilitation	Oct 13	100%	Jun 16	$6,526,633
13	**Sedimentation System**				
	Access Road Drainage Improvements	Jul 03	100%	Dec 03	$138,828
14	**Sludge Residual System**				
	Sludge Handling / Disposal	Jun 98	100%	Jul 16	$26,375,949
15	**Filtration System**				
	Effluent Valve Actuators Replacement	Jan 97	100%	Jun 98	$307,288
	Filter Gallery Rehabilitation	Jan 96	100%	Mar 96	$54,610
	Sand Filters Replacement	Oct 95	100%	Oct 16	$50,035,482
16	**Service Water System**				
	Service Water and Hydrant Pump Replacement	Mar 02	100%	Apr 04	$56,544
	Service Water Tank - Inspection / Rehabilitation	Oct 07	100%	Nov 07	$3,189
17	**Wash Water System**				
	Wash Water Tank Check Valve Replacement	Sep 96	100%	Jun 97	$25,105
	48" Washwater Main Rehabilitation - Corrosion Protection	May 01	100%	Sep 01	$478,085
	Wash Water Pump Replacement	Mar 02	100%	Apr 04	$273,535
	Wash Water Tank Structural Rehabilitation	Oct 05	100%	Dec 06	$416,223
18	**Ascorbic Acid System**				
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19	**Chlorine System**				
	Chlorine Room Rehabilitation	Jun 96	100%	Sep 97	$565,718
	Chlorine Room Upgrades	Sep 05	100%	Sep 05	$45,894
	Chlorine Room Monorail and Scales Replacement	Dec 16	100%	Feb 17	$220,878
20	**Ferric System**				
	Ferric Feed Equipment Replacement	Jul 95	100%	Jun 97	$621,708
	Ferric Feed Metering System	Jan 02	100%	Feb 02	$42,075
	Clarification Optimization (Pumped Flash Mixer System)	Jun 05	100%	Jul 08	$1,006,133
	Ferric System Upgrades	Jun 13	100%	Dec 13	$397,910
21	**Fluoride System**				
	Fluoride Transfer System Rehabilitation	Jun 04	100%	Sep 05	$0
22	**Lime System**				
	Lime Feed Equipment Replacement	Oct 96	100%	Jan 98	$830,083
	Lime Transfer System Rehabilitation	Jun 04	100%	Nov 05	$2,871,098
	Lime System Upgrades	Oct 18	30%	(Dec 21)	$1,268,998
23	**Orthophosphate System**				
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Exhibit 6 - IFR Expenditures from FY 1996 - 2020 by Facility Type

	PROJECT DESCRIPTION	Start Date	Percent Complete	Completion Date	Expenditures
	Storage				**$ 6,545,995**
24	**Storage Facilities**				
	Storage Tanks Inspections / Improvements	Sep 14	50%	(Dec 21)	$1,264,411
25	**Aqueduct Reservoir and Gatehouse**				
	Aqueduct Reservoir - Inspection / Rehabilitation	Apr 99	100%	Oct 00	$1,433,523
	Aqueduct Reservoir - Replace 60" Valve				$442,865
26	**Greenville Ave Tank**				
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27	**Lawton Hill Reservoir and Gatehouse**				
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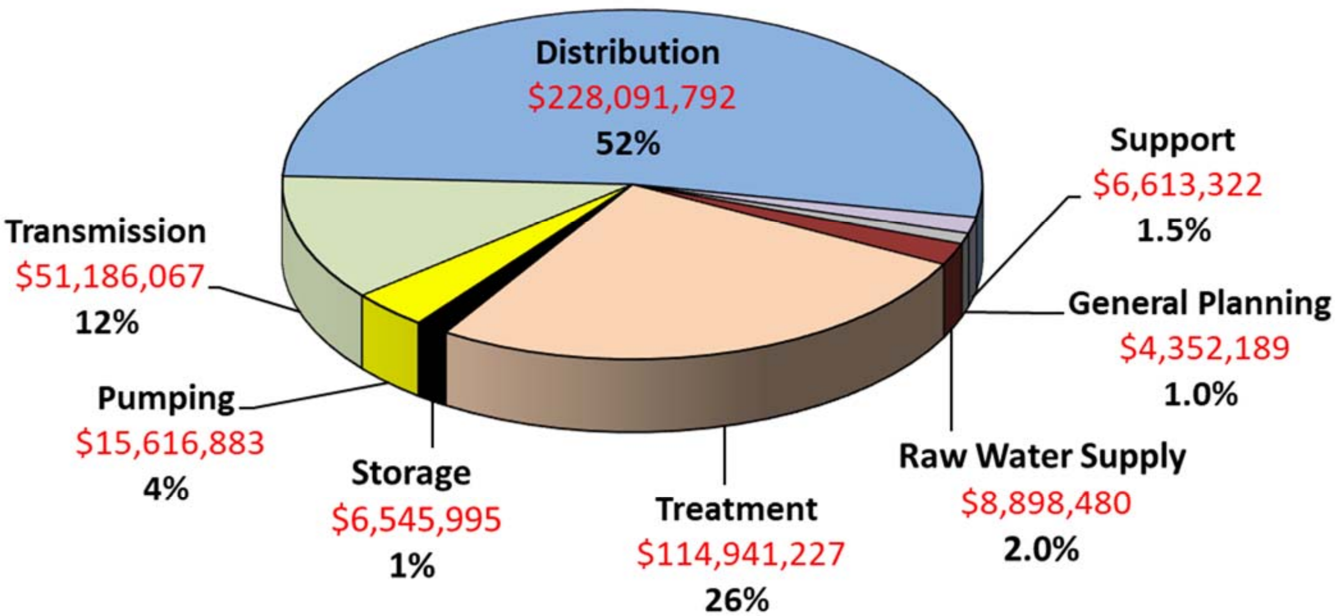
28	**Longview Reservoir and Gatehouse**				
	Longview Reservoir - Structural Rehabilitation	Apr 98	100%	Sep 99	$754,420
29	**Neutaconkanut Reservoir and Gatehouse**				
	Neutaconkanut Reservoir - Gatehouse Rehabilitation	Nov 00	100%	May 01	$45,550
	Neutaconkanut Reservoir - Inspection / Rehabilitation	Oct 05	100%	Jun 08	$2,595,660
30	**Ridge Road Tank**				
	Ridge Road Tank - inspection	Sep 06	100%	Nov 06	$9,566
	Pumping				**$ 15,616,883**
31	**Pumping Facilities**				
	Various Pump Stations - Electronic Equipment Upgrades	Jun 96	100%	Jul 97	$15,202
	Various Pumping and Storage Improvements		Various Projects		$640,735
	Aqueduct, Neutaconkanut and Bath Street Pump Station Upgrades	Oct 18	100%	Oct 19	$1,007,439
32	**Raw Water Booster Pump Station**				
	Raw Water Booster Pump Station - Generator Replacement	Oct 96	100%	May 97	$501,232
	Raw Water Booster Pump Station - Valve Replacement	June 01	100%	Mar 02	$158,753
	Raw Water Booster Pump Station - Pump Rehabilitation	Mar 02	100%	Jun 03	$66,762
	Raw Water Booster Pump Station - Boiler & Heating System Replacement	May 04	100%	Jun 06	$44,215
	Raw Water Booster Pump Station - Electrical Upgrades	Jun 06	100%	Dec 07	$773,325
	Raw Water Booster Pump Station - Generator Replacement	Apr 11	100%	Dec 11	$298,964
33	**Aqueduct Pump Station**				
	Aqueduct Pump Station - Electrical Upgrade	Oct 99	100%	Mar 00	$105,356
	Aqueduct Pump Station - Pump Upgrade	Jun 00	100%	Jul 00	$79,969
	Aqueduct Pump Station Rehabilitation	Apr 05	100%	Nov 07	$2,323,627
34	**Ashby St. Pump Station**				
	Ashby Street Pump Station Replacement	Jan 19	90%	(Apr 21)	$1,357,603
35	**Bath St. Pump Station**				
	Bath Street Pump Station Upgrade	Oct 95	100%	Nov 99	$2,444,436
36	**Cranston Commons Pump Station**				
	--	-----	-----	-----	$0
37	**Dean Estates Pump Station**				
	Dean Estates Pump Station Upgrade	Aug 10	100%	Oct 12	$1,446,457
38	**Fruit Hill Pump Station**				
	Fruit Hill Pump Station Upgrade	Apr 16	100%	Dec 16	$127,557
39	**Greenville Ave Pump Station**				
	Greenville Ave Pump Station - Replace Surge Valve	Oct 01	100%	Nov 01	$11,918
	Greenville Ave Pump Station Replacement	Apr 19	90%	(Apr 21)	$2,384,592
40	**Neutaconkanut Pump Station**				
	Neutaconkanut Pump Station Upgrade	Oct 95	100%	Nov 99	$1,828,739
41	**Waltham Street Pump Station**				
	--	-----	-----	-----	$0

Exhibit 6 - IFR Expenditures from FY 1996 - 2020 by Facility Type

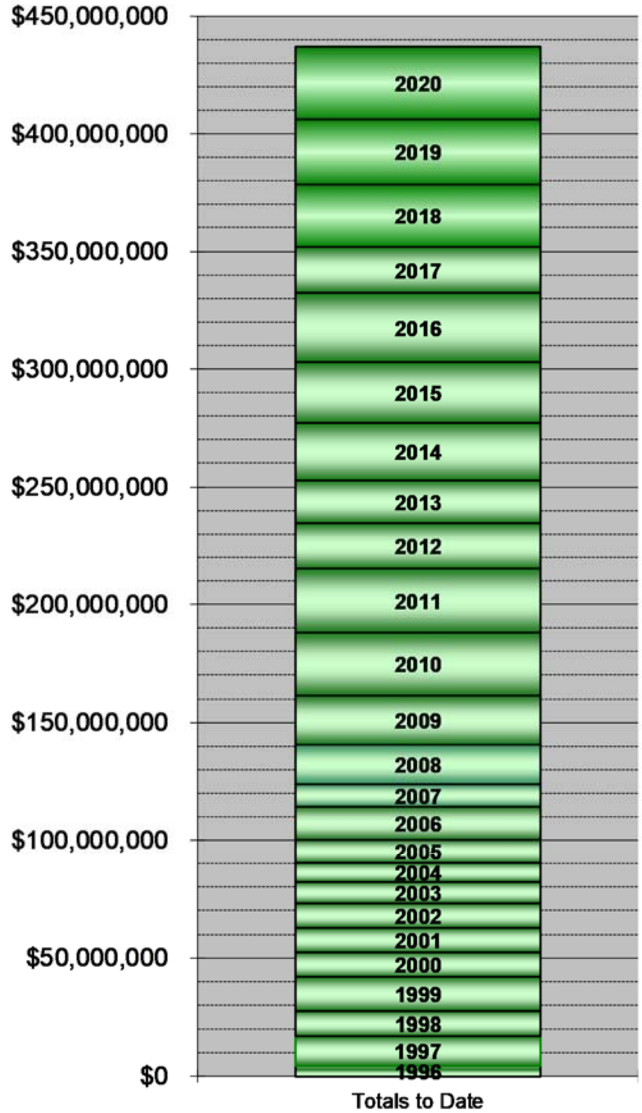
	PROJECT DESCRIPTION	Start Date	Percent Complete	Completion Date	Expenditures
	Transmission				**$ 51,186,067**
42	**Scituate Aqueduct and Tunnel (90")**				
	90" Effluent Finished Water Aqueduct - Inspection / Rehabilitation (2002-2005)	May 02	100%	Mar 05	$7,304,999
43	**Supplemental Tunnel and Aqueduct (78" & 102")**				
	102" Aqueduct- Inspetion / Rehabilitation (2000)	Jan 00	100%	Apr 00	$6,001,681
	Supplemental Tunnel - Inspection / Rehabilitation (2005-2008)	Nov 05	100%	Nov 08	$8,200,651
	102" aqueduct - Inspection / Rehabilitation (2010-2011)	Nov 10	100%	Sep 13	$3,755,337
	78" Aqueduct Inspection / Rehabilitation (2013)	Feb 13	100%	Nov 13	$2,338,500
	Supplemental Tunnel - Inspection / Rehabilitation (2015-2020)	Sep 15	90%	(Apr 21)	$14,679,822
44	**Raw Water Conduits**				
	60" influent conduits - Corrosion Protection	May 98	100%	Jun 99	$457,432
	90" and 60" Raw Water Conduits Inspection / Rehabilitation	Oct 13	100%	Dec 19	$783,061
45	**Transmission System Facilities (16" - 66")**				
	Cathodic Protection - Transmission Mains	Aug00	100%	Dec 00	$82,378
	66" Transmission Main Inspection	Dec 07	100%	Jan 08	$48,155
	60" Transmission Main Inspection	Dec 07	100%	Jan 08	$48,155
	Condition Assessment Transmission Mains		Various Projects		$45,733
	16 inch & Larger Valve Replacement		Various Projects		$6,371,279
	Transmission System Improvements		Various Projects		$1,068,885
	Meter and Junction Chambers Rehabilitation	Oct 10	100%	Feb 13	$752,090
	Distribution				**$ 228,091,792**
46	**Distribution Water Mains (12" and under)**				
	Water Main Rehabilitation		Various Projects		$138,598,023
47	**Distribution System Facilities**				
	Water Meter Replacement		Various Projects		$11,076,516
	Leak Detection	Oct 08	100%	Sep 10	$190,585
	Valve and Hydrant Condition Assessment Program	Sep 10	100%	Sep 12	$1,497,396
	Various Distribution System Improvements		Various Projects		$7,502,173
	Distribution Valve Replacement		Various Projects		$3,582,649
	Fire Hydrant Replacement		Various Projects		$7,198,583
	Lead Service Replacement		Various Projects		$58,280,637
	Blowoff Replacement		Various Projects		$165,229
	Support				**$ 6,613,322**
48	**Support System Facilities**				
	Telephone System Replacement	Nov 97	100%	Nov 98	$348,570
	Academy Avenue Administration Building - Heating System	Oct 97	100%	Oct 97	$40,123
	Academy Avenue Administration Building - Ventilation Improvements	Oct 97	100%	Oct 98	$73,924
	Academy Avenue Administration Building - Replace Roof	Oct 95	100%	Aug 96	$68,190
	Academy Avenue Administration Building - Office Renovation		Various Projects		$574,722
	Underground Storage Tanks - Remove or Replace		Various Projects		$616,012
	Fire Safety System Improvements	Apr 05	100%	Jul 07	$1,866,084
	Various Support System and Facility Improvements		Various Projects		$2,023,423
49	**Central Operations Facility**				
	---	-----	-----	-----	$0
50	**Forestry Garage**				
	Forestry Garage - Roof Replacement	Apr 97	100%	Dec 97	$0
	Forestry Building - Heating System Upgrade	May 04	100%	Jun 06	$30,439
51	**Watershed Storage Facility**				
	Watershed Storage Facility Replacement	Jul 08	100%	Sep 09	$927,480
52	**Records Management System (GIS/AM)**				
	Records Management System (GIS/AM) Upgrades		Various Projects		$44,358
53	**Billing System**				
	---	-----	-----	-----	$0
	General Planning				**$ 4,352,189**
	General Planning	Jul 95	Ongoing	-----	$4,352,189
	Total IFR Expenditures				**$ 436,998,045**

Exhibit 7 - IFR Expenditures from FY 1996 - 2020 by Facility Type Pie Chart



TOTAL INVESTMENT INTO SYSTEM $436,998,045

Exhibit 8 - IFR Expenditures from FY 1996 - 2020 by Year Bar Graph



Fiscal Year	IFR
1996	$4,403,258
1997	$12,613,880
1998	$10,250,593
1999	$14,870,278
2000	$10,168,929
2001	$10,495,654
2002	$10,186,210
2003	$9,339,330
2004	$7,902,458
2005	$9,875,143
2006	$14,001,418
2007	$9,755,533
2008	$16,868,303
2009	$20,628,469
2010	$26,793,921
2011	$26,873,228
2012	$19,741,931
2013	$17,909,955
2014	$24,711,575
2015	$25,399,937
2016	$29,388,866
2017	$19,737,907
2018	$26,770,338
2019	$27,314,765
2020	$30,996,161
Totals to Date	**$436,998,044**

III. IFR EXPENDITURE PLAN

Background – IFR Expenditure Plan – FY 2021 – FY 2040

Water Main Rehabilitation Plan and Schedule

This section describes Providence Water's main rehabilitation program and set of criteria to determine the areas for the replacement or rehabilitation of the unlined cast iron water pipe in the system.

Exhibit 9 – Water Main Condition Assessment

This exhibit shows the location of the mains with the highest priority for rehabilitation based on the latest assessment.

Exhibit 10 – Projected 5 Year Water Main Rehabilitation Plan

This exhibit shows the currently planned work for the first 5 years of the plan. Included within the section is the list of proposed streets for the first five years of the plan.

Exhibit 1 – 20-Year IFR Expenditure Plan – FY's 2021 through 2040

The twenty year infrastructure replacement expenditure plan is a summary of forecasted expenditure needs for the next twenty years, from fiscal year 2021 (commencing July 1, 2020) through FY 2040 (ending June 30, 2040) aggregated by major categories into four separate five year plan increments.

Exhibit 11 –5-Year IFR Expenditure Plan FY's 2021 through 2025

The Five Year Expenditure Plan is a detail of the planned infrastructure replacement program over the five year period from FY 2021 through FY 2025. The plan is detailed by project within functional categories in the system.

Exhibit 12 – 5-Year IFR Expenditure Plan for FY's 2021 through 2025

Pie chart for 5 Year IFR Expenditure Plan

Exhibit 13 – 5-Year IFR Project Overview FY's 2021 through 2025

A brief narrative overview of the scope of each project for the 5 Year IFR Expenditure Plan.

Exhibit 14 – 15-Year IFR Expenditure Plan – FY's 2026 through 2040

The Fifteen Year Expenditure Plan is a spreadsheet of the planned infrastructure replacement needs for each year of the plan from FY 2026 through FY 2040. Project expenditures over this time frame may be less precise than those of the first five years of the plan. Project needs are projected based on anticipated needs over the last 15 years of the plan. Projects will be reevaluated 5 years from now when the next formal plan is due.

Exhibit 15 – 15-Year IFR Expenditure Plan for FY's 2026 through 2040

Pie chart for 15 Year IFR Expenditure Plan.

Exhibit 16 – 15-Year IFR Project Overview FY's 2026 through 2040

A brief narrative explanation of the scope of anticipated replacement work for each project for the 15 Year IFR Expenditure Plan.

Background - IFR Expenditure Plan

The Infrastructure Replacement Expenditure Plan consists of the five (5), fifteen (15), and twenty (20) year forecasts of project needs and expenditures. The 20 year plan is organized by individual projects for the 20 year period for each fiscal year from FY 2021 through FY 2040.

In January 1993 the Rhode Island State Legislature enacted the Comprehensive Clean Water Infrastructure Act. The intent of the legislation was for water suppliers to develop long-term infrastructure replacement programs which would ensure the continued integrity of their systems and provide for funding of this program from water rates.

Pursuant to the enactment of the legislation, the Rhode Island Department of Health, Division of Drinking Water Quality, promulgated Rules and Regulations governing infrastructure replacements for water suppliers. The Rules and Regulations for Clean Water Infrastructure Plans were enacted in January 1995.

Since our last plan in 2015, Providence Water's engineering staff has continued to assess the major components of our water system consistent with the definitions of the regulations and provide recommendations for restoring their useful lives through the development of a twenty-year project plan. Our new plan continues to address improvements to all areas of the system in accordance with the Regulations of the Act, intending to provide for a continued program of scheduled upgrades of system components as they reach the end of their useful lives to ensure the continued reliability of the water system into the future.

Project needs are based on the best available information and assessments at this time and will be adjusted and/or modified as changing needs, priorities, or regulatory requirements necessitate. We consider this plan to be a living document subject to amendments as may be required to match changing State and Federal regulations and changing field conditions. The system's needs have been and will continue to be reevaluated by Providence Water's staff on an ongoing basis. Our schedule of proposed facility replacements is consistent with deterioration or obsolescence, as we know conditions to be now. The plan's focus is on replacement of facilities necessary to continue to deliver a reliable and healthy water supply to all our customers consistent with drinking water standards and regulations as they presently exist.

Our current plan addresses $615.4 million of needed improvements over the next twenty-year period, with $408.25 million or 66 percent of the expenditures concentrated in the distribution system. The oldest portion of the distribution system is 150 years old, with approximately 12 percent of the mains having been installed in the 1800's. To insure the integrity and reliability of the distribution system into the future, the upgrading and replacement of distribution mains and their appurtenances is one of the major concentrations of the Infrastructure Replacement Program.

This is our sixth IFR plan submission to the Rhode Island Department of Health. The five previous plans were submitted on, February 29, 1996, March 30, 2001, March 23, 2006, December 1, 2010 and December 1, 2015. On various occasions, the plans were amended to address changing needs and priorities. Since FY 1996 through June 30, 2020, $437 million has been reinvested back into the system; with $228 million in improvements into distribution, $115 million into treatment, $51.2 million into transmission, $15.6 million into pumping, $6.5 million into storage, $8.9 million into raw water supply, and $6.6 million into support and $4.3 million in overhead and general planning costs.

Water Main Rehabilitation Plan and Schedule

This section describes Providence Water's (PW) Water Main Rehabilitation (WMR) Program for our 20-Year IFR plan for the period from fiscal years 2021 (beginning July 1, 2020) to fiscal year 2040 (ending June 30, 2040). Included in this overall 20-year WMR program is a plan for the initial 5 calendar years (2021 to 2025) of construction, which targets some of the highest priority areas for water main rehabilitation based on our condition assessment evaluations. To develop this 20-year WMR program, including the initial 5-year (2021 to 2025) highest priority water main rehabilitation plan, PW utilized and relied upon industry guidance and best practices described in *American Water Works Association (AWWA) Manual of Water Supply Practice M77 – Condition Assessment of Water Mains* and *AWWA Manual of Water Supply Practice M28 – Rehabilitation of Water Mains.* The development of our 20-year WMR program and its 5-year highest priority rehabilitation plan is described in detail in this section.

The PW system consists of approximately 1,025 miles of water mains (transmission mains 16-inch and greater and distribution mains smaller than 16-inches). Unlined cast-iron (CI) mains, which were installed in our system up until about 1950, make up about 470 miles (about 46%) of the total system piping. These unlined CI mains, commonly installed industry-wide prior to the 1960s, have been found to be particularly problematic for PW with regards to reduced hydraulic capacity and water quality problems. Since their interior surface is not lined with any protective coating, the water is exposed to the bare metal pipe surface, which leads to corrosion. The corrosion that occurs in these unlined CI mains and the associated iron oxide precipitation that forms (a process known as tuberculation) leads to hard water scales (tubercles) forming on the interior pipe walls.

As the ferrous oxide tuberculation scales continue to build on the interior walls of unlined CI water mains over time, the scaling degrades water quality and reduces the pipe diameter, which consequently reduces the hydraulic capacity of the mains. The reduced diameter increases friction as water travels through these mains and causes a reduction in pressure and flow rate (reduced hydraulic capacity), including the ability to provide needed fire flows. The tuberculation scales also degrade water quality in unlined CI mains by turning the water a red or rusty color and through the formation of biofilms in the scales that can allow bacteria to grow and consume disinfectant residual in the water. The water in these unlined CI mains is often aesthetically unpleasant and delivered at reduced flow and pressure. With about half of the total water mains in PW's system being unlined CI, they are understandably a significant focus of our WMR program, given the issues and concerns associated with them.

Consistent with PW's overall mission statement, the purpose of our WMR program is to continue to provide reliable, high-quality, safe, and clean drinking water to our customers. To achieve this through our WMR program, we have the following goals and objectives for our WMR program:

1. Provide and maintain water mains that continue to provide a reliable and satisfactory level of service, both now and into the future.
2. Perform effective renewal and rehabilitation planning with data to support and justify planned water main rehabilitation projects.
3. Prioritize water mains for rehabilitation or replacement over the next 20-year IFR planning period with a data-driven, informed decision making process.
4. Determine which water mains represent the highest priority for rehabilitation or replacement during the initial 5-year IFR planning period.
5. Continue to rehabilitate and replace water mains to improve water quality; to maintain, restore, or increase the hydraulic capacity of mains; and to maintain the structural integrity and reliability of our water system.

To-date, as part of our IFR program, we have already rehabilitated (cleaned and cement-lined or replaced) about 88 miles of water mains, which is approximately 16 percent of the original amount of unlined CI water mains in our system. But there is still much work to be done. In this next 5-year period from 2021 to 2025, and as required by a Bilateral Compliance Agreement with the Rhode Island Department of Health (RIDOH), PW plans to spend a minimum of $19.1 million dollars per year to rehabilitate and replace water mains and appurtenances, for a total spending of over $95.5 million in water main rehabilitation and replacement over the next five years.

To develop our 20-year WMR program, including the initial 5-year (2021 to 2025) highest priority water main rehabilitation plan, Providence Water performed a desktop condition assessment of all our water distribution mains consistent with guidance and industry best practices described in *AWWA M77 – Condition Assessment of Water Mains.* It should be noted that the focus of our WMR program is on our water distribution mains (mains smaller than 16-inches), as we evaluate larger water transmission mains separately and individually through their own condition assessment and rehabilitation programs in our IFR plan. Of the approximately 1,025 total miles of water mains in our system, about 900 miles (88%) are distribution mains less than 16-inches in diameter and included in this WMR program condition assessment.

Our desktop condition assessment for our water distribution mains consisted of a review and analysis of our available documents and records, including system data, repair records, drawings, geotechnical information, failure data, and other existing and available data. As with any condition assessment, no single set of data or information provides all the data or drives all the results. We therefore evaluated all our available data and information to determine the data sets and criteria that currently had sufficient level of detail to develop a weighted-criteria approach to provide a reliable forecast and data-driven, prioritized WMR program.

Our weighted-criteria desktop condition assessment approach for all the water distribution mains in our system includes three main categories – physical characteristics and conditions, operating conditions, and environmental considerations. Each of these three main categories are comprised of various individual criteria. Each water distribution main was assigned a score for each criteria, and the criteria were then weighted based on their relative importance (as determined by PW's Engineering staff using industry best practices and engineering judgement), for a total score in each category that adds up to a total overall score/ranking that defines each water main's priority and need for rehabilitation (NFR). The overall scores/rankings were then used to compare all water distribution mains against each other to prioritize them for rehabilitation. Finally, other, secondary factors and considerations (e.g., paving moratoriums, planned paving (roadway and sidewalk restoration projects), other planned utility work, etc.) were taken into account to adjust the planned timeline for certain water mains or areas for rehabilitation based on these other considerations.

The scores assigned for each criteria and the overall scores/rankings are identified quantitatively from 0 to 100, which correspond to a qualitative rehabilitation priority as follows:

REHABILITATION PRIORITY	SCORE/RANKING
Very Low	89.1-100
Low	79.1-89
Medium	65.1-79
High	65 or less

Each water main was assigned a score from 0 to 100 for each criteria, and then each criteria was weighted based on a percentage given its relative importance in our desktop condition assessment as determined by PW's Engineers. The total weighted percentages of all criteria add up to 100%, so in our evaluation the maximum possible score is 100 and the lowest possible score is 0. This percentage-based scoring system was used as our weighted-criteria approach for our desktop condition assessment to compare all water distribution mains for a data-driven and prioritized rehabilitation plan for our IFR WMR program. The following paragraphs describe each category and criteria in more detail, including their weighted percentages.

PHYSICAL CHARACTERISTICS (50% total)

Physical characteristics and conditions are "static" conditions – in other words, they are information that define the pipe characteristics based on pre-defined information and they provide a relative baseline upon which all water distribution mains can be compared relative to each other.

Age / Year of Installation (10%)

As with any component or piece of equipment, water mains cannot be expected to have an infinite service life. Typically, as pipe age increases, water main condition deteriorates and leaks, breaks, and failures increase. Water mains should therefore be replaced or rehabilitated before the end of their expected service life, which generally is between 50 to 100 years. This criteria defines the age of water mains from when the main was first installed to the present year (2020). Therefore, age is a linear scale from the oldest mains in the system to the most recently installed mains. Since we have data on age for almost all water mains in our system, age represents a relative baseline to compare all water mains to each other. The older the water distribution main, the lower the score it receives for this criteria. It is important to note that water mains can still be in service beyond their expected life, especially if they have not been problematic.

Material/Coating/Lining (25%)

Different pipe materials have different considerations and concerns, along with different expected service lives. As previously discussed, unlined CI water mains make up about half of our water system (and are about 52% of all our distribution mains) and certain mains have been found to be very problematic in terms of both water quality and hydraulic capacity. Unlined CI mains are therefore a significant focus of our WMR program and receive the lowest score for this criteria. Other water distribution main materials in PW's water system include asbestos-cement (AC) (about 27% of our water distribution mains), cement-lined ductile-iron (DI) (about 20% of our water distribution mains) and a very small amount of other materials that comprise about 1% of our water distribution mains (mostly Concrete and Polyvinyl Chloride (PVC)).

AC water mains are a mixture of Portland cement and asbestos fibers that because of their light weight, low frictional resistance, and general internal and external corrosions resistance, were frequently used for distribution mains up until about the late 1970s, when concerns emerged about the hazards of asbestos in the environment and in drinking water. Levels of asbestos in water systems are therefore continually monitored under the Safe Drinking Water Act (SDWA). AC pipe is no longer used for new installations based on concerns and health hazards related to asbestos. However, because they were frequently used up until about the late 1970s, many miles of AC water mains still existing in operation. AC water mains, although generally more resistant to corrosion than metallic pipe materials, are a rigid pipe and they can become very brittle, leaving them susceptible to failure and rupture in improper bedding conditions or from vibration (i.e., traffic loads above); they therefore can have significant break rates. If installed properly, AC water mains can still be an effective pipe material.

Ductile-iron (DI) pipe is perhaps now the most commonly used for water mains. DI is a cast-iron product, made of an iron alloy centrifugally cast in molds. Its previous CI predecessor prior to the 1970s was a gray iron and brittle material that was weak in tension. DI is produced with the addition of magnesium to molten low-sulfur based iron, which makes it about as strong as steel. DI is also commonly manufactured with an interior lining, such as cement mortar lining, that unlike its unlined CI predecessor is generally very durable and protects the interior surface from corrosion. With its exterior asphaltic coating, DI water mains are also relatively resistant to external corrosion; in more corrosive soil environments, they can also be provided with additional coatings or encased with wraps for added protection. DI water mains are therefore typically the newest mains in PW's system in terms of overall age and the least problematic with regards to leaks, breaks, and failures.

Concrete pipe is a rigid pipe that is used mostly for larger diameter water transmission mains. Polyvinyl Chloride (PVC) is a flexible, plastic pipe which has a good resistance to corrosion, is light weight and has a high strength to weight ratio.

Each water distribution main was scored based on its material in this criteria by PW's Engineers. Unlined CI mains received the lowest score based on the extensive amount that exists in our water system and as previously discussed the hydraulic capacity and water quality issues that are very problematic with unlined CI mains.

Lead Service Lines (LSLs) (10%)

Service lines that bring drinking water into homes and buildings that are made of lead can result in elevated lead levels at customer taps, and lead can cause serious health problems. Lead was used for service lines into homes and buildings up until about 1945, so older homes in our water system often have lead service lines (LSLs). Currently, of PW's total of about 77,000 service connections, about 11,000 have a lead service line (LSL). PW has many ongoing projects and initiatives to reduce lead levels at the tap, including treatment changes to make water less corrosive, an aggressive WMR program that also replaces public side lead service lines (the portion of a service line from the water main to the curb shutoff valve that is owned by PW), as well as a private-side lead service line (the portion of a service line that runs from the curb shutoff valve into a building that is owned by individual property owners) replacement loan program that encourages customers to replace their privately owned portion of a lead service line. Replacing lead service lines helps to remove sources of lead and thus helps to reduce lead levels at taps to protect customers from the harmful effects of lead. Given the concerns with lead, water distribution mains in areas of our system with lead service lines therefore receive scores for this criteria that increase their priority for replacement or rehabilitation.

Diameter (2.5%)

Water main diameter is a consideration because larger water distribution mains generally transport more water, supply more customers, and generally speaking are therefore more critical. Diameter is therefore a small, relative measure and comparison of water main criticality, with larger mains moving a larger volume of water and typically supplying a greater amount of customers. Larger, more critical water distribution mains therefore receive scores for this criteria that slightly increase their priority for replacement or rehabilitation, based on their general criticality.

Dead Ends (2.5%)

Water mains that are dead ends are not "looped" and are supplied from only one direction. While they frequently are located on dead-end roads, they can also be located elsewhere. Sometimes dead-end water mains are unavoidable, such as at a divisional valve that is needed to remain closed in order to isolates two distinct pressure gradients and zones. Flow velocity in in dead-end water mains is often low, which can lead to higher water age and water stagnation problems, resulting in more water quality issues and complaints. Not being "looped" and supplied from only one source, dead-end water mains also do not provide a redundant source of supply. Bleeders, or small diameter pipes, were sometimes located at the end of dead-end water mains to run water to waste in an attempt to move water and avoid stagnation and water quality problems; however this results in wasted water and is not very efficient. Although an indicator of a dead-end, bleeders are no longer found very often in our water system. Dead-end water mains are therefore not desirable and mains should be looped wherever possible to provide redundancy, enhanced circulation, and improved water quality. Water mains that are dead ends (other than unavoidable dead ends such as at division valves) therefore receive scores for this criteria that increase their priority for replacement or rehabilitation.

Location / Criticality

In any water system, certain water mains are more critical and have a greater consequence of failure. Consequence of failure is impacted by the type of customers (e.g., hospitals, medical facilities, schools, etc.) that water mains supply; the number of customers affected by a supply interruption of a water main and the duration of any supply interruption; location; hydraulics (loss of supply, reduced pressures, flow and firefighting capabilities); impacts of a failure to human activities; damage and impacts to physical surroundings (e.g., roads, highways, buildings, adjacent utilities, traffic detours, business closures, etc.) should a failure occur; and the potential to cause injuries or loss of life from a failure. Identifying critical water mains helps to effectively prioritize water main rehabilitation and therefore water mains that supply critical customers or that have a greater consequence of failure would receive greater priority for rehabilitation or replacement. Even though a water main supplies "critical" customers, the water main may be in good condition and does not necessarily require rehabilitation or replacement. However, combined with other criteria, these water mains may become a higher priority candidate for rehabilitation or replacement based on their location, criticality, and/or consequence of failure.

Currently, "critical" water mains can only be identified as the individual water mains that have a direct service connection to a critical facility, but there are likely many more "critical" water mains in our system. PW currently uses our general knowledge of our water system and locations of critical customers and facilities to qualitatively help to select water main rehabilitation project areas based on mains identified as high priority for replacement from our quantitative condition assessment weighted-criteria scoring system, which is why this criteria currently does not have a weighted percentage assigned to it. In future IFR plan updates, we hope to utilize our hydraulic water distribution system computer model (currently in the process of being updated and upgraded) to perform automated criticality simulations to identify all critical water mains and incorporate these results into our quantitative weighted-criteria condition assessment scoring and ranking system.

OPERATING CONDITIONS (50% total)

Operating conditions are "dynamic" conditions – they can change or vary over time based on system hydraulics, water quality, changes and improvements made to the system, and other variable conditions. They highlight specific issues, concerns, and/or problems that further elevate the priority of water mains for rehabilitation or replacement, above and beyond the baseline condition established by water main physical characteristics.

Water Quality / Customer Complaints (22.5%)

The deterioration of water quality that occurs in a water system is often signaled by customer complaints regarding the clarity, color, taste, and/or odor of the water. In a GIS database, PW tracks all water quality customer complaints by location, the type/reason of complaint, and follow-up actions. This criteria therefore defines areas with water mains with an associated and confirmed number of water quality complaints that can be indicative of problems associated with those water distribution mains. Water distribution mains in areas of our water system with water quality complaints therefore receive scores for this criteria that increase their priority for replacement or rehabilitation.

Lead Sampling Results (22.5%)

As previously discussed, lead can cause serious health problems. Lead can enter drinking water primarily through service lines or plumbing material made of or containing lead. As part of the EPA Lead and Copper Rule, PW samples and monitors lead levels at customer taps. Based on these sampling results, water distribution mains in areas of our water system with high lead levels therefore receive scores for this criteria increase their priority for replacement or rehabilitation.

Breaks & Leaks (5%)

Leaks are holes or cracks in a water main, valve, hydrant, appurtenance or service connection that continuously lose water but that does not result in a service interruption. Breaks are physical damage to a water main, valve, hydrant, appurtenance, or service connection that result in a service interruption until repairs are made. Currently, leaks are not problematic in the PW system, as there are no known areas in the system with a high frequency of leaks. Typically, water mains that have broken once are likely to break again and the intervals between breaks often becomes shorter. While a single break does not mark the complete failure of a water main, mains that have had multiple breaks and that have been fixed multiple times typically indicate that they may no longer be serviceable due to excessive repair history. A history of multiple breaks therefore is an indicator of water mains that are most in need of attention. Water distribution mains that have a history of breaks therefore receive scores for this criteria that increase their priority for replacement or rehabilitation. PW's new asset management software now provides a centralized location for storing records related to breaks and leaks and for future IFR plan updates, we hope to have a more extensive database of historical information to further score and weight this criteria to put a greater emphasis on breaks and leaks.

Pressure

Accepted industry standards require that water pressure be neither too low nor too high in homes and buildings. The optimal industry standard domestic service pressure is generally between 60 to 80 pounds per square inch (psi) at ground level. Low pressure can cause flow reductions when more than one water-using device is in service. High pressure can cause faucets, fixtures or plumbing fittings to leak; hot water tank and heater pressure relief valves to discharge; lead to an increase in water main break rates; and result in excess water being wasted in leaks and water main breaks. Industry standards recommend that the maximum pressure in a water distribution system be no more than 90 to 100 psi, and plumbing codes often require pressure reducing valves for pressures that exceed 75-80 psi. Higher pressure, therefore, is a small, relative comparison measure to elevate water main priority for rehabilitation or replacement based on a higher chance of water main leak and/or breaks. PW currently uses our general knowledge of our water system and typical static pressures to help select water main rehabilitation project areas based on mains identified as high priority for replacement from our quantitative condition assessment weighted-criteria scoring system, which is why this criteria currently does not have a weighted percentage assigned to it. In future IFR plan updates, we plan to utilize our updated hydraulic water distribution system computer model (currently in the process of being updated and upgraded) to run various simulations and incorporate pressure results into our quantitative weighted-criteria condition assessment scoring and ranking system. Currently, water models report pressure at junctions, so PW is in the process of developing a method to geospatially link these junction pressure results to nearby water mains that can then be used quantitatively to develop numeric scores for this criteria.

Hydraulic Capacity

Undersized or heavily tuberculated water mains result in high friction losses and reduced hydraulic capacity (reduced flow rates and pressures). Low pressure can cause flow reductions when more than one water-using device is in service. With regards to low pressure, industry standards recommend that minimum pressure during peak demands should not be less than 35 psi. Furthermore, National Fire Protection Association (NFPA) and AWWA require that a minimum pressure of 20 psi be maintained at all ground elevations when fire flows occur during maximum day demands, which provides for adequate supply of water to a fire pumper truck while overcoming friction losses in hydrant branches, hydrants, and suction hoses to the pumper truck. PW currently uses information and results from field data from our unidirectional flushing (UDF) and fire hydrant flow tests, to help select water main rehabilitation project areas based on mains identified as high priority for replacement from our quantitative condition assessment weighted-criteria scoring system, which is why this criteria currently does not have a weighted percentage assigned to it. Water mains identified with large pressure losses from our UDF program and results from fire hydrant flow test, both of which are when mains are flushed and/or run under stressed conditions, provide a “snapshot” that is currently compared against National Fire Protection Association (NFPA) industry standards as a qualitative consideration to help select project areas for water main rehabilitation. For future IFR plan updates, we plan to run more detailed extended period simulations throughout our entire water system to further evaluate fire flows and peak flow conditions that indicate whether a water main is undersized and/or its internal condition is resulting in reduced hydraulic capacity; these results will then be used in the future to assign a quantitative score to every water distribution main for this criteria.

Condition

Water mains are buried beneath the ground and it is therefore difficult to know their true condition unless they are excavated for any reason. This criteria represents any known condition or structural issues with a water main and/or where the condition of the interior of the main is degraded, based on any investigations, studies, or other times if and when the main was excavated for repairs. Providence Water now has a program, that every time a water main is opened (e.g., to repair a break, replace a valve, cut in a new valve, etc.), the interior and exterior of the water main is photographed to document its condition. Additionally, if any condition assessment investigations have been performed on water mains using any internal or external non-destructive testing methods (e.g., electromagnetic, ultrasonic, acoustic, etc.), these condition assessment results are reflected in this criteria. PW currently uses our general knowledge of our water system and information on pipe condition from repairs made to qualitatively help to select water main rehabilitation project areas based on mains identified as high priority for replacement from our quantitative condition assessment weighted-criteria scoring system, which is why this criteria currently does not have a weighted percentage assigned to it. Moving forward for future IFR plan updates, we are working to gather more data for this criteria from our new asset management system and develop a quantitative scoring system for this criteria to further incorporate it into our quantitative weighted-criteria condition assessment scoring and ranking system.

ENVIRONMENTAL CONSIDERATIONS

Environmental considerations are factors that represent environmental conditions that can affect the performance or longevity of a water main or otherwise increase a water main's priority for rehabilitation or replacement. These are generally factors that highlight environmental issues that further elevate the concern about water mains, above and beyond their baseline physical conditions and operating conditions. Currently, PW uses this category and these criteria qualitatively to help select water main rehabilitation project areas based on mains identified as high priority for replacement from our quantitative condition assessment weighted-criteria scoring system, which is why this category and criteria currently does not have weighted percentages assigned to it. Moving forward for future IFR plan updates, we hope to have more quantitative data that can be geospatially linked to water mains and used in our quantitative weighted-criteria condition assessment scoring and ranking system.

Soil Type/Corrosivity

Typically corrosive soil environments are problematic for water mains and lead to higher water main break rates, especially for metallic or metallic containing pipe materials. For future IFR plan updates, we hope to be able to incorporate soils maps (e.g., from the United States Department of Agriculture, National Resource Conservation Service (Soil Properties and Qualities)) in our GIS database to quantitatively assess and assign scores to each water distribution main based on soil corrosivity ratings.

OTHER / OPPORTUNITY FACTORS & CONSIDERATIONS

The criteria described above were used to develop and prioritize our WMR program, as they directly relate to and drive our decision making approach to achieve the goals and objectives of our program. But PW also strives to coordinate all our WMR work with recent and planned roadway paving and restoration, as well as work performed by other utilities by continually providing all municipalities and utility stakeholders with our planned water main work areas and requesting they provide their planned work areas to PW. We adjust our planned WMR projects and planned work areas as needed and on a continual basis to coordinate our work to limit disruptions and impacts to areas, customers, businesses, traffic, and newly paved roads; replace our water mains before roadway paving or other utility (drain, gas, sewer, other utility project, etc.) work will be occurring; and avoid working in roads and streets that have recently been repaved. As part of the development of our WMR program, PW contacted all of our service communities (Providence, North Providence, Cranston, Smithfield and Johnston), utility agencies (COX, RIDOT, NBC, National Grid, Verizon), and other project stakeholders to request any data and information that they have related to paving moratoriums, upcoming planned roadway paving and sidewalk restoration projects, and upcoming utility work and projects (drain, sewer, gas, electric, communications, etc.). The following factors and considerations were therefore based on the data and information provided to PW by these entities as of October 2020 during preparation of this IFR plan update. PW took this information into account to make final adjustments to our planned WMR program and initial 5-year water main rehabilitation plan and we will continue to update our planned work areas in the future as additional information becomes available from these agencies.

Paving (Moratoriums and Planned Work)

PW gathered data and information from all our service communities on roads that have recently been paved and are in a state of moratorium with regards to pavement and any excavation work, as well as their upcoming plans to pave roads and/or restore sidewalks. We adjust our WMR plans in accordance with this information. For roads recently paved and/or currently in a state of moratorium, we adjust our planned work to avoid these roads while they are in a state of moratorium, so as to avoid excavating in newly paved roads. For roads that are planned to be paved in the near future, we adjust our water main work to include rehabilitation or replacement of water mains in those roads before they will be paved, even if the water main may not have been in the highest priority category for rehabilitation – we want to upgrade our water mains in roads that will be paved and that will be otherwise in a state of moratorium that could prevent us from rehabilitating our water mains.

Other Utility Work

PW contacted representatives from utility agencies to gather data and information on their planned utility work. For any roads with work planned by other utility agencies, we adjust our water main work to include rehabilitation or replacement of water mains in those roads concurrent with the other utility work and/or before they are scheduled to be paved, even if the water main may not have been in the highest priority category for rehabilitation – this limits disruption to areas and upgrades our water mains in roads that may be paved that would otherwise would be in a state of moratorium that could prevent us from rehabilitating our water mains.

RESULTS OF CONDITION ASSESSMENT & 20-YEAR WMR PROGRAM

PW maintains information on all our water system assets in a GIS database. Water mains are one layer that makes up this GIS database, and this layer contains all the information on our water mains. All the GIS layers are linked together as part of a spatial mapping network, which defines the relationship between the layers and allows PW to use GIS spatial and database tools to determine and/or assign numerical rankings, scores, and values to any GIS asset, including water mains. The water distribution main GIS data was exported from GIS into a spreadsheet, to assign scores to each pipe for each criteria and then calculate each pipe's overall score/ranking based on the assigned scores and weighted percentages. The overall scores/rankings for all water distribution mains from our desktop condition assessment were then incorporated back into our GIS database and linked to each GIS water main asset segment to create color-coded maps based on their final, weighted, and prioritized ranking.

The results of our desktop condition assessment that we incorporated into our GIS database were then used to make decisions to prioritize water mains for rehabilitation. The results of our desktop condition assessment and corresponding 20-year WMR program with 5-year water main rehabilitation plan is presented in the following figures and tables and summarized in the following paragraphs.

20-YEAR WMR PROGRAM (2021 TO 2040) & 5-YEAR REHABILITATION PLAN (2021 TO 2025)

Exhibit 9 presents the overall results of our desktop condition assessment for our next 20-year IFR planning period. Water distribution mains are grouped and color-coded based their overall score/ranking from our desktop condition assessment. As shown on this figure, water distribution mains with a score/ranking of 65 or less are shown in red and represent the highest priority for water main rehabilitation over the next 20 years. There are about 135 miles of water distribution mains (14% of our total of 943 miles of water distribution mains) shown on this map with a score/ranking of 65 or less, and these represent the mains that PW will focus on over the next 20 year IFR period.

To determine our water main rehabilitation plan for the next five years from 2021 to 2025, we reviewed the water mains with a score/ranking of 65 or less that represent the highest priority for rehabilitation. We reviewed them against areas where we currently are or recently have been performing water main rehabilitation, roads with paving moratoriums, areas with planned roadway and/or sidewalk restoration, and areas with other upcoming planned utility work. As can been seen from Exhibit's 9 and 10, we selected water main rehabilitation project areas for the next five years that are adjacent to and continue the water main rehabilitation work we have recently been performing. Generally, these areas have been at the farthest extremities of our water system, where water age from our source and treatment plant is typically the longest. It should be noted that in the project areas we selected for the next five years from 2021 to 2025, these area also include some water mains with scores/rankings above 65 – this is to take advantage of economy of scale and cost efficiencies by selecting project areas in the same geographical areas. It also should be noted that some of the areas selected for rehabilitation for 2021 our carryover from the last IFR plan, which was developed under a slightly different scoring system to prioritize water distribution mains for rehabilitation. Exhibit 10 shows a year-by-year water main rehabilitation project area plan for the next five years from 2021 to 2025.

In selecting the limits for each of the water main rehabilitation project area, PW used our historical unit cost database for water main rehabilitation and replacement to establish a planning-level unit cost per foot for water main rehabilitation, which includes all costs for water main rehabilitation work (replacing and/or cleaning and cement lining water mains); installing new hydrants, valves and appurtenances; replacing service connections; trenching, earthwork, and permanent restoration (roadway paving, sidewalk restoration, loaming and seeding, etc.); traffic control (police details and flaggers); construction inspections; and appropriate planning-level contingencies. We established a conservative planning-level unit cost of $350 per foot for water main rehabilitation based on our historical database. This planning-level water main rehabilitation unit cost was then used to determine the approximate total length of water mains that could be rehabilitated each year to meet our objective to rehabilitate at least $19.1 million of water mains per year. A year-by-year summary of our planned water main rehabilitation is as follows:

YEAR	LENGTH (miles)	ESTIMATED AMOUNT
2021	17.6	$32,500,000
2022	10.0	$18,500,000
2023	12.3	$22,700,000
2024	11.2	$20,700,000
2025	12.5	$23,000,000
TOTAL	**63.5**	**$117,400,000**
	AVERAGE $/YEAR =	**$23,480,000**

As this table shows, as part of our WMR program over the next five years from 2021 to 2025, PW plans to spend $23,480,000 on average per calendar year on water main rehabilitation and replacement, for a total of over $117,000,000 in water main rehabilitation and replacement in the next five years. Note that these values may slightly differ from the spending plan presented elsewhere in our IFR plan, as the spending plan is based on fiscal years and this table shows projected costs based on calendar years (and construction seasons). Additionally, each year has additional "one-off" projects that come up to addressing pressing issues that further add to this planned water main rehabilitation spending each year.

The table following Exhibit 10 presents a summary of all water mains that we plan to rehabilitate over the next five years from 2021 to 2025 that corresponds with the maps previously discussed. The streets are organized by service community and street in alphabetical order, along with their weighted score from our condition assessment.

Our IFR plan and this WMR program is a living document, and as specific planning, design, and implementation are in process, we may modify this plan in the future to adjust to changing conditions and new or updated information. Our WMR program is based on the best available information we have at this current time. For example, if upcoming planned paving in a service community changes, or if another utility's planned work changes, we may adjust our planned water main rehabilitation work and reallocate funding in order to rehabilitate water mains in those roads that will otherwise be under a paving moratorium once they are restored and paved. We may also adjust our planned water main rehabilitation work to realize savings from cost sharing for permanent road restoration by working in a road concurrently with another utility agency.

As with any condition assessment, it is a recurring, progressive, and iterative process. This current assessment is based on our current data and information. We will continue to revise and update as necessary when new information becomes available, and then again with future iterations of IFR plan updates (the next update in 5 years in 2025). For listed criteria that did not include any quantitative scoring or weighted percentages in the condition assessment for this IFR plan, it is important to note that these criteria may drive future changes to our condition assessment and WMR program. Moving forward, we plan to update our evaluations with additional condition assessment data and results, hydraulic modeling simulations and results, and criticality assessments. The results of this current condition assessment will also establish the basis for our next IFR plan update in 2025.

Exhibit 9 - Water Main Condition Assessment

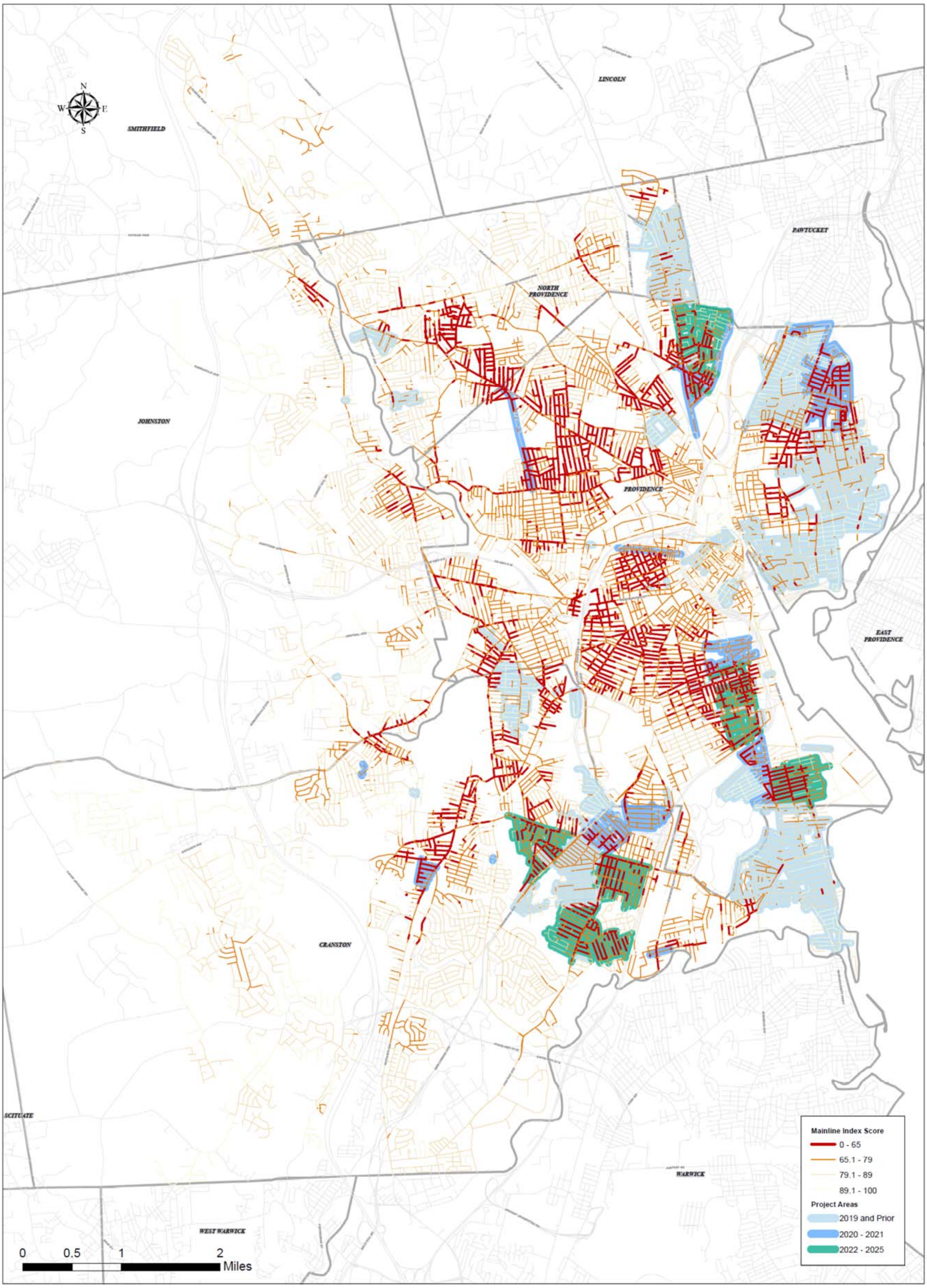
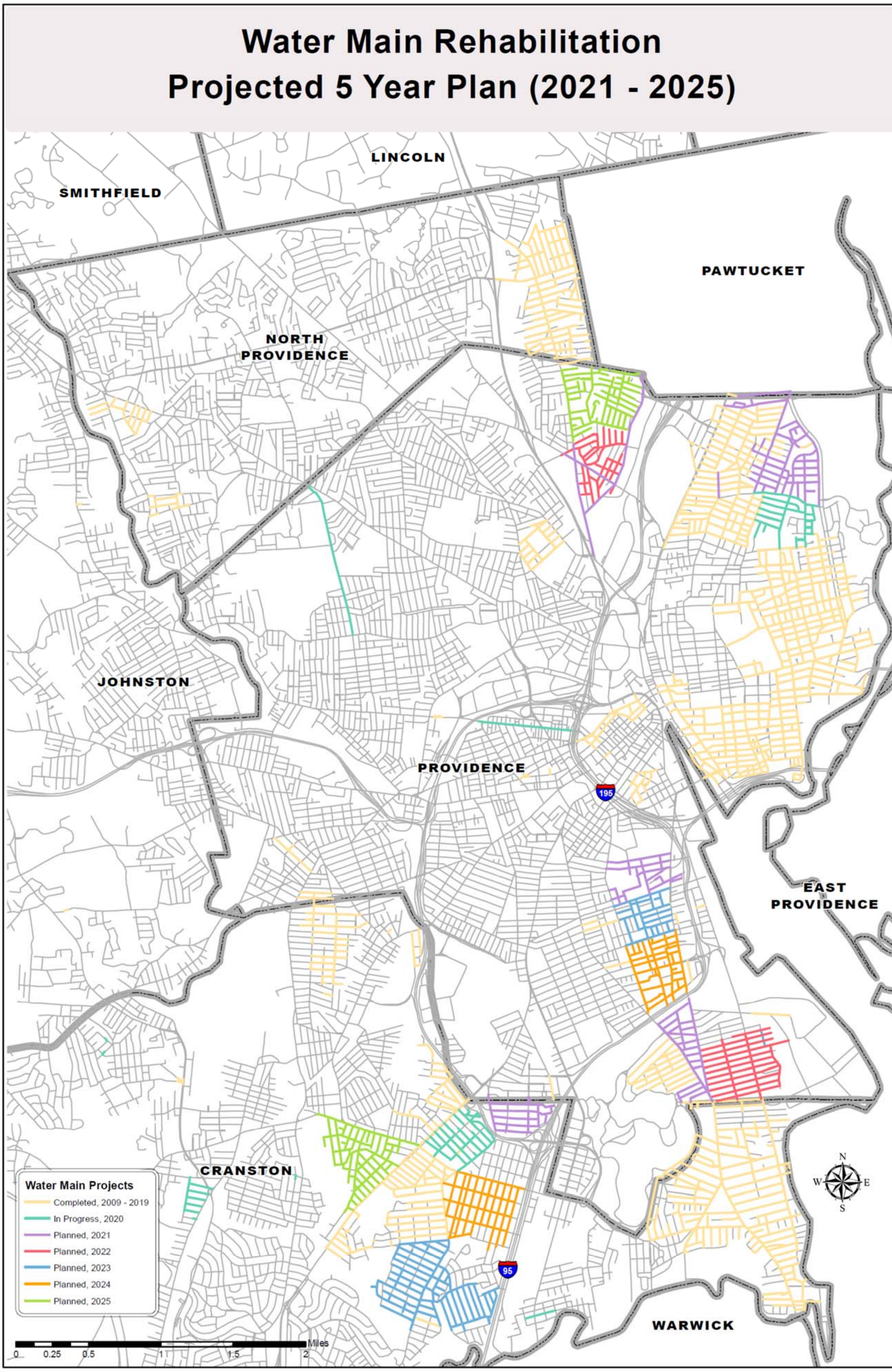


Exhibit 10 - Projected 5 Year Water Main Rehabilitation Plan



Projected Streets for Calendar Year 2021

STREET	CITY	YEAR	LENGTH in FT
ALPHONSO ST	PROVIDENCE	2021	255
BLACKSTONE ST	PROVIDENCE	2021	2353
BOGMAN ST	PROVIDENCE	2021	514
BORINQUEN ST	PROVIDENCE	2021	697
CHESTER AVE	PROVIDENCE	2021	244
CULVER ST	PROVIDENCE	2021	576
DUDLEY ST	PROVIDENCE	2021	2343
EUDORA ST	PROVIDENCE	2021	409
GAY ST	PROVIDENCE	2021	489
HILTON ST	PROVIDENCE	2021	387
JANES ST	PROVIDENCE	2021	195
MILK ST	PROVIDENCE	2021	589
PILGRIM ST	PROVIDENCE	2021	663
PLAIN ST	PROVIDENCE	2021	1325
RHODES	PROVIDENCE	2021	1316
STANFORD ST	PROVIDENCE	2021	698
WILLARD AVE	PROVIDENCE	2021	1273
BALTON RD	PROVIDENCE	2021	567
BAYARD ST	PROVIDENCE	2021	305
BLACKSTONE BLVD	PROVIDENCE	2021	3344
BURLINGTON ST	PROVIDENCE	2021	1041
CAMP ST	PROVIDENCE	2021	913
CHASE AVE	PROVIDENCE	2021	2313
CHASE DR	PROVIDENCE	2021	204
COLE AVE	PROVIDENCE	2021	1763
CREATION DR	PROVIDENCE	2021	597
EIGTH ST	PROVIDENCE	2021	800
ELMGROVE AVE	PROVIDENCE	2021	2303
FIFTH ST	PROVIDENCE	2021	905
FOURTH ST	PROVIDENCE	2021	1363
HARTSHORN RD	PROVIDENCE	2021	207
HARWICH RD	PROVIDENCE	2021	870
HILLSIDE AVE	PROVIDENCE	2021	1915
HOLLY ST	PROVIDENCE	2021	863
HOPE ST	PROVIDENCE	2021	3909
INTERVALE RD	PROVIDENCE	2021	1212
LAURISTON ST	PROVIDENCE	2021	1003
LINDEN DR	PROVIDENCE	2021	345
LORIMER AVE	PROVIDENCE	2021	1906
LORIMER AVE	PROVIDENCE	2021	601
MUTUAL PL	PROVIDENCE	2021	248
NORTH AVE	PROVIDENCE	2021	616

STREET	CITY	YEAR	LENGTH in FT
SIXTH ST	PROVIDENCE	2021	1579
WESTFORD RD	PROVIDENCE	2021	1084
WINFIELD CT	PROVIDENCE	2021	174
WINFIELD RD	PROVIDENCE	2021	256
WINFIELD RD	PROVIDENCE	2021	733
WINGATE RD	PROVIDENCE	2021	926
ALEXANDER ST	CRANSTON	2021	795
ALEXANDER ST	CRANSTON	2021	248
BRANDON RD	CRANSTON	2021	1680
BROOKSIDE DR	CRANSTON	2021	1306
DORIC AVE	CRANSTON	2021	297
FRIENDLY RD	CRANSTON	2021	2453
MONUMENT ST	CRANSTON	2021	794
PAINE AVE	CRANSTON	2021	2386
PARKMAN ST	CRANSTON	2021	231
PONTIAC AVE	CRANSTON	2021	1339
WELFARE AVE	CRANSTON	2021	1644
ALDRICH ST	PROVIDENCE	2021	1381
BAILEY BLVD	PROVIDENCE	2021	231
BAKER ST	PROVIDENCE	2021	1017
BROAD ST	PROVIDENCE	2021	3473
BROOM ST	PROVIDENCE	2021	500
CALLA ST	PROVIDENCE	2021	425
CASS ST	PROVIDENCE	2021	681
CHAPMAN ST	PROVIDENCE	2021	484
CYR ST	PROVIDENCE	2021	769
EDDY ST	PROVIDENCE	2021	3421
FARRAGUT AVE	PROVIDENCE	2021	951
JILLSON ST	PROVIDENCE	2021	607
JOHNSON ST	PROVIDENCE	2021	492
MORTON ST	PROVIDENCE	2021	385
NORTH MARION AVE	PROVIDENCE	2021	1306
O'CONNOR ST	PROVIDENCE	2021	1409
PORTER ST	PROVIDENCE	2021	561
PORTER ST	PROVIDENCE	2021	497
BRANCH AVE	PROVIDENCE	2021	2164
CHARLES ST	PROVIDENCE	2021	4152
SILVER SPRING ST	PROVIDENCE	2021	4997
SMITHFIELD AVE	PROVIDENCE	2021	760

Projected Streets for Calendar Year 2022

STREET	CITY	YEAR	LENGTH in FT
ASCHAM ST	PROVIDENCE	2022	734
ASHTON ST	PROVIDENCE	2022	985
CHATHAM ST	PROVIDENCE	2022	1550
COMMODORE ST	PROVIDENCE	2022	1393
DENISON ST	PROVIDENCE	2022	331
EDWARD ST	PROVIDENCE	2022	394
FLORA ST	PROVIDENCE	2022	1128
GRAFTON ST	PROVIDENCE	2022	624
HALL ST	PROVIDENCE	2022	455
HAWKINS ST	PROVIDENCE	2022	1437
HORTON ST	PROVIDENCE	2022	455
IANTHE ST	PROVIDENCE	2022	379
LOMBARDI ST	PROVIDENCE	2022	416
LORETO ST	PROVIDENCE	2022	436
LUNA ST	PROVIDENCE	2022	1044
MALVERN ST	PROVIDENCE	2022	657
MARIETTA ST	PROVIDENCE	2022	946
MCMILLEN ST	PROVIDENCE	2022	700
METCALF ST	PROVIDENCE	2022	1072
NORTHUP AVE	PROVIDENCE	2022	1053
STONE ST	PROVIDENCE	2022	714
TOURO ST	PROVIDENCE	2022	1083
VAUGHAN ST	PROVIDENCE	2022	546
ALABAMA AVE	PROVIDENCE	2022	2346
CALIFORNIA AVE	PROVIDENCE	2022	2634
CAROLINA AVE	PROVIDENCE	2022	2670
GEORGIA AVE	PROVIDENCE	2022	2656
INDIANA AVE	PROVIDENCE	2022	2500
MASSACHUSETTS AVE	PROVIDENCE	2022	2552
MICHIGAN AVE	PROVIDENCE	2022	1568
NARRAGANSETT BLVD	PROVIDENCE	2022	2443
NEW YORK AVE	PROVIDENCE	2022	3231
OHIO AVE	PROVIDENCE	2022	2526
TORONTO AVE	PROVIDENCE	2022	1388
VERMONT AVE	PROVIDENCE	2022	2706
VIRGINIA AVE	PROVIDENCE	2022	2248
WASHINGTON AVE	PROVIDENCE	2022	2674

Projected Streets for Calendar Year 2023

STREET	CITY	YEAR	LENGTH in FT
AUTUMN ST	CRANSTON	2023	561
BRANCH AVE	CRANSTON	2023	446
BRYANT RD	CRANSTON	2023	1548
COLONIAL AVE	CRANSTON	2023	1816
DAVIS AVE	CRANSTON	2023	2081
DAVIS CT	CRANSTON	2023	190
FAIRFIELD RD	CRANSTON	2023	1528
FORDSON AVE	CRANSTON	2023	1308
GLENWOOD AVE	CRANSTON	2023	869
GREENWAY ST	CRANSTON	2023	354
HAWTHORNE AVE	CRANSTON	2023	1283
KEITH AVE	CRANSTON	2023	1327
MASON AVE	CRANSTON	2023	1330
MYRTLE AVE	CRANSTON	2023	1669
NORMAN AVE	CRANSTON	2023	1388
PONTIAC AVE	CRANSTON	2023	3562
SPRING ST	CRANSTON	2023	235
SPRING ST	CRANSTON	2023	155
SUMMER ST	CRANSTON	2023	753
SUMMER ST	CRANSTON	2023	90
SUMMER ST	CRANSTON	2023	219
TALLMAN AVE	CRANSTON	2023	1425
TENNESSEE AVE	CRANSTON	2023	628
WALDRON AVE	CRANSTON	2023	1590
BURNSIDE ST	PROVIDENCE	2023	1086
FRENCH ST	PROVIDENCE	2023	302
HARRIET ST	PROVIDENCE	2023	950
LOUISA ST	PROVIDENCE	2023	350
OCEAN ST	PROVIDENCE	2023	1481
OXFORD ST	PROVIDENCE	2023	1827
PLAIN ST	PROVIDENCE	2023	545
POTTERS AVE	PROVIDENCE	2023	1898
PUBLIC ST	PROVIDENCE	2023	2121
REYNOLDS AVE	PROVIDENCE	2023	550
SARATOGA ST	PROVIDENCE	2023	766
SAYLES ST	PROVIDENCE	2023	1269
SEARLE ST	PROVIDENCE	2023	346
SWAN ST	PROVIDENCE	2023	1063
TEMPLE CT	PROVIDENCE	2023	196
TEMPLE ST	PROVIDENCE	2023	514
TRASK ST	PROVIDENCE	2023	1086
ALLEN AVE	CRANSTON	2023	207

STREET	CITY	YEAR	LENGTH in FT
ASH AVE	CRANSTON	2023	1230
BEECH AVE	CRANSTON	2023	1278
BELMONT RD	CRANSTON	2023	341
BOXWOOD AVE	CRANSTON	2023	1293
BRADFORD RD	CRANSTON	2023	365
BREWSTER RD	CRANSTON	2023	547
CASE AVE	CRANSTON	2023	567
DALE AVE	CRANSTON	2023	1257
FAIRWEATHER AVE	CRANSTON	2023	916
FOREST AVE	CRANSTON	2023	1077
FOREST AVE	CRANSTON	2023	1455
GROVE AVE	CRANSTON	2023	1144
HARPER AVE	CRANSTON	2023	1503
HEMLOCK AVE	CRANSTON	2023	1156
MALDEN ST	CRANSTON	2023	696
MAPLETON ST	CRANSTON	2023	2224
MILFORD ST	CRANSTON	2023	656
PHILMONT AVE	CRANSTON	2023	754
ROCKLAND AVE	CRANSTON	2023	730
TENNYSON RD	CRANSTON	2023	1270
WALTHAM ST	CRANSTON	2023	1011
WOBURN ST	CRANSTON	2023	472

Projected Streets for Calendar Year 2024

STREET	CITY	YEAR	LENGTH in FT
APPLEGATE LN	PROVIDENCE	2024	387
ASHMONT ST	PROVIDENCE	2024	961
AUTUMN ST	PROVIDENCE	2024	444
BRIGGS ST	PROVIDENCE	2024	926
BURNSIDE ST	PROVIDENCE	2024	1104
CAHILL ST	PROVIDENCE	2024	535
COLFAX ST	PROVIDENCE	2024	1331
DAYTON CT	PROVIDENCE	2024	177
EDDY ST	PROVIDENCE	2024	2301
GALLUP ST	PROVIDENCE	2024	1343
HARRIET ST	PROVIDENCE	2024	400
PRAIRIE AVE TO OCEAN ST	PROVIDENCE	2024	839
THURBERS AVE TO RICHARDSTON ST	PROVIDENCE	2024	242
MILLARD ST	PROVIDENCE	2024	325
MINER ST	PROVIDENCE	2024	392
MYSTIC ST	PROVIDENCE	2024	470
NEBRASKA ST	PROVIDENCE	2024	430
OCEAN ST	PROVIDENCE	2024	2500
OCEAN ST	PROVIDENCE	2024	1157
PAVILION AVE	PROVIDENCE	2024	1672
PRAIRIE AVE	PROVIDENCE	2024	2618
RACHEL ST	PROVIDENCE	2024	379
RICHARDSON ST	PROVIDENCE	2024	843
RUGBY ST	PROVIDENCE	2024	1925
TENNYSON LN	PROVIDENCE	2024	191
THURBERS AVE	PROVIDENCE	2024	1692
WYATT ST	PROVIDENCE	2024	426
AUBURN ST	CRANSTON	2024	2679
CLARENCE ST	CRANSTON	2024	2538
GARDEN ST	CRANSTON	2024	2079
GRACE ST	CRANSTON	2024	2168
GREENWOOD ST	CRANSTON	2024	1615
HODSELL ST	CRANSTON	2024	810
LAURENS ST	CRANSTON	2024	2300
MAGNOLIA ST	CRANSTON	2024	2449
ORCHARD ST	CRANSTON	2024	1616
ORCHARD ST	CRANSTON	2024	1634
PARK AVE	CRANSTON	2024	2522
POTTER ST	CRANSTON	2024	2297
RICHARD ST	CRANSTON	2024	2404
ROLFE SQ	CRANSTON	2024	1647
SOUTH CLARENDON ST	CRANSTON	2024	2174
WOODBINE ST	CRANSTON	2024	2274

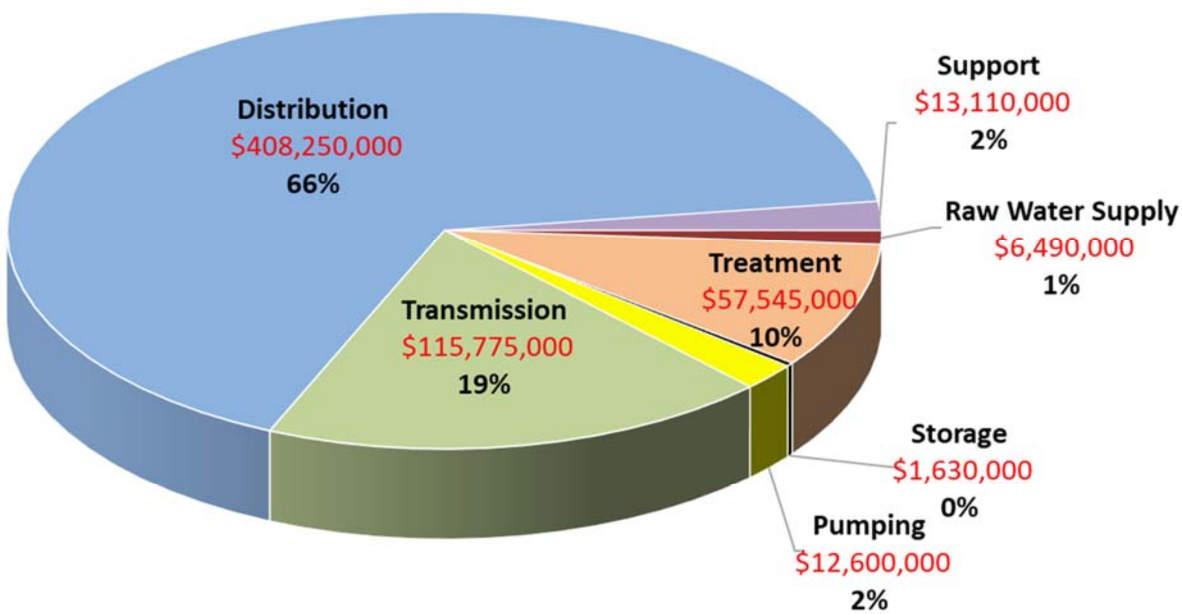
Projected Streets for Calendar Year 2025

STREET	CITY	YEAR	LENGTH in FT
AMORY ST	PROVIDENCE	2025	618
ARGOL ST	PROVIDENCE	2025	1168
BATCHELLER AVE	PROVIDENCE	2025	554
BISMARK ST	PROVIDENCE	2025	1078
BLAINE ST	PROVIDENCE	2025	659
BROCKTON ST	PROVIDENCE	2025	537
CHARLES ST	PROVIDENCE	2025	2595
CHRISTOPHER ST	PROVIDENCE	2025	1052
COMO ST	PROVIDENCE	2025	135
DANBY ST	PROVIDENCE	2025	529
DEPINEDO ST	PROVIDENCE	2025	1636
DEVON ST	PROVIDENCE	2025	367
DIMARIO DR	PROVIDENCE	2025	324
EDGEWORTH AVE	PROVIDENCE	2025	1012
EDGEWORTH AVE	PROVIDENCE	2025	409
ENTERPRISE ST	PROVIDENCE	2025	239
FOCH AVE	PROVIDENCE	2025	683
GILLEN ST	PROVIDENCE	2025	752
HAMPTON ST	PROVIDENCE	2025	548
JASPER ST	PROVIDENCE	2025	965
JOB ST	PROVIDENCE	2025	1361
LEDGE ST	PROVIDENCE	2025	2097
LINDA CT	PROVIDENCE	2025	894
LUKE ST	PROVIDENCE	2025	440
MARISA LN	PROVIDENCE	2025	193
MILANO ST	PROVIDENCE	2025	354
NELLIE ST	PROVIDENCE	2025	723
PARENTE ST	PROVIDENCE	2025	260
PAUL ST	PROVIDENCE	2025	666
PETER ST	PROVIDENCE	2025	697
QUARRY ST	PROVIDENCE	2025	154
RACHAEL AVE	PROVIDENCE	2025	582
SEDAN ST	PROVIDENCE	2025	595
SEDAN ST	PROVIDENCE	2025	232
SMART ST	PROVIDENCE	2025	476
SMART ST	PROVIDENCE	2025	1066
SPOKANE ST	PROVIDENCE	2025	560
SWIFT ST	PROVIDENCE	2025	1496
WILNA ST	PROVIDENCE	2025	459
WILNA ST	PROVIDENCE	2025	261
WINDMILL ST	PROVIDENCE	2025	2107
AMALIA AVE	CRANSTON	2025	178

STREET	CITY	YEAR	LENGTH in FT
AUSDALE RD	CRANSTON	2025	901
AUSDALE RD	CRANSTON	2025	1658
AUSDALE RD	CRANSTON	2025	399
BROOKWOOD RD	CRANSTON	2025	1040
CALAMAN RD	CRANSTON	2025	2952
COASTWAY PLZ	CRANSTON	2025	489
COLUMBUS BLVD	CRANSTON	2025	951
COLUMBUS BLVD	CRANSTON	2025	673
CROTHERS AVE	CRANSTON	2025	1674
DEBORAH WY	CRANSTON	2025	263
EGAN RD	CRANSTON	2025	375
GARLAND AVE	CRANSTON	2025	1818
GRISWOLD AVE	CRANSTON	2025	382
HANDY AVE	CRANSTON	2025	252
HEMALIN RD	CRANSTON	2025	414
HUMBERT AVE	CRANSTON	2025	819
KNOLLWOOD AVE	CRANSTON	2025	3111
LEYDEN ST	CRANSTON	2025	482
LOCKMERE RD	CRANSTON	2025	578
LORETTA ST	CRANSTON	2025	326
NORTH VALE AVE	CRANSTON	2025	2227
NOWELL RD	CRANSTON	2025	214
ORLANDO AVE	CRANSTON	2025	489
PARK AVE	CRANSTON	2025	3879
RICHLAND RD	CRANSTON	2025	1326
RIVERFARM RD	CRANSTON	2025	1134
ROSLYN AVE	CRANSTON	2025	1793
SEYMOUR AVE	CRANSTON	2025	785
SPENSTONE RD	CRANSTON	2025	550
STEVENS RD	CRANSTON	2025	891
SUTTON PL	CRANSTON	2025	696
TURN ST	CRANSTON	2025	200
VIKING RD	CRANSTON	2025	297

Exhibit 1 - 20 Year IFR Expenditure Plan - FY 2021 - 2040

	Total Amount	Budget 2021-2025	Budget 2026-2030	Budget 2031-2035	Budget 2036-2040
Raw Water Supply	$6,490,000	$ 3,670,000	$ 2,080,000	$ 370,000	$ 370,000
Treatment	$57,545,000	$ 45,905,000	$ 2,850,000	$ 5,170,000	$ 3,620,000
Storage	$1,630,000	$ 480,000	$ 350,000	$ 450,000	$ 350,000
Pumping	$12,600,000	$ 7,000,000	$ 4,200,000	$ 1,050,000	$ 350,000
Transmission	$115,775,000	$ 33,225,000	$ 25,850,000	$ 30,850,000	$ 25,850,000
Distribution	$408,250,000	$ 108,250,000	$ 100,000,000	$ 100,000,000	$ 100,000,000
Support	$13,110,000	$ 7,500,000	$ 1,870,000	$ 1,870,000	$ 1,870,000
Total	**$615,400,000**	**$206,030,000**	**$137,200,000**	**$139,760,000**	**$132,410,000**



TOTAL INVESTMENT INTO SYSTEM $615,400,000

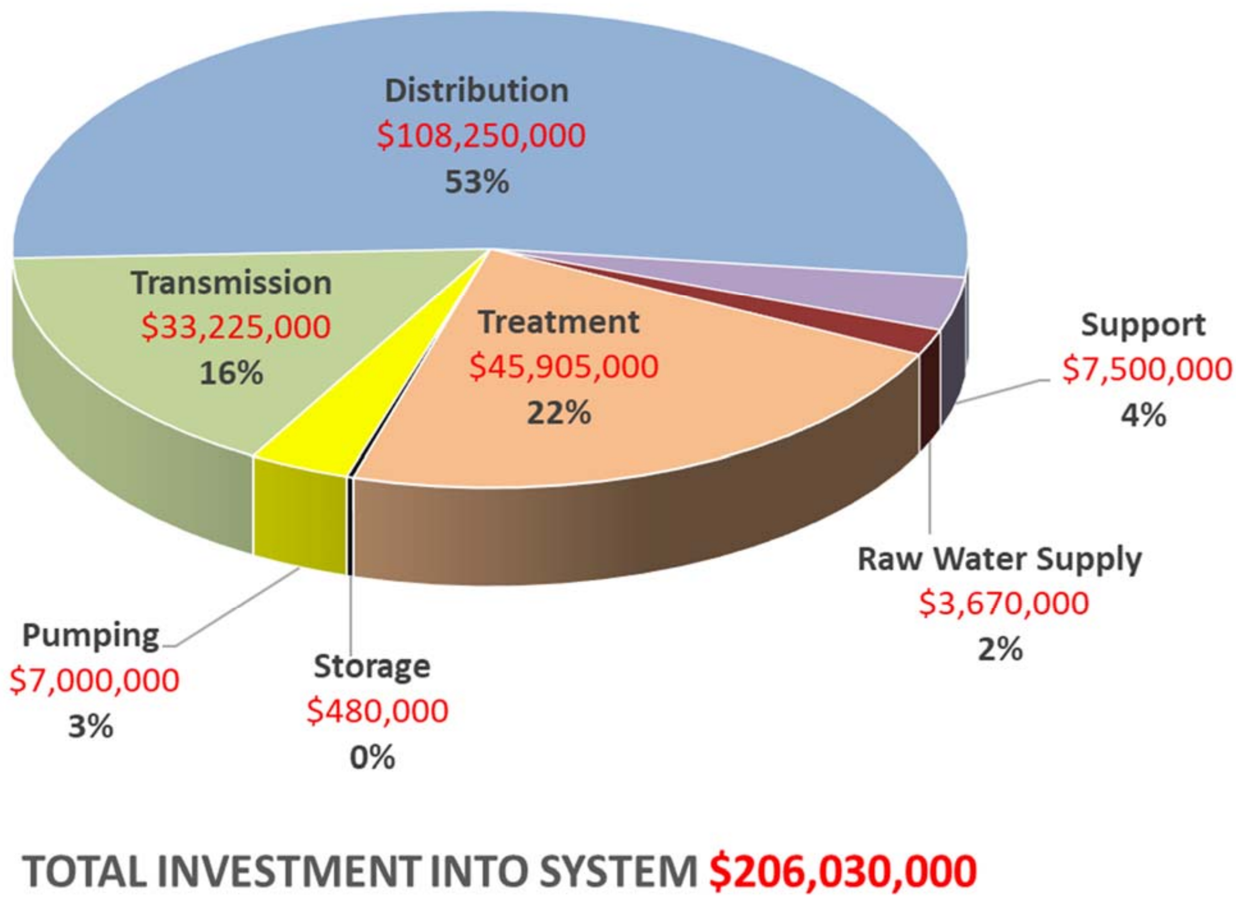
Exhibit 11 - 5 Year IFR Expenditure Plan - FY 2021 – 2025

	Providence Water IFR Expenditure Plan FY 2021 through 2025	Budget 2021 - 2025	Budget 2021	Budget 2022	Budget 2023	Budget 2024	Budget 2025
	RAW WATER SUPPLY						
1	**Raw Water Supply Facilities**						
1A	Various Raw Water Supply Facilities Projects	**250,000**	50,000	50,000	50,000	50,000	50,000
1B	Reservoir and Dam Inspections	**220,000**	70,000	20,000	10,000	80,000	40,000
2	**Scituate Reservoir and Gainer Dam**						
2A	Gainer Dam Spillway Rehabilitation	**200,000**	200,000				
3	**Barden Reservoir and Dam**						
	There are no projects in the 5 year plan at this location						
4	**Moswansicut Reservoir and Dam**						
	There are no projects in the 5 year plan at this location						
5	**Ponagansett Reservoir and Dam**						
	There are no projects in the 5 year plan at this location						
6	**Regulating Reservoir and Dam**						
	There are no projects in the 5 year plan at this location						
7	**Westconnaug Reservoir and Dam**						
	There are no projects in the 5 year plan at this location						
8	**Secondary Reservoirs and Dams**						
8A	Secondary Reservoir and Dam Improvements	**3,000,000**	1,000,000	500,000	500,000	500,000	500,000
	Raw Water Supply Total	**$3,670,000**	**$1,320,000**	**$570,000**	**$560,000**	**$630,000**	**$590,000**
	TREATMENT						
9	**Treatment Plant Facilites**						
9A	Various Treatment Plant Projects	**500,000**	100,000	100,000	100,000	100,000	100,000
9B	PW Lab Equipment	**50,000**	10,000	10,000	10,000	10,000	10,000
9C	Treatment Process and Water Quality Studies	**2,500,000**	100,000	1,000,000	1,000,000	200,000	200,000
9D	Treatment Plant Building Rehabilitation	**4,000,000**	1,000,000	3,000,000			
10	**SCADA / Control System**						
10A	SCADA / Control System Improvements	**550,000**	250,000	150,000	50,000	50,000	50,000
11	**Treatment Plant Structures and Conduits**						
11A	Treatment Plant Structures and Conduits Inspection	**60,000**	10,000				50,000
12	**Aeration System**						
	There are no projects in the 5 year plan at this location						
13	**Sedimentation System**						
13A	Sedimentation Basin Rehabilitation	**36,500,000**	1,500,000	11,000,000	2,000,000	11,000,000	11,000,000
14	**Sludge Residual System**						
	There are no projects in the 5 year plan at this location						
15	**Filtration System**						
	There are no projects in the 5 year plan at this location						
16	**Service Water System**						
16A	Service Water System Evaluation	**100,000**	100,000				
16B	Service Water System Rehabilitation	**1,000,000**		1,000,000			
17	**Wash Water System**						
17A	48" Wash Water System Inspection	**10,000**	10,000				
18	**Ascorbic Acid System**						
	There are no projects in the 5 year plan at this location						
19	**Chlorine System**						
	There are no projects in the 5 year plan at this location						
20	**Ferric System**						
20A	Ferric System Improvements	**10,000**	10,000				
21	**Fluoride System**						
21A	Fluoride System Improvements	**25,000**					25,000
22	**Lime System**						
22A	Lime Feeder Replacement	**600,000**	600,000				
23	**Orthophosphate System**						
	There are no projects in the 5 year plan at this location						
	Treatment Total	**$45,905,000**	**$3,690,000**	**$16,260,000**	**$3,160,000**	**$11,360,000**	**$11,435,000**

	Providence Water IFR Expenditure Plan FY 2021 through 2025	Budget 2021 - 2025	Budget 2021	Budget 2022	Budget 2023	Budget 2024	Budget 2025
	STORAGE						
24	**Storage Facilities**						
24A	Various Storage Facilities Projects	**480,000**	280,000	50,000	50,000	50,000	50,000
25	**Aqueduct Reservoir and Gatehouse**						
	There are no projects in the 5 year plan at this location						
26	**Greenville Ave Tank**						
	There are no projects in the 5 year plan at this location						
27	**Lawton Hill Reservoir and Gatehouse**						
	There are no projects in the 5 year plan at this location						
28	**Longview Reservoir and Gatehouse**						
	There are no projects in the 5 year plan at this location						
29	**Neutaconkanut Reservoir and Gatehouse**						
	There are no projects in the 5 year plan at this location						
30	**Ridge Road Tank**						
	There are no projects in the 5 year plan at this location						
	Storage Total	**$480,000**	**$280,000**	**$50,000**	**$50,000**	**$50,000**	**$50,000**
	PUMPING						
31	**Pumping Facilities**						
31A	Various Pumping Facilities Projects	**320,000**	120,000	50,000	50,000	50,000	50,000
32	**Raw Water Booster Pump Station**						
32A	Raw Water Booster Pump Station Building Improvements	**600,000**			600,000		
33	**Aqueduct Pump Station**						
	There are no projects in the 5 year plan at this location						
34	**Ashby St. Pump Station**						
34A	Ashby St Pump Station Replacement	**600,000**	600,000				
35	**Bath St. Pump Station**						
	There are no projects in the 5 year plan at this location						
36	**Cranston Commons Pump Station**						
36A	Cranston Commons Pump Station Replacement	**4,000,000**		1,000,000	2,000,000	1,000,000	
37	**Dean Estates Pump Station**						
37A	Dean Estates Pump Upgrades	**780,000**	30,000	750,000			
38	**Fruit Hill Pump Station**						
38A	Fruit Hill Pump Station Generator Replacement	**350,000**	350,000				
39	**Greenville Ave Pump Station**						
39A	Greenville Ave Pump Station Replacement	**350,000**	350,000				
40	**Neutaconkanut Pump Station**						
	There are no projects in the 5 year plan at this location						
41	**Waltham St. Pump Station**						
	There are no projects in the 5 year plan at this location						
	Pumping Total	**$7,000,000**	**$1,450,000**	**$1,800,000**	**$2,650,000**	**$1,050,000**	**$50,000**

	Providence Water IFR Expenditure Plan FY 2021 through 2025	Budget 2021 - 2025	Budget 2021	Budget 2022	Budget 2023	Budget 2024	Budget 2025
	TRANSMISSION						
42	**Scituate Aqueduct and Tunnel (90")**						
42A	Scituate Aqueduct and Tunnel (90") Inspection	**5,000,000**			5,000,000		
42B	Scituate Aqueduct and Tunnel (90") Rehabilitation	**2,000,000**			2,000,000		
43	**Supplemental Tunnel and Aqueduct (78" & 102")**						
43A	102" Aqueduct fiber optic monitoring	**625,000**	125,000	125,000	125,000	125,000	125,000
43B	78" Aqueduct Inspection	**3,000,000**		3,000,000			
43C	78" Aqueduct Rehabilitation	**7,000,000**		7,000,000			
43D	102" Aqueduct Inspection	**3,000,000**				3,000,000	
43E	102" Aqueduct Rehabilitation	**9,100,000**	2,100,000			7,000,000	
43F	Supplemental Tunnel and Aqueduct Rehabilitation Plan	**300,000**			300,000		
44	**Raw Water Conduits and Valves**						
44A	Raw Water Conduits Inspection	**200,000**	200,000				
44B	60" Raw Water Valve Replacement	**400,000**	400,000				
45	**Transmission System Facilities**						
45A	Various Transmission System (16" - 66") Facilities Projects	**2,500,000**	500,000	500,000	500,000	500,000	500,000
45B	12" Blowoff Valve Replacement	**100,000**	100,000				
	Transmission Total	**$33,225,000**	**$3,425,000**	**$10,625,000**	**$7,925,000**	**$10,625,000**	**$625,000**
	DISTRIBUTION						
46	**Distribution Water Mains**						
46A	Water Main Rehabilitation	**98,875,000**	26,975,000	17,975,000	17,975,000	17,975,000	17,975,000
47	**Distribution System Facilities**						
47A	Various Distribution System Facilities Projects	**3,750,000**	750,000	750,000	750,000	750,000	750,000
47B	Lead Service Replacements	**5,625,000**	1,125,000	1,125,000	1,125,000	1,125,000	1,125,000
	Distribution Total	**$108,250,000**	**$28,850,000**	**$19,850,000**	**$19,850,000**	**$19,850,000**	**$19,850,000**
	SUPPORT						
48	**Support System Facilities**						
48A	Various Support System Facilities Projects	**1,000,000**	200,000	200,000	200,000	200,000	200,000
48B	Arc Flash Study	**1,000,000**		1,000,000			
49	**Central Operations Facility**						
	There are no projects in the 5 year plan at this location						
50	**Forestry Garage**						
	There are no projects in the 5 year plan at this location						
51	**Watershed Storage Facility**						
	There are no projects in the 5 year plan at this location						
52	**Records Management System (GIS/AM)**						
52A	Records Management System (GIS/AM) Improvements	**500,000**	100,000	100,000	100,000	100,000	100,000
53	**Billing System**						
53A	Billing System Replacement	**5,000,000**	500,000	2,500,000	2,000,000		
	Support Total	**$7,500,000**	**$800,000**	**$3,800,000**	**$2,300,000**	**$300,000**	**$300,000**
	TOTAL	**$206,030,000**	**$39,815,000**	**$52,955,000**	**$36,495,000**	**$43,865,000**	**$32,900,000**

Exhibit 12 - 5 Year IFR Expenditure Plan - FY 2021 - 2025 - Pie Chart



5 Year IFR Project Overview - FY 2021 - 2025

RAW WATER SUPPLY

1. <u>Raw Water Supply Facilities</u>

1A. Various Raw Water Supply Facilities Projects

Raw Water Supply Reservoirs, Dams and Facilities are inspected on a regular basis. The budget amount covers any minor, unscheduled improvements or rehabilitations that come up during these inspections. Also included in this budget amount will be improvements to the fences and access roads in the watershed, some of which date back to their original construction in the 1920's.

1B. Reservoir and Dam Inspections

In accordance with R.I. DEM Rules and Regulations, all of Providence Water's primary and secondary dams are to be inspected throughout the 5-Year plan. Gainer Dam, Ponagansett Dam, and Westconnaug Dam will be scheduled and inspected every 2 years and the remaining dams every 5 years.

2. <u>Scituate Reservoir and Gainer Dam</u>

2A. Gainer Dam Spillway Rehabilitation

The upstream face of the spillway is showing signs of wear. Plans are to remove and replace all of the old unsound concrete along the upstream face of the spillway with a new concrete surface.

3. <u>Barden Reservoir and Dam</u>

There are no projects in the 5-year plan at this location.

4. <u>Moswansicut Reservoir and Dam</u>

There are no projects in the 5-year plan at this location.

5. Ponagansett Reservoir and Dam

There are no projects in the 5-year plan at this location.

6. Regulating Reservoir and Dam

There are no projects in the 5-year plan at this location.

7. Westconnaug Reservoir and Dam

There are no projects in the 5-year plan at this location.

8. Secondary Reservoirs and Dams

8A. Secondary Reservoir and Dam Improvements

Harrisdale/Peeptoad Pond Dam rehabilitation consists of; rehabilitating the cracking on the crest of the dam, rehabilitating areas of erosion on the upstream embankment slope, removing vegetation from the dam crest, downstream and upstream areas, restoration of spalled and cracked concrete at the spillway headwalls and wing walls, and restoration of the downstream wall.

Jordan Pond Dam rehabilitation consists of; rehabilitating the masonry wall along the dam, restoration of the primary and auxiliary spillways, and replacing the low level outlet structure.

Coomer Dam rehabilitation consists of; constructing a new low level outlet intake structure and control gate, cutting and removing trees and brush with 15 feet of the dam and dike, and filling in the eroded areas on the embankments.

Kimball Reservoir Dam rehabilitation consists of; constructing a new concrete spillway with an integrated low level outlet, installing additional stone riprap on the upstream slope where the is currently none, and cutting and removing trees and brush with 15 feet of the dam.

Pine Swamp Dam No. 1 rehabilitation consists of; constructing a new concrete spillway with an integrated low level outlet, cutting and removing trees and brush with 15 feet of the dam, and removing sediment, and debris form the spillway approach and discharge channels.

TREATMENT

9. Treatment Plant Facilities

9A. Various Treatment Plant Projects

The electrical, plumbing, mechanical, security and fire systems each have regularly scheduled inspections. Funds are budgeted for minor upgrades identified during these inspections. The budget amount also covers site improvements at the Treatment Plant Facility as required.

9B. PW Lab Equipment

Extensive testing of the raw and treated water is required on a regularly scheduled basis. The testing and monitoring equipment utilized has various life expectancies depending on the type of equipment and frequency of use. Plans are to replace this equipment as it becomes necessary based on the life expectancy of each piece of equipment.

9C. Treatment Process and Water Quality Studies

In 2012 Providence Water convened an expert advisory panel to evaluate corrosion control treatment, as directed by a June 2012 consent agreement between Providence Water and the RI Department of Health. The goal of the expert advisory panel is to provide recommendations, including additional studies and/or treatment adjustments needed, to achieve the lead action level while optimizing corrosion control within the distribution system. In accordance with the current 2020 Bilateral Compliance Agreement between Providence Water and the RI Department of Health, PW shall meet with the expert advisory panel at least annually.

PW will conduct extensive pipe loop testing to determine the effect of a distribution system pH reduction from 10.2 to about 7.8 on iron mobilization within unlined cast iron mains and lead release from lead service lines, after an established period of orthophosphate addition This pipe loop test will incorporate sections of unlined cast iron water mains and lead service lines that are currently in use within PW's distribution system. At this time, we estimate a testing duration of about 5 years.

9D. Treatment Plant Building Rehabilitation

Treatment Plant Building Rehabilitation consists of architectural improvements to the treatment plant building including the replacement of the old exterior siding with a new exterior cover and the existing windows with new energy efficient windows. In addition, the freight and passenger elevators at the treatment plant are old, and parts have become obsolete. Plans are to modernize the elevators by replacing electrical, mechanical, emergency, and fire protection components.

10. SCADA / Control System

10A. SCADA / Control System Improvements

Because computer technology is ever changing, funds have been budgeted for the upgrade of the remote PLC system and additional software programming on an as-needed basis. Annual funds are budgeted to anticipate ongoing needs, which include future hardware replacements and software upgrades.

11. Treatment Plant Structures and Conduits

11A. Treatment Plant Structures and Conduits Inspection

Water is collected in a 260,000-gallon clear well, and is the last structure in the treatment process, where finished water from the plant enters and exits the structure under gravity to the transmission system. Plans are to inspect the clear well and identify any necessary rehabilitation work.

12. Aeration System

There are no projects in the 5 Year Plan associated with this system.

13. Sedimentation System

13A. Sedimentation Basin Rehabilitation

The treatment plant sedimentation basins were built in 1939 and have not had any major rehabilitation since their creation. The basins are constructed of large concrete slabs with troughs in the bottom designed to collect residuals from the treatment process. The basins are periodically taken out of service to remove the residuals and deliver them to the residual management system which is located across the street from the treatment plant. The basins are in need of major concrete rehabilitation but are effectively meeting the treatment needs at the plant. However, the current residual management process is struggling to meet existing regulatory requirements. Prior to investing a significant amount of money on a rehabilitation project, Providence Water has decided to evaluate alternatives for continuing to utilize the existing basins. This evaluation will compare all of the alternatives and determine the best path forward for the future.

The evaluation will include a review of alternatives for clarification processes at the plant as well as alternatives for residuals management. Following the evaluation, a decision to either rehabilitate the existing basins or replace the basins with an alternative process will be made. The current budget shown in the plan includes only the rehabilitation of the existing basins and may need to be modified once the path forward is determined.

14. Sludge Residual System

There are no projects in the 5-year plan associated with this system.

15. Filtration System

There are no projects in the 5-year plan associated with this system.

16. <u>Service Water System</u>

16A. Service Water System Evaluation

The 40,000 gallon welded steel service water tank, constructed in 1961, is a double ellipsoidal tank, approximately 90 feet high and 20 feet in diameter with a 36-inch diameter riser 63 feet in height. The tank provides service and process water to the Treatment Plant. Plans are to perform complete evaluation of the Service Water System, including the Tank, Pumps, Piping and other related equipment.

16B. Service Water System Rehabilitation

Early indications are that the Service Water System, including the tank, will need to be replaced. The addition of orthophosphate to the treatment process will increase the demand on the service water. Anticipating the need to replace the tank and all associated equipment, the allocated funds are to resize and replace them to accommodate the increased demand.

17. <u>Wash Water System</u>

17A. Wash Water System Inspection

The 400,000-gallon Wash Water tank, which provides backwashing water to the treatment plant's filters, is a circular reinforced concrete underground tank. Plans are to inspect the tank internally. The above ground portion of the pipe was replaced as part of the filter rehabilitation project; plans include an inspection of the underground portion of the 48" pipeline.

18. <u>Ascorbic Acid System</u>

There are no projects in the 5-year plan associated with this system.

19. <u>Chlorine System</u>

There are no projects in the 5-year plan associated with this system.

20. <u>Ferric System</u>

20A. Ferric System Improvements

The two (2) Ferric Transfer Pumps are nearing the end of their useful lives and will be replaced in the 5-year plan. To achieve redundancy and allow for the replacement of the existing Ferric Flash Mixer Pump, funds are allocated for the installation of a second pump.

21. <u>Fluoride System</u>

21A. Fluoride System Improvements

The two (2) Fluoride Metering Pumps and one Magmeter are nearing the end of their useful lives and will be replaced in the 5-year plan**.**

22. <u>Lime System</u>

22A. Lime Feeder Replacement

Replacement of the four (4) existing Lime Feeders is in progress and will be complete in 2021.

23. <u>Orthophosphate System</u>

There are no projects in the 5-year plan associated with this system.

STORAGE

24. <u>Storage Facilities</u>

24A. Various Storage Facilities Projects

All mechanical, electrical, architectural, structural and site components of each storage facility have regularly scheduled inspections. Funds have been budgeted for anticipated improvements to remedy deficiencies as identified during these inspections.

25. <u>Aqueduct Reservoir and Gatehouse</u>

There are no projects in the 5-year plan at this location.

26. <u>Greenville Ave Tank</u>

There are no projects in the 5-year plan at this location.

27. <u>Lawton Hill Reservoir and Gatehouse</u>

There are no projects in the 5-year plan at this location.

28. <u>Longview Reservoir and Gatehouse</u>

There are no projects in the 5-year plan at this location.

29. <u>Neutaconkanut Reservoir and Gatehouse</u>

There are no projects in the 5-year plan at this location.

30. <u>Ridge Road Tank</u>

There are no projects in the 5-year plan at this location.

PUMPING

31. <u>Pumping Facilities</u>

31A. Various Pumping Facilities Projects

All mechanical, electrical, architectural, structural and site components of each pump station have regularly scheduled inspections. Funds have been budgeted for anticipated improvements to remedy deficiencies as identified during these inspections.

32. <u>Raw Water Booster Pump Station</u>

32A. Raw Water Booster Pump Station Building Improvements

Raw Water Booster Pump Station rehabilitation and improvements consist of; replacement of the tile floor, garage doors, interior lights, single glaze windows, brick chimney, driveway and the 12,200 sf roof, restoration of the pump pedestals and front terrace, and remodeling the bathroom.

33. <u>Aqueduct Pump Station</u>

There are no projects in the 5-year plan at this location.

34. <u>Ashby St Pump Station</u>

34A. Ashby St Pump Station Replacement

The replacement of the Ashby St Pump Station is ongoing and scheduled to be complete in 2021.

35. <u>Bath St Pump Station</u>

There are no projects in the 5-year plan at this location.

36. Cranston Commons Pump Station

36A. Cranston Commons Pump Station Replacement

Due to age and increased demand, the Cranston Commons Pump Station will be replaced during the 5-year plan. An evaluation of whether to replace the pump station on-site or build at a newly identified site is currently in process.

37. Dean Estates Pump Station

37A. Dean Estates Pump Station Upgrades

A project to evaluate Dean Estate Pump Stations' performance during the high demand times has begun. Funds have been allocated for the anticipated upgrades of the pumps, generator and associated equipment.

38. Fruit Hill Pump Station

38A. Fruit Hill Pump Station Replace Generator

The 150kW generator at Fruit Hill Pump Station was originally installed in 1988 and nearing the end of its useful life. Plans are to replace the generator.

39. Greenville Ave Pump Station

39A. Greenville Ave Pump Station Replacement

The replacement of the Greenville Ave Pump Station is ongoing and scheduled to be complete in 2021.

40. Neutaconkanut Pump Station

There are no projects in the 5-year plan at this location.

41. Waltham St Pump Station

There are no projects in the 5-year plan at this location.

TRANSMISSION

42. <u>Scituate Aqueduct and Tunnel (90”)</u>

42A. Scituate Aqueduct and Tunnel (90”) Inspection

The 90" effluent finished water aqueduct, constructed in the 1920's, runs approximately 4.5 miles. It is constructed of a concrete lined tunnel section between the west and east portals, and reinforced concrete pipe thereafter. An amount has been budgeted for inspection of the entire length of the aqueduct and future rehabilitative work will be based upon the results of the inspection.

42B. Scituate Aqueduct and Tunnel (90”) Rehabilitation

The 90" effluent finished water aqueduct, constructed in the 1920's, runs approximately 4.5 miles. It is constructed of a concrete lined tunnel section between the west and east portals, and reinforced concrete pipe thereafter. An amount has been budgeted for any rehabilitation found as a result of the inspection.

43. <u>Supplemental Tunnel and Aqueduct (78” & 102”)</u>

43A. 102” Aqueduct fiber optic monitoring

A fiber optic data acquisition system and acoustic monitoring sensor line was installed in 5 miles of the 102” aqueduct in 2006. This system provides real-time monitoring on a continuous 24-hour per-day basis by monitoring the sounds transmitted through the pipeline to detect the acoustic events associated with the failure and break of pre-stressed wires. Funds are budgeted to continuously monitor and analyze the digital data to identify potential problem areas with the pipeline.

43B. 78” Aqueduct Inspection

The 78" aqueduct transmission line consists of 20,131 feet (3.81 miles) of pre-stressed concrete cylinder pipe (PCCP), and two sections of concrete lined tunnel consisting of 3,046 feet (0.58 miles). The 78" aqueduct has undergone significant rehabilitation since previous inspections have discovered extensive corrosive damage. In accordance with the inspection and rehabilitation program developed, both the 78" and 102" lines will continue to be inspected and rehabilitated, as necessary, every five years.

43C. 78" Aqueduct Rehabilitation

Plans are to continue the repair of the 78-inch Aqueduct by means of slip lining. The plan is to do this proactively during the upcoming inspection and repair campaigns. Previously evaluated repairs options determined Slip Lining serves a dual purpose; quick trenchless repairs and cost effectiveness. The process of Slip Lining effectively replaces the damaged PCCP sections with new, structurally sound sections of FRP pipe. Funds have been allocated to slip line approximately 2000 feet of pipe in conjunction with each inspection project.

43D. 102" Aqueduct Inspection

The 102-inch pipeline is 27,325 feet long (5.18 miles). It was constructed in the 1960's and consists of pre-stressed concrete cylinder pipe (PCCP). Extensive corrosive damage has been identified from previous inspections and it has undergone significant rehabilitation. In accordance with the inspection and rehabilitation program developed, both the 78" and 102" lines will continue to be inspected and rehabilitated, as necessary, every five years.

43E. 102" Aqueduct Rehabilitation

Plans are to continue the repair of the 102-inch Aqueduct by means of slip lining. The plan is to do this proactively during the upcoming inspection and repair campaigns. Previously evaluated repairs options determined Slip Lining serves a dual purpose; quick trenchless repairs and cost effectiveness. The process of Slip Lining effectively replaces the damaged PCCP sections with new, structurally sound sections of FRP pipe. Funds have been allocated to slip line approximately 2000 feet of pipe in conjunction with each inspection project.

43F. Supplemental Tunnel and Aqueduct Rehabilitation Plan

The 78- and 102-inch Supplemental Tunnel and Aqueduct (STA) is one of two large diameter pipelines that deliver drinking water from the treatment plant to the distribution system. The majority of the nine-mile long STA was constructed of pre-stressed concrete cylinder pipe (PCCP). PCCP is a composite pipe material, consisting of a steel cylinder with a concrete core that is helically wrapped on the outside with high-strength steel pre-stressing wires that are then covered with a mortar coating; these reinforcing wires are the primary component that gives each pipe section its strength to withstand internal hydrostatic pressure and external loads and the mortar coating's purpose is to protect the wires from corrosion.

In November 1996, a major failure occurred on the 102-inch PCCP aqueduct located just east of Oaklawn Avenue in Cranston. This failure in 1996 raised concerns about the structural integrity of the entire STA system and its susceptibility to failure. In addition to the immediate repair in 1996, PW commissioned an engineering study to determine the cause of the failure, perform a risk assessment of the entire STA system, and evaluate the likelihood of another failure occurring in the future. The primary cause of the 1996 failure of the 102-inch PCCP aqueduct was found to be separation of the outer mortar coating of the PCCP and corrosion of its pre-stressing wires along the full length of the failed pipe section. PCCP starts to be compromised and ultimately fails when these pre-stressing wires break. Unfortunately, the nature of PCCP failures are therefore often sudden and catastrophic failures without any warning, like what happened to the 102-inch aqueduct in 1996.

Beginning in April of 1998, PW has regularly inspected the entire aqueduct and repaired many areas of concern. Following each inspection, the findings and results are reviewed and evaluated against finite-element failure risk curves to determine pipe sections that need to be repaired. Over the years, this comprehensive program has led to the identification and repair of several distressed pipe sections. Repair methods over the years have included repair mortar for debonded concrete coating, external reinforcing, post-tensioning tendon repairs, reinforced concrete encasement for pipes with shallow cover, replacement, new access manholes for future access, exterior and interior mortar patching, cleaning of prestressing wires, application of corrosion-inhibiting slurry, internal welding of the pipelines metal cylinder to repair leaking joints, replacement and repair of existing external “diaper” pipe joints, internal CFRP liners, and most recently internal slip lining over longer lengths.

PW plans to continue proactively slip lining distressed, high risk, and critical areas of both pipelines in their next respective campaigns. The next critical areas to slip line can currently be easily established based on past inspection results and the consequence of failure of critical areas of the both pipelines. PW also plans to commission an engineering study to perform an updated risk assessment, evaluate the remaining useful life of the entire STA, and develop a long-term master plan.

The work of this study and master plan will build upon all prior inspections and investigations, repairs, condition assessments, forensic pipe investigation and repair databases, drawings of the pipelines showing historical deficiencies, investigations and repairs, and a recently developed surge/transient analysis. The master plan will be prioritized to rehabilitate, replace, and strengthen the 78- and 102-inch aqueducts based upon critical risk factors. The criticality assessment risk factors in the master plan will be based on considerations for likelihood of failure and consequence of failure.

44. <u>Raw Water Conduits</u>

44A. Raw Water Conduits Inspection

The 60 inch steel riveted conduits are equipped with a cathodic protection system consisting of four impressed current anode beds along 1000 feet of the underground portion of the twin mains. Plans are to inspect the system and make necessary corrections if needed. Plans also include the inspection of the exposed piping inside the meter chamber and the excavation of a test pit of the buried section to assess the condition of the exterior coating along with soil resistivity testing.

Plans are to internally inspect the 90-inch mortar lined steel pipe encased in concrete, which runs from the junction chamber to the treatment plant. In 2014, two test pits were excavated for an external inspection of the 90” influent pipe. The exterior of the pipe was in excellent condition. Previous internal inspections completed in 2015 identified two areas in need of minor rehabilitation. Plans are to make these repairs during the upcoming inspections.

44B. 60" Raw Water Valve Replacement

The two (2) electrically actuated valves that divert water into the RWBPS can still be operated; however, they are scheduled to be replaced in the 5-year plan because intermittent problems occur due to their age.

45. <u>Transmission System Facilities</u>

45A. Various Transmission System (16"-66") Facilities Projects

Of the approximate 1000 miles of main in the system, about 100 miles of transmission mains are 66 inches or less. Plans are to perform a condition assessment on some of these mains. Nondestructive testing methods will be performed using available technologies and applications accepted by the water industry, such as electromagnetic testing, ultrasonic testing, and/or acoustic soundings. This will aid us to assess the condition of our mains and to identify future replacement work.

Oftentimes during shutdowns, valves are found to be inoperable or are broken during valve operation. An amount has been budgeted to anticipate the replacement of defective larger valves.

45B. 12" Blow Off Valve Replacement

One of the valves used to allow discharge of raw water down the northern branch of the Pawtuxet River is currently inoperable. Plans are to replace the valve.

DISTRIBUTION

46. <u>Distribution Water Mains</u>

46A. Water Mains Rehabilitation

Of the approximate 500 miles of unlined cast iron water mains in the system, about 88 miles have been replaced to the end of fiscal year 2020. Depending on construction bid costs for cleaning and lining, or main replacements, it is estimated that we will replace or rehabilitate approximately 10 to 12 miles of water mains per year.

47. <u>Distribution System Facilities</u>

47A. Various Distribution System Facilities Projects

There are about 14,000 distribution valves in the system. Plans are to replace these valves in conjunction with the water main rehabilitation program. Valves in the system that are found to be defective will also be replaced.

There are about 6,400 hydrants in system. Plans are to replace these hydrants in conjunction with the water main rehabilitation program. Hydrants in the system that are found to be defective will also be replaced.

A blow off is typically located at the end of a dead end main. The purpose of opening a blow off is to release air from a main that can enter the main after a main is shutdown, or to run water to waste in order to clean out the main. When we receive water quality complaints, we sometimes run the blow off to discharge any deposits or sediment from the main. In our system, a typical blow off assembly has a 2” tap and a 2” blow off connection.

47B. Lead Service Replacements

There are approximately 11,000 lead services remaining to be replaced in the system. Plans are to replace these services in conjunction with the water main rehabilitation program. Lead services in the system that are found to be defective will also be replaced.

SUPPORT

48. Support System Facilities

48A. Various Support System Facilities Projects

The various components of each support system facility are inspected regularly throughout each year. Funds are budgeted to cover any improvements identified during these inspections. These funds will also cover any damaged fencing and rehabilitate deteriorated roads at these support service facilities. The fencing and road improvement projects are determined through condition assessments and priority.

48B. Arc Flash Study

Providence Water is conducting an Arc Flash analysis of all its facilities to help define and establish safety protocols required to minimize the risk of electrical injuries. The analysis will produce a report of all existing deficiencies and other recommendations for Providence Water to include with their procedures. Upgrades will designed and implemented to address those deficiencies.

49 Central Operations Facility

There are no projects in the 5-year plan at this location.

50. Forestry Garage

There are no projects in the 5-year plan at this location.

51. Watershed Storage Facility

There are no projects in the 5-year plan at this location.

52. Records Management System (GIS/AM)

52A. Records Management System (GIS/AM) Improvements

Because computer technology is ever changing and upgrades are routinely needed, annual funds are budgeted to anticipate ongoing needs, which include future hardware replacements and software upgrades.

53. Billing System

53A. Replacement of Billing System

The Customer Service Department has begun the process of replacing the existing billing system. The scheduled completion of this project is 2023. By replacing the outdated, inflexible billing system Providence Water will be able to provide enhanced customer service, achieve cost savings and improve process efficiencies.

Note: Some of these projects are in progress and the cost shown for the project in the expenditure plan may be a partial cost for the remainder of the project. Therefore, in these instances the expenditure does not represent the entire cost of the project. The balance that makes up the full project cost was identified and reported prior to fiscal year 2021.

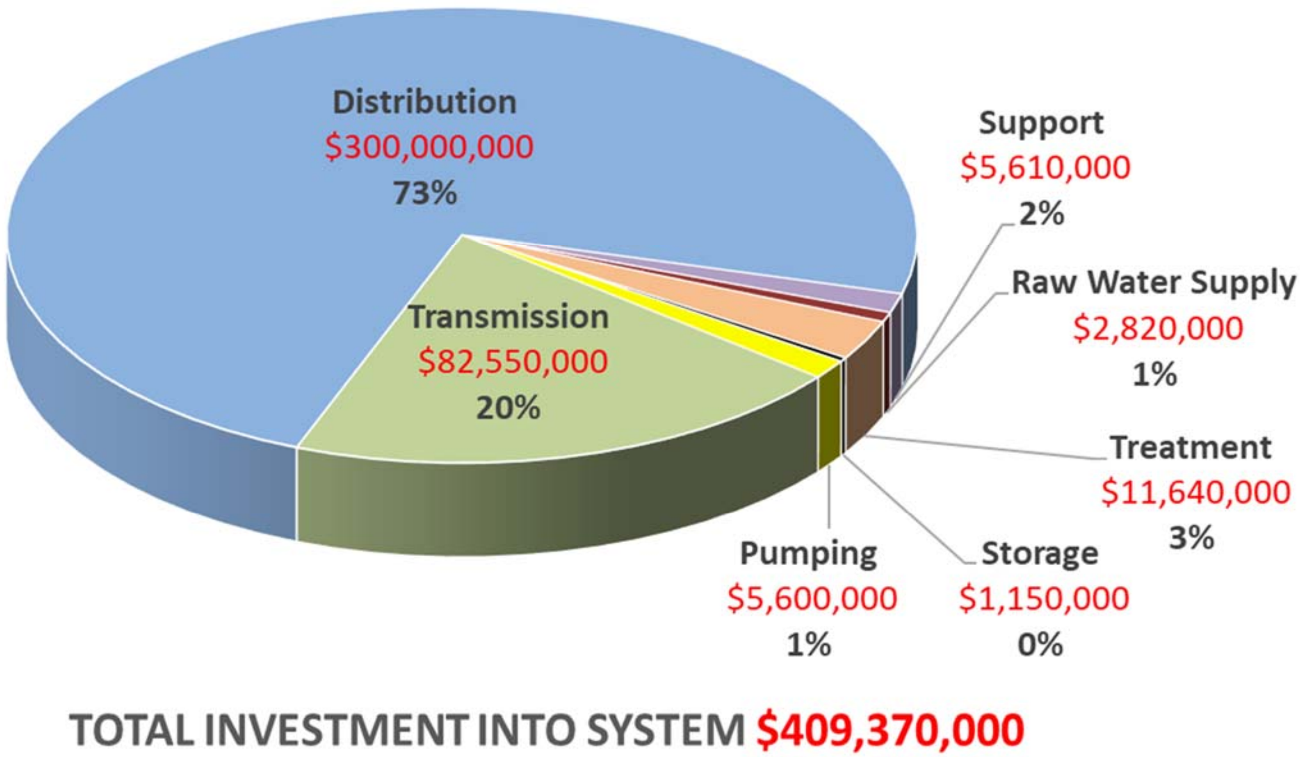
Exhibit 13 - 15 Year IFR Expenditure Plan - FY 2026 – 2040

	Providence Water IFR Expenditure Plan FY 2026 through 2040	Budget 2026 - 2040	FY 2026 through 2030 Budget 2026	Budget 2027	Budget 2028	Budget 2029	Budget 2030	Budget 2026 - 2030	FY 2031 through 2035 Budget 2031	Budget 2032	Budget 2033	Budget 2034	Budget 2035	Budget 2031 - 2035	FY 2036 through 2040 Budget 2036	Budget 2037	Budget 2038	Budget 2039	Budget 2040	Budget 2036 - 2040
	RAW WATER SUPPLY																			
1	**Raw Water Supply Facilities**																			
1A	Various Raw Water Supply Facilities Projects	**750,000**	50,000	50,000	50,000	50,000	50,000	**250,000**	50,000	50,000	50,000	50,000	50,000	**250,000**	50,000	50,000	50,000	50,000	50,000	**250,000**
2	**Scituate Reservoir and Gainer Dam**																			
2A	Scituate Reservoir and Dam Inspections	**80,000**	10,000		10,000		10,000	**30,000**		10,000		10,000		**20,000**	10,000		10,000		10,000	**30,000**
3	**Barden Reservoir and Dam**																			
3A	Barden Reservoir and Dam Inspections	**30,000**					10,000	**10,000**					10,000	**10,000**					10,000	**10,000**
4	**Moswansicut Reservoir and Dam**																			
4A	Moswansicut Reservoir and Dam Inspections	**30,000**					10,000	**10,000**					10,000	**10,000**					10,000	**10,000**
5	**Ponagansett Reservoir and Dam**																			
5A	Ponagansett Reservoir and Dam Inspections	**80,000**	10,000		10,000		10,000	**30,000**		10,000		10,000		**20,000**	10,000		10,000		10,000	**30,000**
6	**Regulating Reservoir and Dam**																			
6A	Regulating Reservoir Rehabilitation	**1,700,000**				850,000	850,000	**1,700,000**						**0**						**0**
6B	Regulating Reservoir and Dam Inspections	**30,000**					10,000	**10,000**					10,000	**10,000**					10,000	**10,000**
7	**Westconnaug Reservoir and Dam**																			
7A	Westconnaug Reservoir and Dam Inspections	**70,000**		10,000		10,000		**20,000**	10,000		10,000		10,000	**30,000**		10,000		10,000		**20,000**
8	**Secondary Reservoirs and Dams**																			
8A	Secondary Reservoir and Dam Inspections	**50,000**				20,000		**20,000**				20,000		**20,000**				10,000		**10,000**
	Raw Water Supply Total	**$2,820,000**	**$70,000**	**$60,000**	**$70,000**	**$930,000**	**$950,000**	**$2,080,000**	**$60,000**	**$70,000**	**$60,000**	**$90,000**	**$90,000**	**$370,000**	**$70,000**	**$60,000**	**$70,000**	**$70,000**	**$100,000**	**$370,000**
	TREATMENT																			
9	**Treatment Plant Facilites**																			
9A	Various Treatment Plant Projects	**1,500,000**	100,000	100,000	100,000	100,000	100,000	**500,000**	100,000	100,000	100,000	100,000	100,000	**500,000**	100,000	100,000	100,000	100,000	100,000	**500,000**
9B	PW Lab Equipment	**150,000**	10,000	10,000	10,000	10,000	10,000	**50,000**	10,000	10,000	10,000	10,000	10,000	**50,000**	10,000	10,000	10,000	10,000	10,000	**50,000**
9C	Treatment Process and Water Quality Studies	**3,000,000**	200,000	200,000	200,000	200,000	200,000	**1,000,000**	200,000	200,000	200,000	200,000	200,000	**1,000,000**	200,000	200,000	200,000	200,000	200,000	**1,000,000**
10	**SCADA / Control System**																			
10A	SCADA / Control System Improvements	**750,000**	50,000	50,000	50,000	50,000	50,000	**250,000**	50,000	50,000	50,000	50,000	50,000	**250,000**	50,000	50,000	50,000	50,000	50,000	**250,000**
11	**Treatment Plant Structures and Conduits**																			
11A	Treatment Plant Structures and Conduits Inspection	**150,000**					50,000	**50,000**					50,000	**50,000**					50,000	**50,000**
12	**Aeration System**																			
12A	Aeration System Inspection	**30,000**					10,000	**10,000**					10,000	**10,000**					10,000	**10,000**
13	**Sedimentation System**																			
	There are no projects in the 15 year plan at this location																			
14	**Sludge Residual System**																			
	There are no projects in the 15 year plan at this location																			
15	**Filtration System**																			
15A	Filter Media Replacement	**3,500,000**						**0**					2,000,000	**2,000,000**	1,500,000					**1,500,000**
15B	Filter Blower Replacement	**500,000**			500,000			**500,000**						**0**						**0**
15C	Filter Valve Actuator Replacment	**1,000,000**						**0**	1,000,000					**1,000,000**						**0**
16	**Service Water System**																			
16A	Service Water System Inspection	**300,000**	100,000					**100,000**	100,000					**100,000**	100,000					**100,000**
17	**Wash Water System**																			
17A	Wash Water System Inspection	**30,000**	10,000					**10,000**	10,000					**10,000**	10,000					**10,000**
18	**Ascorbic Acid System**																			
18A	Ascorbic Acid System Improvements	**50,000**	50,000					**50,000**						**0**						**0**
19	**Chlorine System**																			
19A	Chlorine System Improvements	**50,000**		50,000				**50,000**						**0**						**0**
20	**Ferric System**																			
20A	Ferric System Improvements	**150,000**	50,000		50,000			**100,000**						**0**					50,000	**50,000**
21	**Fluoride System**																			
21A	Fluoride System Improvements	**280,000**	30,000				50,000	**80,000**					200,000	**200,000**						**0**
22	**Lime System**																			
22A	Lime System Improvements	**100,000**				100,000		**100,000**						**0**						**0**
23	**Orthophosphate System**																			
23A	Orthophosphate System Improvements	**100,000**						**0**						**0**	100,000					**100,000**
	Treatment Plant Total	**$11,640,000**	**$600,000**	**$410,000**	**$910,000**	**$460,000**	**$470,000**	**$2,850,000**	**$1,470,000**	**$360,000**	**$360,000**	**$360,000**	**$2,620,000**	**$5,170,000**	**$2,070,000**	**$360,000**	**$360,000**	**$360,000**	**$470,000**	**$3,620,000**

	Providence Water IFR Expenditure Plan FY 2026 through 2040	Budget 2026 - 2040	Budget 2026	Budget 2027	Budget 2028	Budget 2029	Budget 2030	Budget 2026 - 2030	Budget 2031	Budget 2032	Budget 2033	Budget 2034	Budget 2035	Budget 2031 - 2035	Budget 2036	Budget 2037	Budget 2038	Budget 2039	Budget 2040	Budget 2036 - 2040
			FY 2026 through 2030						FY 2031 through 2035						FY 2036 through 2040					
	STORAGE																			
24	**Storage Facilities**																			
24A	Various Storage Facilities Projects	**750,000**	50,000	50,000	50,000	50,000	50,000	**250,000**	50,000	50,000	50,000	50,000	50,000	**250,000**	50,000	50,000	50,000	50,000	50,000	**250,000**
25	**Aqueduct Reservoir and Gatehouse**																			
25A	Aqueduct Reservoir Inspection	**50,000**						**0**		50,000				**50,000**						**0**
26	**Greenville Ave Tank**																			
26A	Greenville Ave Tank Inspection	**100,000**				50,000		**50,000**						**0**				50,000		**50,000**
27	**Lawton Hill Reservoir and Gatehouse**																			
27A	Lawton Hill Reservoir Inspection	**50,000**						**0**		50,000				**50,000**						**0**
28	**Longview Reservoir and Gatehouse**																			
28A	Longview Reservoir Inspection	**50,000**						**0**	50,000					**50,000**						**0**
29	**Neutaconkanut Reservoir and Gatehouse**																			
29A	Neutaconkanut Reservoir Inspection	**50,000**						**0**	50,000					**50,000**						**0**
30	**Ridge Road Tank**																			
30A	Ridge Road Tank Inspection	**100,000**				50,000		**50,000**						**0**				50,000		**50,000**
	Storage Facilities Total	**$1,150,000**	**$50,000**	**$50,000**	**$50,000**	**$150,000**	**$50,000**	**$350,000**	**$150,000**	**$150,000**	**$50,000**	**$50,000**	**$50,000**	**$450,000**	**$50,000**	**$50,000**	**$50,000**	**$150,000**	**$50,000**	**$350,000**
	PUMPING																			
31	**Pumping Facilities**																			
31A	Various Pumping Facilities Projects	**750,000**	50,000	50,000	50,000	50,000	50,000	**250,000**	50,000	50,000	50,000	50,000	50,000	**250,000**	50,000	50,000	50,000	50,000	50,000	**250,000**
32	**Raw Water Booster Pump Station**																			
32A	Raw Water Booster Pump Station Improvements	**200,000**			200,000			**200,000**						**0**						**0**
33	**Aqueduct Pump Station**																			
33A	Aqueduct Pump Station Improvements	**500,000**						**0**	500,000					**500,000**						**0**
34	**Ashby St. Pump Station**																			
34A	Ashby St. Pump Station Improvements	**100,000**						**0**					100,000	**100,000**						**0**
35	**Bath St. Pump Station**																			
35A	Bath St. Pump Station Improvements	**1,500,000**	1,000,000	500,000				**1,500,000**						**0**						**0**
36	**Cranston Commons Pump Station**																			
36A	Cranston Commons Pump Station Improvements	**100,000**						**0**						**0**			100,000			**100,000**
37	**Dean Estates Pump Station**																			
37A	Dean Estates Pump Station Improvements	**100,000**						**0**					100,000	**100,000**						**0**
38	**Fruit Hill Pump Station**																			
38A	Fruit Hill Pump Station Improvements	**150,000**			150,000			**150,000**						**0**						**0**
39	**Greenville Ave Pump Station**																			
39A	Greenville Ave Pump Station Improvements	**100,000**						**0**					100,000	**100,000**						**0**
40	**Neutaconkanut Pump Station**																			
40A	Neutaconkanut Pump Station Improvements	**2,000,000**		1,000,000	1,000,000			**2,000,000**						**0**						**0**
41	**Waltham St. Pump Station**																			
41A	Waltham St. Pump Station Improvements	**100,000**				100,000		**100,000**						**0**						**0**
	Pumping Facilities Total	**$5,600,000**	**$1,050,000**	**$1,550,000**	**$1,400,000**	**$150,000**	**$50,000**	**$4,200,000**	**$550,000**	**$50,000**	**$50,000**	**$50,000**	**$350,000**	**$1,050,000**	**$50,000**	**$50,000**	**$150,000**	**$50,000**	**$50,000**	**$350,000**

	Providence Water IFR Expenditure Plan FY 2026 through 2040	Budget 2026 - 2040	FY 2026 through 2030 Budget 2026	Budget 2027	Budget 2028	Budget 2029	Budget 2030	Budget 2026 - 2030	FY 2031 through 2035 Budget 2031	Budget 2032	Budget 2033	Budget 2034	Budget 2035	Budget 2031 - 2035	FY 2036 through 2040 Budget 2036	Budget 2037	Budget 2038	Budget 2039	Budget 2040	Budget 2036 - 2040
	TRANSMISSION																			
42	**Scituate Aqueduct and Tunnel (90")**																			
42A	Scituate Aqueduct and Tunnel (90") Inspection	**5,000,000**						**0**			5,000,000			**5,000,000**						**0**
43	**Supplemental Tunnel and Aqueduct (78" & 102")**																			
43A	102" Aqueduct fiber optic monitoring	**2,250,000**	150,000	150,000	150,000	150,000	150,000	**750,000**	150,000	150,000	150,000	150,000	150,000	**750,000**	150,000	150,000	150,000	150,000	150,000	**750,000**
43B	78" Aqueduct Inspection	**9,000,000**		3,000,000				**3,000,000**		3,000,000				**3,000,000**		3,000,000				**3,000,000**
43C	78" Aqueduct Rehabilitation	**21,000,000**		7,000,000				**7,000,000**		7,000,000				**7,000,000**		7,000,000				**7,000,000**
43D	102" Aqueduct Inspection / Rehabilitation	**9,000,000**				3,000,000		**3,000,000**				3,000,000		**3,000,000**				3,000,000		**3,000,000**
43E	102" Aqueduct Inspection / Rehabilitation	**21,000,000**				7,000,000		**7,000,000**				7,000,000		**7,000,000**				7,000,000		**7,000,000**
44	**Raw Water Conduits and Valves**																			
44A	Raw Water Conduits Inspection	**300,000**					100,000	**100,000**					100,000	**100,000**					100,000	**100,000**
45	**Transmission System Facilities**																			
45A	Various Transmission System (16" - 66") Facilities Projects	**15,000,000**	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	**5,000,000**	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	**5,000,000**	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	**5,000,000**
	Transmission Total	**$82,550,000**	**$1,150,000**	**$11,150,000**	**$1,150,000**	**$11,150,000**	**$1,250,000**	**$25,850,000**	**$1,150,000**	**$11,150,000**	**$6,150,000**	**$11,150,000**	**$1,250,000**	**$30,850,000**	**$1,150,000**	**$11,150,000**	**$1,150,000**	**$11,150,000**	**$1,250,000**	**$25,850,000**
	DISTRIBUTION																			
46	**Distribution Water Mains**																			
46A	Water Main Rehabilitation	**285,000,000**	19,000,000	19,000,000	19,000,000	19,000,000	19,000,000	**95,000,000**	19,000,000	19,000,000	19,000,000	19,000,000	19,000,000	**95,000,000**	19,000,000	19,000,000	19,000,000	19,000,000	19,000,000	**95,000,000**
47	**Distribution System Facilities**																			
47A	Various Distribution System Facilities Projects	**15,000,000**	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	**5,000,000**	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	**5,000,000**	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	**5,000,000**
	Distribution Total	**$300,000,000**	**$20,000,000**	**$20,000,000**	**$20,000,000**	**$20,000,000**	**$20,000,000**	**$100,000,000**	**$20,000,000**	**$20,000,000**	**$20,000,000**	**$20,000,000**	**$20,000,000**	**$100,000,000**	**$20,000,000**	**$20,000,000**	**$20,000,000**	**$20,000,000**	**$20,000,000**	**$100,000,000**
	SUPPORT																			
48	**Support System Facilities**																			
48A	Various Support System Facilities Projects	**3,000,000**	200,000	200,000	200,000	200,000	200,000	**1,000,000**	200,000	200,000	200,000	200,000	200,000	**1,000,000**	200,000	200,000	200,000	200,000	200,000	**1,000,000**
49	**Central Operations Facility**																			
49A	Central Operations Facility Upgrades	**300,000**	20,000	20,000	20,000	20,000	20,000	**100,000**	20,000	20,000	20,000	20,000	20,000	**100,000**	20,000	20,000	20,000	20,000	20,000	**100,000**
50	**Forestry Garage**																			
50A	Forestry Garage Facility Upgrades	**30,000**					10,000	**10,000**					10,000	**10,000**					10,000	**10,000**
51	**Watershed Storage Facility**																			
51A	Watershed Storage Facility Upgrades	**30,000**					10,000	**10,000**					10,000	**10,000**					10,000	**10,000**
52	**Records Management System (GIS/AM)**																			
52A	Records Management System (GIS/AM) Improvements	**1,500,000**	100,000	100,000	100,000	100,000	100,000	**500,000**	100,000	100,000	100,000	100,000	100,000	**500,000**	100,000	100,000	100,000	100,000	100,000	**500,000**
53	**Billing System**																			
53A	Billing System Improvements	**750,000**	50,000	50,000	50,000	50,000	50,000	**250,000**	50,000	50,000	50,000	50,000	50,000	**250,000**	50,000	50,000	50,000	50,000	50,000	**250,000**
	Support Total	**$5,610,000**	**$370,000**	**$370,000**	**$370,000**	**$370,000**	**$390,000**	**$1,870,000**	**$370,000**	**$370,000**	**$370,000**	**$370,000**	**$390,000**	**$1,870,000**	**$370,000**	**$370,000**	**$370,000**	**$370,000**	**$390,000**	**$1,870,000**
	TOTAL	**$409,370,000**	**$23,290,000**	**$33,590,000**	**$23,950,000**	**$33,210,000**	**$23,160,000**	**$137,200,000**	**$23,750,000**	**$32,150,000**	**$27,040,000**	**$32,070,000**	**$24,750,000**	**$139,760,000**	**$23,760,000**	**$32,040,000**	**$22,150,000**	**$32,150,000**	**$22,310,000**	**$132,410,000**

Exhibit 14 - 15 Year IFR Expenditure Plan - FY 2026 - 2040 Pie Chart



15 Year IFR Project Overview - FY 2026 - 2040

RAW WATER SUPPLY

1. <u>Raw Water Supply Facilities</u>

1A. Various Raw Water Supply Facilities Projects

Raw Water Supply Reservoirs, Dams and Facilities are inspected on a regular basis. The budget amount covers any minor, unscheduled improvements or rehabilitations that come up during these inspections. Also included in this budget amount will be improvements to the fences and access roads in the watershed, some of which date back to their original construction in the 1920's.

2. <u>Scituate Reservoir and Gainer Dam</u>

2A. Scituate Reservoir and Dam Inspections

In accordance with R.I. DEM Rules and Regulations, all of Providence Water's primary and secondary dams are to be inspected throughout the 15-year plan. This dam will be scheduled and inspected every 2 years starting in 2022.

3. <u>Barden Reservoir and Dam</u>

3A. Barden Reservoir and Dam Inspections

In accordance with R.I. DEM Rules and Regulations, all of Providence Water's primary and secondary dams are to be inspected throughout the 15-year plan. This dam will be scheduled and inspected every 5 years starting in 2025.

4. <u>Moswansicut Reservoir and Dam</u>

4A. Moswansicut Reservoir and Dam Inspections

In accordance with R.I. DEM Rules and Regulations, all of Providence Water's primary and secondary dams are to be inspected throughout the 15-year plan. This dam will be scheduled and inspected every 5 years starting in 2025.

5. <u>Ponagansett Reservoir and Dam</u>

5A Ponagansett Reservoir and Dam Inspections

In accordance with R.I. DEM Rules and Regulations, all of Providence Water's primary and secondary dams are to be inspected throughout the 15-year plan. This dam will be scheduled and inspected every 2 years starting in 2022.

6. <u>Regulating Reservoir and Dam</u>

6A. Regulating Reservoir Rehabilitation

Upgrades to the dam will be needed consisting of regrading and providing armor protection along both the upstream and downstream slopes, rehabilitating/replacing the existing stone walls along both the upstream and downstream slopes, rehabilitating the concrete spillway, rehabilitating the concrete outlet structure, and rehabilitating the current drainage system along the length of the dam.

6B. Regulating Reservoir and Dam Inspections

In accordance with R.I. DEM Rules and Regulations, all of Providence Water's primary and secondary dams are to be inspected throughout the 15-year plan. This dam will be scheduled and inspected every 5 years starting in 2025.

7. <u>Westconnaug Reservoir and Dam</u>

7A. Westconnaug Reservoir and Dam Inspections

In accordance with R.I. DEM Rules and Regulations, all of Providence Water's primary and secondary dams are to be inspected throughout the 15-year plan. This dam will be scheduled and inspected every 2 years starting in 2021.

8. Secondary Reservoirs and Dams

8A. Secondary Reservoirs and Dam Improvements

In accordance with R.I. DEM Rules and Regulations, all of Providence Water's secondary dams have been scheduled to be inspected throughout this plan every 5 years. Plans are to inspect all secondary dams and structures and to conduct remedial work as required to extend their useful lives. Amounts are budgeted for needed improvements for the continual upkeep of all dams and appurtenant structures.

TREATMENT

9. Treatment Plant Facilities

9A. Various Treatment Plant Projects

The electrical, plumbing, mechanical, security and fire systems each have regularly scheduled inspections. Funds are budgeted for minor upgrades identified during these inspections. The budget amount also covers site improvements at the Treatment Plant Facility as required.

9B. PW Lab Equipment

Extensive testing of the raw and treated water is required on a regularly scheduled basis. The testing and monitoring equipment utilized has various life expectancies depending on the type of equipment and frequency of use. Plans are to replace this equipment as it becomes necessary based on the life expectancy of each piece of equipment.

9C. Treatment Process and Water Quality Studies

In 2012 Providence Water convened an expert advisory panel to evaluate corrosion control treatment, as directed by a June 2012 consent agreement between Providence Water and the RI Department of Health. The goal of the expert advisory panel is to provide recommendations, including additional studies and/or treatment adjustments needed, to achieve the lead action level while optimizing corrosion control within the distribution system. In accordance with the current 2020 Bilateral Compliance Agreement between

Providence Water and the RI Department of Health, PW shall meet with the expert advisory panel at least annually.

PW will conduct extensive pipe loop testing to determine the effect of a distribution system pH reduction from 10.2 to about 7.8 on iron mobilization within unlined cast iron mains and lead release from lead service lines, after an established period of orthophosphate addition This pipe loop test will incorporate sections of unlined cast iron water mains and lead service lines that are currently in use within PW's distribution system. At this time, we estimate a testing duration of about 5 years.

10. <u>SCADA / Control System</u>

10A. SCADA / Control System Improvements

Because computer technology is ever changing, funds have been budgeted for the upgrade of the remote PLC system and additional software programming on an as-needed basis. Annual funds are budgeted to anticipate ongoing needs, which include future hardware replacements and software upgrades.

11. <u>Treatment Plant Structures and Conduits</u>

11A. Treatment Plant Structures and Conduits Inspection

Plans are to internally inspect the major conduits at the plant consisting of the influent and effluent aerator conduits, the aerated water conduit (the lower tunnel), the settled water conduit (the upper tunnel), the filter conduit, and the clear well.

12. <u>Aeration System</u>

An inspection of this system is scheduled for once every 5 years beginning in 2030.

13. <u>Sedimentation System</u>

This system will undergo major upgrades in the 5 year plan. These improvements will most likely carry over into the 15 year plan. No projects are currently scheduled for this system in the 15 year plan.

14. <u>Sludge Residual System</u>

This system will undergo major upgrades in the 5 year plan. These improvements will most likely carry over into the 15 year plan. No projects are currently scheduled for this system in the 15 year plan.

15. <u>Filtration System</u>

15A. Filter Media Replacement

In the plan, the filter media made up of anthracite coal and sand will be replaced for all 18 of the filters.

15B. Filter Blower Replacement

The blowers will be nearing the end of their useful life. There is a project scheduled to replace these assets in the 15-year plan.

15C. Filter Valve Actuator Replacement

The actuators will be nearing the end of their useful life. There is a project scheduled to replace these assets in the 15-year plan.

16. <u>Service Water System</u>

16A. Service Water System Inspection

Plans are to perform a complete inspection of the service water system every 5 years throughout the 15-year plan.

17. <u>Wash Water System</u>

17A. Wash Water System Inspection

Plans are to perform a complete inspection of the wash water system every 5 years throughout the 15-year plan.

18. Ascorbic Acid System

18A. Ascorbic Acid System Improvements

Minor improvements are expected in the early part of the 15 year plan.

19. Chlorine System

19A. Chlorine System Improvements

The chlorine feeders and pumps will be nearing the end of their useful life. There will be a project scheduled to upgrade these assets in the 15-year plan.

20. Ferric System

20A. Ferric Feed System Improvements

The day tanks, metering pumps, and mag meters will be nearing the end of their useful life. There will be a project scheduled to upgrade these assets in the 15-year plan.

21. Fluoride System

21A. Fluoride System Improvements

The transfer pumps, mag meters, and storage and day tanks will be nearing the end of their useful life. There will be a project scheduled to upgrade these assets in the 15-year plan.

22. Lime System

22A. Lime System Improvements

Sections of the transfer pipe (Sweeps) on the Lime System will be nearing the end of their useful life. There will be a project scheduled to upgrade these assets in the 15-year plan.

23. Orthophosphate System

23A. Orthophosphate System Improvements

Pumps, meters and tanks will need to be rehabilitated or replaced towards the end of the 15 year plan.

STORAGE

<u>24. Storage Facilities</u>

24A. Various Storage Facilities Projects

All mechanical, electrical, architectural, structural and site components of each storage facility have regularly scheduled inspections. Funds have been budgeted for anticipated improvements to remedy deficiencies as identified during these inspections.

25. <u>Aqueduct Reservoir and Gatehouse</u>

25A. Aqueduct Reservoir Inspection

Each storage reservoir is scheduled for inspection once every 10 years. This reservoir will be inspected in 2032.

26. <u>Greenville Ave Tank</u>

26A Greenville Ave Tank Inspections

Each storage reservoir is scheduled for inspection once every 10 years. This reservoir will be inspected in 2029 and 2039.

27. <u>Lawton Hill Reservoir and Gatehouse</u>

<u>27A. Lawton Hill Reservoir Inspection</u>

Each storage reservoir is scheduled for inspection once every 10 years. This reservoir will be inspected in 2032.

28. <u>Longview Reservoir and Gatehouse</u>

<u>28A. Longview Reservoir Inspection</u>

Each storage reservoir is scheduled for inspection once every 10 years. This reservoir will be inspected in 2031.

29. Neutaconkanut Reservoir and Gatehouse

29A. Neutaconkanut Reservoir Inspection

Each storage reservoir is scheduled for inspection once every 10 years. This reservoir will be inspected in 2031.

30. Ridge Road Tank

30A. Ridge Road Tank Inspection

Each storage reservoir is scheduled for inspection once every 10 years. This reservoir will be inspected in 2029 and 2039.

PUMPING

31. Pumping Facilities

31A. Various Pumping Facilities Projects

All mechanical, electrical, architectural, structural and site components of each pump station have regularly scheduled inspections. Funds have been budgeted for anticipated improvements to remedy deficiencies as identified during these inspections.

32. Raw Water Booster Pump Station

32A. Raw Water Booster PS Improvements

The valves and actuators will be nearing the end of their useful life. There will be a project scheduled to upgrade these assets in the 15-year plan.

33. Aqueduct Pump Station

33A. Aqueduct PS Improvements

The pumps, motors, valves and VFD’s will be nearing the end of their useful life. There will be a project scheduled to upgrade these assets in the 15-year plan.

34. <u>Ashby St Pump Station</u>

34A. Ashby St PS Improvements

The VFD's will be nearing the end of their useful life. There will be a project scheduled to upgrade these assets in the 15-year plan.

35. <u>Bath Street Pump Station</u>

35A. Bath Street PS Improvements

Many of the major components of the Bath St pump station will be nearing the end of their useful life. There will be a project scheduled to design and completely rehab the pump station in the 15-year plan.

36. <u>Cranston Commons Pump Station</u>

36A. Cranston Commons Pump Station Improvements

This pump station is scheduled for replacement in the 5 year plan. VFD's will need to be replaced in the 15 year plan.

37. <u>Dean Estates Pump Station</u>

37A. Dean Estates PS Improvements

The VFD's will be nearing the end of their useful life. There will be a project scheduled to upgrade these assets in the 15-year plan.

38. <u>Fruit Hill Pump Station</u>

38A. Fruit Hill PS Improvements

The VFD's will be nearing the end of their useful life. There will be a project scheduled to upgrade these assets in the 15-year plan.

39. <u>Greenville Ave Pump Station</u>

39A. Greenville Ave PS Improvements

The VFD’s will be nearing the end of their useful life. There will be a project scheduled to upgrade these assets in the 15-year plan.

40. <u>Neutaconkanut Pump Station</u>

40A. Neutaconkanut Pump Station Improvements

Many of the major components of the Bath St pump station will be nearing the end of their useful life. There will be a project scheduled to design and completely rehab the pump station in the 15-year plan.

41. <u>Waltham St Pump Station</u>

41A. Waltham St Pump Station Improvements

The pumps, motors, valves and VFD’s will be nearing the end of their useful life. There will be a project scheduled to upgrade these assets in the 15-year plan.

TRANSMISSION

42. <u>Scituate Aqueduct and Tunnel (90”)</u>

42A. Scituate Aqueduct and Tunnel (90”) Inspection

The 90" effluent finished water aqueduct, constructed in the 1920's, runs approximately 4.5 miles. It is constructed of a concrete lined tunnel section between the west and east portals, and reinforced concrete pipe thereafter. An amount has been budgeted for inspection of the entire length of the aqueduct and future rehabilitative work will be based upon the results of the inspection.

43. Supplemental Tunnel and Aqueduct (78” & 102”)

43A. 102” Aqueduct Fiber Optic Monitoring

A fiber optic data acquisition system and acoustic monitoring sensor line was installed in 5 miles of the 102” aqueduct in 2006. This system provides real-time monitoring on a continuous 24-hour per-day basis by monitoring the sounds transmitted through the pipeline to detect the acoustic events associated with the failure and break of pre-stressed wires. Funds are budgeted to continuously monitor and analyze the digital data to identify potential problem areas with the pipeline.

43B. 78” Aqueduct Inspection

The 78" aqueduct transmission line consists of 20,131 feet (3.81 miles) of pre-stressed concrete cylinder pipe (PCCP), and two sections of concrete lined tunnel consisting of 3,046 feet (0.58 miles). The 78" aqueduct has undergone significant rehabilitation since previous inspections have discovered extensive corrosive damage. In accordance with the inspection and rehabilitation program developed, both the 78" and 102" lines will continue to be inspected and rehabilitated, as necessary, every five years.

43C. 78” Aqueduct Rehabilitation

Plans are to continue the repair of the 78-inch Aqueduct by means of slip lining. The plan is to do this proactively during the upcoming inspection and repair campaigns. Previously evaluated repairs options determined Slip Lining serves a dual purpose; quick trenchless repairs and cost effectiveness. The process of Slip Lining effectively replaces the damaged PCCP sections with new, structurally sound sections of FRP pipe. Funds have been allocated to slip line approximately 2000 feet of pipe in conjunction with each inspection project.

43D. 102” Aqueduct Inspection

The 102-inch pipeline is 27,325 feet long (5.18 miles). It was constructed in the 1960's and consists of pre-stressed concrete cylinder pipe (PCCP). Extensive corrosive damage has been identified from previous inspections and it has undergone significant rehabilitation. In accordance with the inspection and rehabilitation program developed, both the 78" and 102" lines will continue to be inspected and rehabilitated, as necessary, every five years.

43E. 102" Aqueduct Rehabilitation

Plans are to continue the repair of the 102-inch Aqueduct by means of slip lining. The plan is to do this proactively during the upcoming inspection and repair campaigns. Previously evaluated repairs options determined Slip Lining serves a dual purpose; quick trenchless repairs and cost effectiveness. The process of Slip Lining effectively replaces the damaged PCCP sections with new, structurally sound sections of FRP pipe. Funds have been allocated to slip line approximately 2000 feet of pipe in conjunction with each inspection project.

44. Raw Water Conduits

44A. Raw Water Conduits Inspection

The 60 inch steel riveted conduits are equipped with a cathodic protection system consisting of four impressed current anode beds along 1000 feet of the underground portion of the twin mains. Plans are to inspect the system and make necessary corrections if needed. Plans also include the inspection of the exposed piping inside the meter chamber and the excavation of a test pit of the buried section to assess the condition of the exterior coating along with soil resistivity testing.

Plans are to internally inspect the 90-inch mortar lined steel pipe encased in concrete, which runs from the junction chamber to the treatment plant. In 2014, two test pits were excavated for an external inspection of the 90" influent pipe. The exterior of the pipe was in excellent condition.

45. Transmission System Facilities

45A. Various Transmission (16" - 66") Facilities Projects

Of the approximate 1000 miles of main in the system, about 100 miles of transmission mains are 66 inches or less. Plans are to perform a condition assessment on some of these mains. Nondestructive testing methods will be performed using available technologies and applications accepted by the water industry, such as electromagnetic testing, ultrasonic testing, and/or acoustic soundings. This will aid us to assess the condition of our mains and to identify future replacement work.

Oftentimes during shutdowns, valves are found to be inoperable or are broken during valve operation. An amount has been budgeted to anticipate the replacement of defective larger valves.

DISTRIBUTION

46. <u>Distribution Water Mains</u>

46A. Water Mains Rehabilitation

Of the approximate 500 miles of unlined cast iron water mains in the system, about 88 miles have been replaced to the end of fiscal year 2020. Depending on construction bid costs for cleaning and lining, or main replacements, it is estimated that we will replace or rehabilitate approximately 10 to 12 miles of water mains per year.

47. <u>Distribution System Facilities</u>

47A. Various Distribution System Facilities Projects

There are about 14,000 distribution valves in the system. Plans are to replace these valves in conjunction with the water main rehabilitation program. Valves in the system that are found to be defective will also be replaced.

There are approximately 11,000 lead services remaining to be replaced in the system. Plans are to replace these services in conjunction with the water main rehabilitation program. Lead services in the system that are found to be leaking will also be replaced.

There are about 6,400 hydrants in system. Plans are to replace these hydrants in conjunction with the water main rehabilitation program. Hydrants in the system that are found to be defective will also be replaced.

A blow off is typically located at the end of a dead end main. The purpose of opening a blow off is to release air from a main that can enter the main after a main is shutdown, or to run water to waste in order to clean out the main. When we receive water quality complaints, we sometimes run the blow off to discharge any deposits or sediment from the main. In our system, a typical blow off assembly has a 2” tap and a 2” blow off connection. At times because of recurring problem areas in the system, it is preferred to purge the main from a larger diameter connection. Our plan is to replace some of these old blow off connections with fire hydrants, which have two - 2 ½ ports, and one - 4 ½ port. This will provide the ability to run a larger volume of water from the end of the dead end main.

The system is comprised of approximately 900 miles of distribution mains, 113 miles of transmission mains (16” to 66”), 863 transmission valves, 14,000 distribution valves, 77,000 services, and 6,400 hydrants. A system-wide leak detection project was completed in 2010. The plan is to perform a leak detection survey in the 15-year plan.

SUPPORT

48. <u>Support System Facilities</u>

48A. Various Support System Facilities Projects

The various components of each support system facility are inspected regularly throughout each year. Funds are budgeted to cover any improvements identified during these inspections. These funds will also cover any damaged fencing and rehabilitate deteriorated roads at these support service facilities. The fencing and road improvement projects are determined through condition assessments and priority.

49. <u>Central Operations Facility</u>

49A Central Operations Facility Upgrades

Budget has been allocated for minor improvements to this facility each year. Any major upgrades will be performed under a Various Support System project.

50. <u>Forestry Garage</u>

50A. Forestry Garage Facility Upgrades

Budget has been allocated for minor improvements to this facility once every five years. Any major upgrades will be performed under a Various Support System project.

51. <u>Watershed Storage Facility</u>

51A. Watershed Storage Facility Upgrades

Budget has been allocated for minor improvements to this facility once every five years. Any major upgrades will be performed under a Various Support System project.

52. <u>Records Management System (GIS/AM)</u>

52A. Records Management System (GIS/AM) Improvements

Because computer technology is ever changing and upgrades are routinely needed, annual funds are budgeted to anticipate ongoing needs, which include future hardware replacements and software upgrades.

53. <u>Billing System</u>

53A. Billing System Improvements

Because computer technology is ever changing and upgrades are routinely needed, annual funds are budgeted to anticipate ongoing needs, which include future hardware replacements and software upgrades.

IV. REVENUE REQUIREMENTS

Overview of Revenue Plan

Exhibit 3 – 20-Year Sources and Uses of Funds – FY's 2021 through 2040 – Providence Water has developed a Sources and Uses of Funds Plan based on planned replacement needs, current authorized funding, and minimal proposed new funding. The Exhibit lists the projected Sources and Uses of Funds in four five-year phases. The plan is subject to change as it is implemented. Any additional funding or borrowing will be addressed as we move forward.

Overview of Revenue Plan

Providence Water has developed a Sources and Uses of Funds Plan using current authorized funds based on our anticipated replacement needs within our system. EXHIBIT – 2 lists the projected Sources and Uses of Funds in four (4) five-year phases. The current authorized funding amount is $27.3 million per year. Additional funding and borrowing will be required to balance the projected expenditures.

Sources of Funds

Providence Water began funding a restricted Infrastructure Replacement Fund (IFR) in 1996. At that time, the RI Public Utilities Commission (RIPUC) granted Providence Water a phased-in funding approach to begin its IFR program. Over the years, Providence Water has requested and the RIPUC has approved several increases to the funding level consistent with our plan and accomplishments.

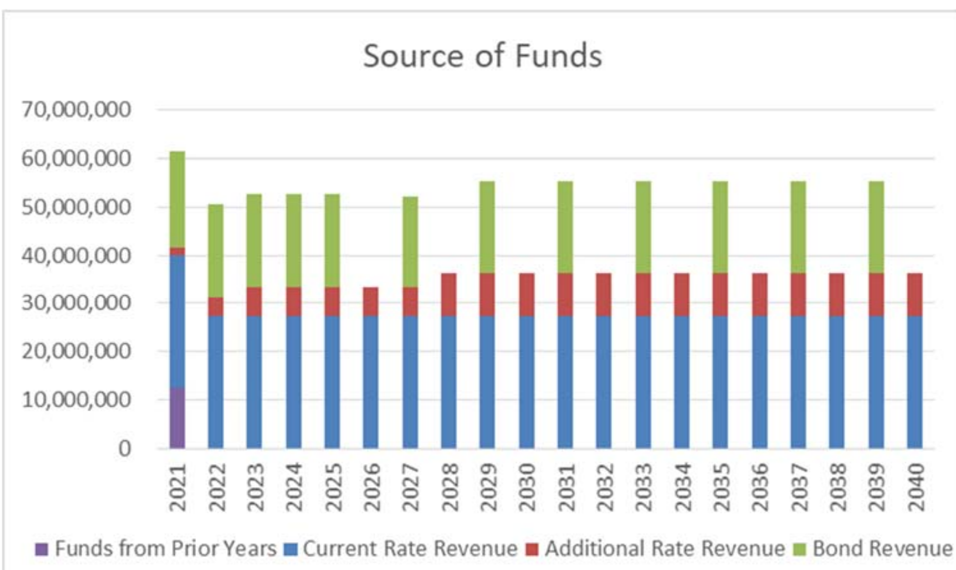
Providence Water has a short-term revolving line of credit with Century Bank that provides access to funds in case of an emergency or cash flow fluctuations. Providence Water does plan to issue bonds for some of the projects in this IFR plan. The plan is also balanced by projecting a number of additional increases in the funding level authorized by the PUC. Please see EXHIBIT – 2. Over the 20-year period, current funding is $546 million, available funds from prior years is $12.6 million and there are no available bond proceeds from earlier issues. A combination of additional rate revenue and bond proceeds of $382.9 million will be needed to balance the plan.

Uses of Funds

Providence Water has projects totaling $615,400,000 over the 20-year period. This amount includes capitalized labor and benefits authorized by the Public Utilities Commission to be reimbursed to Providence Water's Operating Fund from the IFR Fund. Debt service as well as applied overhead are included as a use of funds in this plan. Existing debt service obligations totals $95,441,549, new debt service obligations could be potentially $189,854,668 and applied overhead is estimated at $40,000,000. The total uses of funds are projected to be $940.7 million and the total sources of funds are projected to be $942.2 million resulting in a potential $1.5 million cumulative surplus over the 20-year period. This IFR plan is subject to change and PWSB will invariably have to make amendments to this plan to match changing State and Federal regulations as well as changing field conditions. This replacement plan and the projected funding of this plan is based on the best information available at this time.

Exhibit 2 - 20-Year Sources and Uses of Funds - FY 2021 - 2040

Fiscal Years	2021 - 2025	2026 - 2030	2031 - 2035	2036 - 2040	2021 - 2040
Sources of Funding					
Current Authorized Funding	136,500,000	136,500,000	136,500,000	136,500,000	546,000,000
Current Bond Proceeds	-				
East Smithfield Debt Service Fund Transfer	259,861	250,403	156,596	-	666,860
Funds Available from Prior Years	12,636,999	7,627,159	3,483,185	12,847,365	12,636,999
Additional Rate Revenue	23,666,667	39,000,000	45,000,000	45,000,000	152,666,667
Additional Bond Proceeds	97,197,211	38,000,000	57,000,000	38,000,000	230,197,211
Total Sources of Funds	**270,260,738**	**221,377,562**	**242,139,781**	**232,347,365**	**942,167,737**
Uses of Funding					
Construction Project Expenditures	206,030,000	137,200,000	139,760,000	132,410,000	615,400,000
Existing Debt Service	34,608,662	64,994,378	79,532,416	88,465,845	95,441,549
Applied Overhead	10,000,000	10,000,000	10,000,000	10,000,000	40,000,000
Additional Debt Service	11,994,916	5,700,000	14,250,000	14,250,000	189,854,668
Total Uses of Funds	**262,633,579**	**217,894,378**	**229,292,416**	**230,875,845**	**940,696,217**
IFR Program Surplus	**7,627,159**	**3,483,185**	**12,847,365**	**1,471,520**	**1,471,520**



A. APPENDIX

The Comprehensive Clean Water Infrastructure Act of 1993 - Chapter 46-15.6 of the General Laws of Rhode Island

Rules and Regulations for Clean Water Infrastructure Plans

The Comprehensive Clean Water Infrastructure Act of 1993
Chapter 46-15.6 of the General Laws of Rhode Island

TITLE 46
Waters and Navigation
CHAPTER 46-15.6 - Clean Water Infrastructure

Index of Sections

§ 46-15.6-1 Short title. - This chapter shall be referred to as the "Comprehensive Clean Water Infrastructure Act of 1993".

History of Section. - (P.L. 1993, Ch. 312, § 1; P.L. 1993, Ch. 438, § 1.)

§ 46-15.6-2 Legislative findings, intent, and objectives. - (a) the general assembly hereby recognizes and declares that:

(1) Water is vital to life and comprises an invaluable natural resource, which is not to be abused by any segment of the state's population or its economy. It is the policy of this state to restore, enhance, and maintain the chemical, physical, and biological integrity of its waters to protect health.

(2) The waters of this state are a critical renewable resource which must be protected to insure the availability of safe and potable drinking water for present and future needs.

(3) It is a paramount policy of the state to protect the purity of present and future drinking water supplies by protecting the infrastructure of potable water, including treatment plants, pipes, valves, pumping stations, storage facilities, interconnections, and water mains.

(4) It is imperative to provide a uniform and valid mechanism to base assistance for the construction, repair, protection, and/or improvement of potable water infrastructure replacement.

(5) The decay of infrastructure and related construction due to deterioration or functional obsolescence can threaten the quality of supplies and, therefore, can endanger public health; thus it is necessary to take immediate and continuing steps to repair and replace the infrastructure used to deliver water supplies in order to restore water system facilities.

(6) Failure to replace the infrastructure used to deliver water supplies may cause and probably will continue to degrade the quality of public drinking water.

(7) Protection of water quality is necessary from the collection source through the point of delivery to the ultimate consumer.

(8) The potable threat to public health caused by unsafe drinking water far outweighs the economic costs for the construction of the potable water infrastructure replacement.

(b) That the objectives of this chapter are:

(1) To establish a funding mechanism to insure that infrastructure replacement programs are carried out by each municipality and by each municipal department, agency, district, authority, or other entity engaged in or authorized to engage in the supply, treatment, transmission, or distribution of drinking water, and,

(2) That the plans and their execution achieve and insure that the investment of the public in such facilities is not eroded.

History of Section. - (P.L. 1993, Ch. 312, § 1; P.L. 1993, Ch. 438, § 1; P.L. 2007, Ch. 340, § 53.)

§ 46-15.6-3 Infrastructure replacement program. - All municipalities, municipal departments and agencies, districts, authorities or other entities engaged in or authorized to engage in the supply, transmission, distribution of drinking water on a wholesale or retail basis, and which obtain, transport, purchase, or sell more than fifty million (50,000,000) gallons of water per year, shall be referred to as "water suppliers" for the purpose of this chapter. All water suppliers shall prepare, maintain, and carry out an infrastructure replacement program as described in this chapter.

History of Section. - (P.L. 1993, Ch. 312, § 1; P.L. 1993, Ch. 438, § 1.)

§ 46-15.6-4 Content of infrastructure replacement component. - (a) the infrastructure replacement component (hereinafter referred to as "component") shall include without limitation:

(1) A detailed financial forecast of facility replacement improvement requirements for the next twenty (20) years including, but not limited to, the principal components of the water system such as reservoirs, dams, treatment plants, pipes, valves, fire hydrants, pumping stations, storage facilities, pumping and well equipment, interconnections and water mains. Each financial forecast shall analyze the condition and life expectancy of the existing facilities, prioritize needed repairs and replacements and amortize such improvement requirements on an annual basis over the next twenty (20) years in accordance with rules and regulations promulgated herein. Water suppliers, which have in effect infrastructure improvement or rehabilitation programs and mechanisms for funding approved by their appropriate governing bodies, may submit their existing programs for complete or partial compliance with the provisions of this section.

(2) A method that establishes and maintains fiscal controls and accounting depreciation standards sufficient to ensure proper accounting for evaluation of facility requirements necessitated by this chapter in accordance with rules and regulations promulgated herein.

(b) Components shall be consistent with applicable local comprehensive plans in which the service areas are or are planned to be located.

(c) Proceeds from the watershed protection fund shall be usable for reimbursement of water suppliers for preparation of their infrastructure replacement components as described in this chapter up to fifty percent (50%) of the cost of the component.

History of Section - (P.L. 1993, Ch. 312, § 1; P.L. 1993, Ch. 438, § 1.)

§ 46-15.6-5 Completion, filing, approval and implementation of infrastructure component. - (a) Each water supplier required by this chapter to prepare and maintain an infrastructure replacement component shall complete and adopt a component two (2) years subsequent to the date each party's water supply management plan per § 46-15.3-7.5 is due.

(b) Water suppliers subject to the requirements of § 46-15.6-3 shall file a copy of all components, only to the extent the components differ from plans filed under § 46-15.3-5.1 thereto with the following: the division of drinking water quality of the department of health (hereinafter referred to as "the department").

(c) A water supplier subject to § 46-15.6-3 shall review their components at least once every five (5) years and shall modify or replace their components as necessary.

(d) The department shall coordinate expeditious review of components prepared by water suppliers subject to this chapter. Upon receipt of components prepared by water suppliers under this chapter, water resources board, and the division of public utilities and carriers (for those water suppliers within their jurisdiction) shall have one hundred and twenty (120) days to review the components and submit comments thereon to the department. Upon consideration of written comments by all agencies designated herein, the department shall determine whether the component complies with the requirements of this chapter. This determination shall be made within eight (8) months of the initial submission. A thirty (30) day public comment period shall be included in this eight (8) month review period. Failure by the department to notify water suppliers of its determination within the prescribed time limit shall constitute approval.

(e) Each water supplier shall implement the requirements of its infrastructure replacement program and component, including its infrastructure replacement fund, as mandated by this chapter in accordance to rules and regulations promulgated per § 46-15.6-7.

History of Section. - (P.L. 1993, Ch. 312, § 1; P.L. 1993, Ch. 438, § 1; P.L. 1995, Ch. 103, § 1; P.L. 1997, Ch. 37, § 1; P.L. 1998, Ch. 340, § 1; P.L. 2009, Ch. 288, § 9; P.L. 2009, Ch. 341, § 9.)

§ 46-15.6-6 Financing infrastructure replacement. - The cost of infrastructure replacement programs and indemnification as required by this chapter shall be financed as follows:

(1) The cost of programs to implement infrastructure replacement shall be paid by the water users. The charges shall be limited to those necessary and reasonable to undertake the actions required by this chapter. These charges shall be based upon the annual funding requirements of the facility improvements necessitated over each successive twenty (20) year period. Interest earned on money in this infrastructure replacement fund shall be credited to this infrastructure replacement fund.

(2) Each water supplier designated in § 46-15.6-3 shall establish a special account designated as the infrastructure replacement fund to be held as a restricted receipt account and to be administered by the water supplier solely to implement and carry out the replacement of infrastructure as required by this chapter.

(3) Any money which may accumulate in the infrastructure replacement fund in excess of that needed to implement the annual infrastructure replacement program or in excess of that exclusively pledged to repayment of outstanding bonds or notes or loan repayments to implement the infrastructure replacement program shall revert to the rate payers of that particular system on a biannual basis.

(4) Each water supplier designated in § 46-15.6-3 may, as a complete or partial alternative to direct funding of its infrastructure replacement program, finance its infrastructure replacement program through bonding. The annual debt service of each bond or bonds shall be applied and credited towards the annual requirement of the infrastructure replacement program's annual funding requirements.

(5) The Rhode Island public utilities commission, as to water suppliers within its jurisdiction, shall permit an increase for just and reasonable infrastructure replacement in the portion of the water suppliers' rate structure to comply with this chapter and shall allow the water supplier to add this required funding to its rate base in accordance with this chapter.

History of Section. - (P.L. 1993, Ch. 312, § 1; P.L. 1993, Ch. 438, § 1; P.L. 2009, Ch. 288, § 9; P.L. 2009, Ch. 341, § 9.)

§ 46-15.6-7 Rules governing content of programs, components, review, evaluation, funding, and implementation. - The department with the concurrence of the water resource board, and the Rhode Island public utilities commission, as to water suppliers within its jurisdiction, shall forthwith promulgate rules and regulations for the review of components as pertains to financial forecasts of facility replacement, improvement requirements and fiscal controls and accounting depreciation standards per § 46-15.6-4(a)(1) and (a)(2). The department with the concurrence of the water resource board, and the Rhode Island public utilities commission, as to water suppliers within its jurisdiction, shall promulgate the criteria or standards, which it will use to evaluate the implementation of approved components, programs and funding mechanisms.

History of Section. - (P.L. 1993, Ch. 312, § 1; P.L. 1993, Ch. 438, § 1; P.L. 1997, Ch. 37, § 1; P.L. 2009, Ch. 288, § 9; P.L. 2009, Ch. 341, § 9.)

§ 46-15.6-8 Severability. - If any provision of this chapter or of any rule, regulation or determination made thereunder, or the application thereof to any person, agency or circumstances, is held invalid by a court of competent jurisdiction, the remainder of the chapter, rule, regulation, or determination and the application of such provisions to other persons, agencies, or circumstances shall not be affected thereby. The invalidity of any section or sections of this chapter shall not affect the validity of the remainder of this chapter.

History of Section. - (P.L. 1993, Ch. 312, § 1; P.L. 1993, Ch. 438, § 1.)

§ 46-15.6-9 Excluding requirement of state mandated cost. - The provisions of §§ 45-13-7 - 45-13-10 shall not apply to §§ 46-15.6-1 - 46-15.6-8.

History of Section. - (P.L. 1993, Ch. 312, § 1; P.L. 1993, Ch. 438, § 1.)

Rules and Regulations for Clean Water Infrastructure Plans

216-RICR-50-05-7
TITLE 216 – DEPARTMENT OF HEALTH
CHAPTER 50 – ENVIRONMENTAL HEALTH
SUBCHAPTER 05 - WATER QUALITY

PART 7 – Clean Water Infrastructure Plans

7.1 AUTHORITY

A. These rules and regulations are promulgated pursuant to the authority conferred by R.I. Gen. Laws § 46-15.6-7.

B. The terms and provisions of the rules and regulations shall be liberally construed to allow the Department of Health to effectuate the purposes of the state law, goals, and policies consistent with the R.I. Gen. Laws Chapter 46-15.6.

7.2 PURPOSE

A. The waters of this state are a critical renewable resource which must be protected to insure the continued availability of safe and potable drinking water for present and future needs. It is a paramount policy of the state to protect the purity of present and future drinking water supplies by protecting the infrastructure of potable water, including sources, treatment plants and distribution systems. The decay of water supply infrastructure due to deterioration or functional obsolescence can threaten the quality of water supplies and therefore can endanger public health. Therefore, it is necessary to take timely and continuing steps to repair and replace the infrastructure used to treat and deliver drinking water from public water suppliers.

B. By planning and funding for future infrastructure replacement, unexpected large capital expenditures causing sudden increases in water rates can hopefully be avoided. The intent of this Infrastructure Replacement Plan is to provide a planning and funding mechanism to ensure that infrastructure replacement programs are carried out by each municipality, district, agency, authority, or other entity engaged in the supply, treatment, transmission, and/or distribution of drinking water.

C. Goals of the plan include the justification of a facility replacement program, the provision of a dedicated and sufficient funding mechanism, the prioritization of infrastructure replacement, and the prevention of the erosion of drinking water infrastructure.

7.3 DEFINITIONS

A. Wherever used in this Part, the following terms shall be construed as follows:

1. “Audit” means the annual formal examination of the water supplier's financial statements including all investments, interest, expenditures, and operating costs.

2. “Commission” means the Public Utilities Commission (PUC) of the State of Rhode Island.

3. “Comprehensive plan” means the Comprehensive Plan adopted and approved in accordance with R.I. Gen. Laws Chapter 45-22.2, the RI Comprehensive Planning and Land Use Regulation Act. A document prepared by each local municipality which contains the planning and implementation program for land use, housing, economic development, natural and cultural resources, services and facilities, open space and recreation, and circulation.

4. “Department” means the Department of Health (DOH), Division of Drinking Water Quality.

5. “Distribution facilities” means the pipes and appurtenant facilities employed specifically to deliver, to dispense, to render or to circulate potable water directly to the consumer.

6. “Drinking water” means potable water served to the public.

7. “Economic life” means the expected financial lifespan of a component of a public water system which is used to depreciate the capital expense of the component.

8. “Eligible expenditures” means those costs and expenses necessary to fund, manage, and implement the infrastructure replacement plan, only. This may include associated accounting fees, consulting fees, replacement construction, etc.

9. “Infrastructure” means the permanent underlying framework of the public water system, including but not limited to, supplies, transmission, storage, distribution, pumping, and treatment facilities.

10. “Life expectancy” means the expected physical lifespan of a component of a public water system.

11. “Maintenance” means a planned program of inspection, adjustment, exercise, lubrication, etc. which allows the maximum continuous service of the equipment in the system at the lowest possible cost to the utility as required in the Water Resources Board "Rules and Procedures for Water Supply Systems Management Planning" § 8.07(c). Routine maintenance expenditures are not eligible for funding from the Infrastructure Replacement Plan.

12. “Rate fee” means the charge per unit for public water based upon a ratio, scale, or standard relative to the cost of supplying potable drinking water.

13. “Rehabilitation” means rehabilitation which restores existing facilities or components to a condition which extends the physical and economic life of the component. Rehabilitation is an eligible expenditure under the Infrastructure Replacement Plan.

14. “Repair” means expenditures to return into service a component of the infrastructure that has failed is not an eligible expenditure under the Infrastructure Replacement Plan.

15. “Replacement” means new construction to substitute for existing facilities or components which cannot be rehabilitated or repaired cost effectively is an eligible expenditure under the Infrastructure Replacement Plan.

16. “Special account” means an account established by physically opening an account designated as the "Infrastructure Replacement Fund" that is acceptable under this Part. This account shall be self-contained in that deposits and withdrawals are recorded by the financial institution through a fiduciary relationship with the utility. This special account shall be a restricted receipt account dedicated solely for funding of eligible expenditures from the infrastructure replacement program and be administered by the general manager of the water supplier or his designee. All receipts, income, and interest earned on these funds shall be accrued within this special account.

17. “Surcharge” means a fee charged in addition to normal system rate fees which is used to fund extraordinary or special conditions of the water system.

18. “Transmission facilities” means the pipes, pumping stations, and storage facilities required to carry raw and/or potable water from a water source to or throughout an area served or to be served by a water supply system for the specific purpose of supplying water to support a general population.

19. Water supplier” means any municipality, municipal department, agency, district, authority, or other entity engaged in or authorized to engage in the supply, treatment, transmission, or distribution of drinking water on a wholesale or retail sales basis.

20. “Water supply sources” means Department of Health approved sources of supply connected to a water supply system and available for distribution. These sources may be surface waters or groundwater wells.

21. “Water supply management plan” means a plan prepared by applicable public water suppliers which plans and implements effective and efficient conservation, development, utilization, and protection of water supply resources consistent with the present and future needs of the State and its people as defined in R.I. Gen. Laws § 46-15.4.

7.4 APPLICABILITY - PREPARATION OF PLANS

All water suppliers which supply, obtain, transport, distribute, purchase, and/or sell on a wholesale or retail basis, more than fifty million (50,000,000) gallons of water per year shall be required to prepare, maintain, and carry out a clean water infrastructure replacement plan as described in this Part.

7.5 CONFORMITY WITH OTHER LEGISLATION

The clean water infrastructure replacement plans shall be in conformity with all applicable provisions of state and federal laws including the federal Safe Drinking Water Act (42 U.S.C. § 300f et seq.); and R.I. Gen. Laws Chapter 46-13, Public Drinking Water Supply. Infrastructure replacement plans must be consistent with the Comprehensive 3 Plan for the community or communities associated with the water system. Infrastructure replacement plans shall also be consistent with the water supply management plans required under R.I. Gen. Laws § 46-15.3-5.1.

7.6 CONTENTS OF PLANS

A. Clean water infrastructure replacement plans shall be prepared in the format, and shall address each of the topics listed in this section, to the extent that each is relevant to the water supplier, the water source, the water system, and the transmission/distribution/storage system. Systems which currently have an infrastructure replacement plan may review the existing plan and utilize existing information to the extent that it is consistent with the intent of the infrastructure replacement plan outlined below. The initial plan may include a schedule for the completion of the evaluation of major components or items which require detailed investigation. The schedule must demonstrate an expeditious, responsible, and reasonable time period for compliance.

B. All principal components of the water system such as sources, reservoirs, dams, spillways, intakes, treatment plants, pump stations, storage facilities, pumping and well equipment, shall be listed and evaluated. Relatively small and numerous components of the system such as water mains, distribution piping, valves, hydrants, and interconnections may be evaluated as a group. This evaluation shall consider the following:

1. A brief description of the system with a schematic of the process flow will be included in the plan. This description of the system may be taken directly from the Water Supply Management Plan where relevant and is not intended as a duplicate effort but to facilitate the evaluation of individual components. Age and condition of the existing component and the necessity for replacement of the component within a twenty (20) year time frame shall be evaluated. Specific components may be in need of immediate replacement while others may extend well beyond the twenty (20) year time frame. Replacement should be evaluated and prioritized over a minimum of five (5) year intervals. The level of detail in the analysis of the component should reflect the priority of the component to the proper operation of the system as well as the age and known condition of the component. A detailed schedule for the initial five (5) year interval must be included. No infrastructure replacement construction is required to take place within any time interval if demonstrated to not be necessary.

2. Life expectancy of the component shall be determined. Life expectancy shall be determined by design criteria, specific site conditions, maintenance records, manufacturer's documentation, engineering evaluation, physical inspection, invasive and/or non-destructive integrity testing, or a combination

of all of the above. Records of inspection and maintenance may be reviewed when determining the life expectancy of the component. The attached Component Life Expectancy and Actual Life Expectancy Guideline (“Guideline”), in § 7.9 of this Part, is intended to serve as a general rule of thumb for component life expectancy and actual life expectancy within an individual system may be demonstrated to be significantly more or less than the Guideline value.

3. Consideration shall be given to the public water system's ability to meet current and future requirements of the Safe Drinking Water Act. Treatment requirements should be analyzed to the extent possible to ensure that infrastructure replacement and/or rehabilitation will comply with mandated requirements consistent with the Safe Drinking Water Act.

4. A financial forecast shall be based on the analysis of the condition and life expectancy of the existing facilities, prioritized needed repairs and replacements and amortize proportionally such improvement requirementson an annual basis over the next twenty years consistent with their respective life expectancy. The forecast shall include contingency costs, range of construction costs, and/or confidence limits of the financial forecast.

5. Infrastructure replacement shall meet the needs of the water suppliers, however priority of anticipated replacement and grouping of replacement projects by time of replacement, similarity of projects, and importance of the component to the system shall be considered when establishing the schedule. Priority should be given to components which have a known need for replacement and less detailed analysis given to relatively new infrastructure items.

C. When planning infrastructure replacement, the water supplier shall consider sizing facilities to meet the approved local comprehensive plans for existing or proposed service areas. The existing or proposed service area shall be defined consistent with that described in the supplier's most recent Water Supply Management Plan. Funding for proposed expansion shall come from the capital improvement program utilizing new capital rather than from replacement funding. It is intended that the infrastructure replacement plan evolve from the Water Supply Management Plan and expand the concepts of capital improvement planning initiated in the Water Supply Management Plan. The infrastructure replacement plan shall be consistent with sound waterworks practice.

D. The infrastructure replacement plan must recognize and maintain existing fiscal controls and accounting standards in accordance with Generally Accepted Government Accounting Principles sufficient to ensure fiscal responsibility for the evaluation and implementation of the infrastructure replacement. These fiscal controls and accounting standards must be established where none currently exist. The financial requirements of the plan shall conform to those outlined in §7.8 of this Part.

E. Funds from the watershed protection fund may be used for the preparation of clean water infrastructure replacement plans up to fifty percent (50%) of the cost of the plan. Disbursements from the fund shall be in accordance with R.I. Gen. Laws Chapter 46-15.3-11 of the Public Drinking Water Resources Board Operating Fund. The remaining costs are eligible for funding through the Safe Drinking Water Revolving Loan Fund. The plan shall incorporate the proposed rate structure impacts, schedule of proposed rate changes, and schedule for full funding consistent with the funding requirements for scheduled infrastructure replacement.

7.7 REVIEW OF PLANS

A. Water suppliers subject to the requirements of this Part shall file six copies of the clean water infrastructure plan with the Center for Drinking Water Quality of the Department. Plans must be submitted no later than one year subsequent to the date the system's water supply management plan is due.

B. The Department shall coordinate review of the plan with the Department of Environmental Management's Division of Water Supply Management, the Department of Administration's Division of Planning, the Water Resources Board, and the Public Utilities Commission. The PUC shall only review Plans for those systems which are regulated by the PUC. Each Department shall have one hundred twenty (120) days to review the plan and submit comments to the Department of Health. Upon consideration of the comments, the Department shall determine if the plan complies with the requirements of this Part within two hundred forty days (240) of the initial submission. A thirty (30) day public comment period is inclusive in this two hundred forty day (240) review period.

C. Water suppliers shall review and update their infrastructure replacement plans at a minimum frequency of every five years. Major modifications or revisions to the infrastructure replacement plan shall be submitted for review more frequently as necessary.

D. Water suppliers shall implement the infrastructure replacement plan according to the approved plan. On-site review of facility components may be conducted by the Department when appropriate and/or applicable. The responsible official of the water supply system shall be required to verify that construction expenditures are consistent with the plan.

7.8 FINANCING INFRASTRUCTURE IMPROVEMENTS

A. Each water supplier subject to the requirements of this Part shall establish a separate special account designated as the Infrastructure Replacement Fund to be held as a restricted receipt account and to be administered by the water supplier solely to implement and carry out the replacement or rehabilitation of infrastructure in accordance with the approved plan. The dedicated account should be invested in accordance with the standards established for the agency, municipality, or water supplier.

B. The costs of programs to implement infrastructure replacement shall be paid by the users of the water system at a rate directly proportional to the users' consumption of water. Charges shall be limited to those necessary and reasonable for implementation of the plan. These charges shall be based upon the annual funding requirements of the facility improvements necessitated over each successive twenty (20) year period.

C. Interest earned on this account shall be credited to this account only. Accumulated funds in excess of that estimated to be necessary to implement the plan shall revert to the rate payers of the system on a biannual basis. Funds will be allowed to accumulate with the intent to build sufficient capital to finance the estimated costs of major projects. It is understood that annual investments may be necessary over many years to fund major projects. Funds accumulated that are in excess of that estimated to implement the plan will cause the water supplier to reduce the future charges for infrastructure replacement.

D. Water suppliers may alternatively fund the infrastructure replacement program through partial or complete external funding at the option of the water supply system. Debt service and debt service issuance costs for any and all funding shall be an eligible expense as part of the program's funding requirements.

E. The Public Utilities Commission, as to water suppliers within its jurisdiction, shall permit an increase for just and reasonable infrastructure replacement in the portion of the water suppliers' rate structure to comply with this Part and shall allow the water supplier to add this required funding to its rate base in accordance with this

Part. Proposed increases in rates by regulated water utilities to finance infrastructure improvements shall be filed and reviewed in conformance with R.I. Gen. Laws Title 39.

F. The applicable section of the water supplier's annual audit shall be submitted to the Department to verify compliance with the funding intentions of the infrastructure replacement plan. The dedicated fund for infrastructure replacement will be a separate line item in the audit. Financial and summary status reports shall be submitted for each on-going project which outlines funds spent on the project, funds remaining, percentage of completion, and a brief description of work completed and work remaining. Project expenditures must be consistent with the plan and be eligible expenditures under the plan. Audits shall be submitted within 180 days from the end of the water supplier's fiscal year. Extensions will be allowed for reasonable cause.

7.9 Component Life Expectancy and Actual Life Expectancy Guideline

7.9.1 Typical Life Expectancy

B. Source of Supply Plant
   C. Structures and improvements: 35-40 years
   D. Collecting/Impounding reservoirs: 50-75 years
   E. Intake structures: 35-45 years
   F. Wells and springs: 25-35 years
   G. Galleries and tunnels: 25-50 years
   H. Supply mains: 50-75 years

G. Pumping Plant
   1. Structures: 35-40 years
   2. Pumping equipment: 10-15 years
   3. Other pumping plant: 20 years

H. Water Treatment Plant
   1. Structures: 35-40 years
   2. Water treatment equipment: 15-20 years

I. Transmission/Distribution
   1. Structures: 35-40 years
   2. Reservoirs and tanks: 30-60 years
   3. Mains: 50-75 years
   4. Services: 30-50 years
   5. Meters: 15 years
   6. Hydrants: 40-60 years

J. General Plant
   1. Structures: 35-40 years
   2. Furniture/equipment: 15-20 years
   3. Transportation equipment: 7 years
   4. Stores equipment: 10 years
   5. Tools, shop equipment: 7-10 years
   6. Laboratory equipment: 10-15 years
   7. Power operated equipment: 10 years
   8. Communication equipment: 10 years

216-RICR-50-05-7

TITLE 216 - DEPARTMENT OF HEALTH
CHAPTER 50 - ENVIRONMENTAL HEALTH
SUBCHAPTER 05 - WATER QUALITY
PART 7 - Clean Water Infrastructure Plans (216-RICR-50-05-7)

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